No. 20-70899

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

PUBLIC WATCHDOGS,
Petitioner,
v.
UNITED STATES NUCLEAR REGULATORY COMMISSION,
Respondent.

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW OF AGENCY ACTION

Pursuant to 5 U.S.C. § 705, 28 U.S.C. § 1651, Federal Rule of Appellate Procedure 27, and Ninth Circuit Rule 27-1, Petitioner Public Watchdogs files this Motion for Temporary Injunctive Relief Pending Judicial Review. For the reasons discussed herein, Public Watchdogs respectfully requests that the Court order Respondent United States Nuclear Regulatory Commission ("NRC") to temporarily suspend all spent nuclear fuel transfer operations at San Onofre Nuclear Generating Station ("SONGS") Units 2 and 3 pending this Court's review of the NRC's arbitrary and capricious denial of Public Watchdog's petition under 10 C.F.R. § 2.206 (the "2.206 Petition").

INTRODUCTION

Spent nuclear fuel "poses a dangerous, long-term health and environmental risk. It will remain dangerous for time spans seemingly beyond human comprehension." *New York v. Nuclear Regulatory Comm'n*, 681 F.3d 471, 474 (D.C. Cir. 2012). Despite the incalculable hazards posed by spent nuclear fuel, the long-term storage and management of spent nuclear fuel has proven to be an intractable, Sisyphean task. Decades-long efforts by Congress, federal agencies, and numerous stakeholders to construct a deep geological permanent repository for the country's ever-growing stockpile of spent nuclear fuel have been unsuccessful, and no viable plan currently exists for a permanent storage solution.

Due to the lack of a centralized permanent repository, millions of pounds of deadly spent nuclear fuel are currently stored on site at nuclear power plants across the country. Although it is well known in the government and the nuclear power industry that there is no permanent storage solution on the horizon, the NRC routinely permits nuclear power plant licensees to store spent nuclear fuel in "temporary" on site storage installations, relying on the plainly false assumption that this waste will

be transferred to a permanent repository in the relatively near future. Indeed, the NRC has adopted a feckless general policy of allowing licensees to store spent nuclear fuel indefinitely at locations throughout the United States without any plan or strategy for actively monitoring, managing or funding such indefinite storage operations.

The NRC's arbitrary and dangerous general policy regarding long-term storage and management of spent nuclear fuel poses serious public health and safety risks at all decommissioned nuclear facilities in the United States. But the policy poses unique, acute, and wholly unreasonable public health and safety hazards at SONGS. Situated only 108 feet from the Pacific Ocean, near one of California's most populated beaches, within a tsunami inundation zone, and surrounded by active fault lines, the SONGS Independent Spent Fuel Storage Installation ("ISFSI") is in perhaps the most perilous location possible. Moreover, the SONGS licensees are hastily burying spent nuclear fuel in the SONGS ISFSI in welded thin-walled canisters that have a limited useful lifespan and cannot be safely opened when the interred spent nuclear fuel (inevitably) needs to be repackaged. Finally, the SONGS licensees have proven to be negligent, if not reckless, in transferring spent nuclear fuel

from the relative safety of the SONGS spent fuel pools to the SONGS ISFSI. Indeed, from August 2018 to July 2019, the SONGS licensees had to suspend the transfer of spent nuclear fuel because they nearly caused a nuclear catastrophe, losing control of (and almost dropping) two fully loaded canisters of spent nuclear fuel more than 18 feet into the ISFSI.

Shortly after the NRC permitted the SONGS licensees to resume spent fuel transfer operations, Public Watchdogs submitted its 2.206 Petition, requesting that the NRC immediately (1) suspend all decommissioning activities at SONGS and (2) require the SONGS licensees to submit a new decommissioning plan that properly accounted for the reality that spent nuclear fuel will be buried at SONGS indefinitely.[1] On February 26, 2020, the NRC denied the 2.206 Petition without even addressing the primary issue raised by Public Watchdogs—

[1] Separately, Public Watchdogs filed suit in federal district court against the NRC and the SONGS licensees, alleging violations of the Administrative Procedure Act as well as state and federal tort and nuisance laws. *Public Watchdogs v. U.S. Nuclear Regulatory Comm'n, et al.*, Case No. 3:19-cv-1635-JLS-MSB (S.D. Cal.). Respondent NRC moved to dismiss that case, in part by arguing that challenges to the SONGS licensees' actions could only be brought in a 2.206 proceeding. The district court's dismissal of that separate civil lawsuit is currently on appeal, and this Court has granted expedited briefing and scheduled oral argument for June 2020. *Public Watchdogs v. Southern California Edison Co.*, Case No. 19-56531, Docket No. 10 (9th Cir. Jan. 27, 2020).

namely, the dire public health and safety hazards posed by allowing the continued burial of spent nuclear fuel at SONGS pursuant to a decommissioning plan that falsely assumes that all spent nuclear fuel will be transferred to a permanent repository in the foreseeable future.

Public Watchdogs has filed a petition for judicial review of this arbitrary and capricious decision by the NRC. In connection with that petition, Public Watchdogs seeks temporary injunctive relief to preserve the Court's jurisdiction and prevent irreparable harm to Public Watchdogs and the public. Every eight days, the SONGS licensees are able to load another defective canister with deadly spent nuclear fuel and bury it on the Pacific Coastline, imperiling the lives of millions of Southern California residents. At this rate, all spent nuclear fuel will be buried at SONGS, and all alternative storage options at SONGS will be demolished, long before the Court has the opportunity to consider the serious issues raised in Public Watchdogs' petition for judicial review. Accordingly, Public Watchdogs respectfully requests that the Court order the NRC to temporarily suspend all spent nuclear fuel transfer operations at SONGS, pending this Court's resolution of Public Watchdogs' petition for judicial review.

BACKGROUND

A. The Long History of Operational Failures at SONGS.

SONGS began operating as a nuclear electric generating station in the 1960s. Throughout its time as an operational nuclear power plant, SONGS was marred by numerous instances of poor safety and regulatory compliance, which ultimately contributed to the premature cessation of operations at the site. The SONGS licensees' compliance debacles included the backward installation of a 420-ton nuclear reactor vessel, and the unlicensed replacement of steam generators with defective substitutes. These failures were not mere technical violations—the unlicensed steam generators ultimately malfunctioned and leaked deadly radioactive steam into the environment. As a result of these and other operational errors, in June 2013, Southern California Edison and the other SONGS licensees ("Licensees") submitted written certification to the NRC that they were permanently ceasing operations and intended to commence decommissioning of the site. [APP 000041, 000048.][2]

B. The Falsely Predicated Decommissioning Plan.

[2] All citations to "APP" refer to Petitioner's Appendix of Exhibits, which is being submitted in support of this Motion.

In 2014, Licensees submitted their decommissioning plan to the NRC, including a Post-Shutdown Decommissioning Activities Report ("PSDAR"), an Irradiated Fuel Management Plan ("IFMP"), and a Site Specific Decommissioning Cost Estimate ("DCE"). The PSDAR provided a general overview of the timetable for the decommissioning, decontamination, restoration, and license termination activities at the SONGS site. [APP 000051.] The PSDAR specified that the SONGS licensees would begin transferring spent nuclear fuel from spent fuel pools to dry storage in the SONGS ISFSI in 2014 and complete the transfer by June 2019. *Id.* Thereafter, Licensees proposed to store the spent nuclear fuel in the ISFSI during decommissioning from June 2019 to December 2031. *Id.* Finally, Licensees proposed to store the spent nuclear fuel in the ISFSI during a post-decommissioning period from December 2031 to December 2049. *Id.* This timeline was based on the assumptions that the Department of Energy ("DOE") will begin accepting spent nuclear fuel from the industry in 2024, that all spent nuclear fuel will be permanently removed from the ISFSI and transferred to an off-site permanent repository by 2049, and that the SONGS site will be

restored to a condition acceptable for unrestricted use by 2051. *Id.* These critical assumptions have proven to be pure folly.

The IFMP provides additional details regarding Licensees' strategy for storing, monitoring, and managing spent nuclear fuel buried at SONGS during and after the decommissioning period. [APP 000078-000091.] Like the PSDAR, the IFMP is expressly based on the false assumptions that the DOE would begin accepting spent nuclear fuel from the industry in 2024 and that all spent nuclear fuel would be permanently removed from SONGS by 2049. [APP 000082.]

Finally, the DCE provided a detailed estimate of the anticipated costs of the decommissioning and spent fuel management activities at SONGS. [APP 000093-000185.] Licensees projected that the total cost of decommissioning and restoring the SONGS site would exceed $4 billion, of which approximately $1.3 billion was allocated for spent fuel management at the SONGS site through 2049. [APP 000101, 000127.] Once again, the DCE was based on the false assumptions that the DOE will begin accepting spent nuclear fuel from the industry in 2024 and that all spent nuclear fuel will be removed from SONGS by 2049. [APP 000100, 000102, 000104, 000106, 000118.]

At the time Licensees submitted the PSDAR, IFMP, and DCE, there was, in fact, no viable plan or intention for the DOE to begin accepting spent nuclear fuel in 2024, or any other time. Indeed, Licensees submitted their decommissioning plan approximately 4 years after the DOE withdrew its application for a license to construct a permanent repository for spent nuclear fuel at Yucca Mountain in Nevada, and approximately 3 years after the NRC suspended its adjudicatory proceeding regarding the withdrawal of the DOE's license application. [APP 000187-000201.] Nevertheless, on July 17, 2015, the NRC granted a license amendment that allowed Licensees to commence decommissioning of SONGS according to Licensees' falsely predicated decommissioning plan. [APP 000325-000326.]

C. Selection of a Perilous Storage Location, Defective Storage System, and Irretrievable Thin-Walled Canisters.

At the time Licensees submitted their decommissioning plan to the NRC, they had not yet identified a location for expanding the SONGS ISFSI, nor had they selected storage equipment or vendors for the build

out of the ISFSI. [APP 000043.] In December 2014, Licensees selected a location for the ISFSI and selected Holtec International's ("Holtec") HI-STORM UMAX storage system for the "temporary" on-site storage of spent nuclear fuel. [APP 000203.] The location selected for the ISFSI is a mere 108 feet from the Pacific Ocean, within a tsunami inundation zone surrounded by active fault lines, and little more than a foot above the mean high tide level, making it especially susceptible to flooding as sea levels rise. [APP 000207-000208.] Moreover, though Licensees' decommissioning plan falsely claimed that spent nuclear fuel would be stored at the SONGS ISFSI for approximately 30 years, Holtec only warranted its storage system for 10 years. [APP 000220.] What's more, Licensees selected Holtec's thin-walled canisters to store the spent nuclear fuel at SONGS, which were surreptitiously redesigned by Holtec after they were approved by the NRC. Not only are these canisters unsuitable for indefinite storage of spent nuclear fuel, but every single canister that is downloaded into the SONGS ISFSI incurs contact deformities, which can eventually grow into cracks, rendering them susceptible to leaking and preventing their safe removal. [APP 000213-000214.] Making matters worse, Licensees have admitted that the

technology does not currently exist to enable them to remove and repackage spent nuclear fuel from a canister once it has been welded shut and downloaded into the ISFSI, and that any technology that might be developed in the future would require either a spent fuel pool or a dry transfer station. [APP 000698-000699.]

D. The Decommissioning Disasters and Temporary Suspension of Fuel Transfer Operations at SONGS.

On July 22, 2018, Licensees were attempting to insert a 49-ton canister full of radioactive nuclear fuel into the ISFSI. Because of their negligent design and oversight, they did not notice when the canister became stuck on a ¼-inch thick steel guide ring near the top of the chamber. Although the canister had halted its descent, the SONGS licensees continued to unwind the safety cables that were designed to secure the canister, leaving the canister caught on a thin piece of metal and unprotected from a fall of more than 18 feet to the concrete floor below. [APP 000583-000584.] In contravention of NRC regulations, Licensees failed to disclose this near catastrophe to the NRC.

Ten days later, on August 3, 2019, Licensees once again lost control of a 49-ton canister full of deadly spent nuclear fuel, leaving it precariously perched on a narrow metal flange more than 18 feet above

the concrete floor of the ISFSI for almost an hour. As before, the SONGS licensees did not timely disclose this near catastrophe to the NRC. [APP 000576.]

Both of these incidents might have been concealed from the public were it not for a courageous whistleblower who bravely spoke out during a SONGS public engagement panel meeting. [APP 000209.] Following the disclosure of these incidents, the NRC conducted an investigation and ultimately imposed a paltry fine of $116,000. [APP 000528.] Although the NRC did not order Licensees to cease operations, Licensees "voluntarily agreed" to suspend fuel transfer operations at SONGS for 11 months. [APP 000209.] At no time during this extended suspension of fuel transfer operations did the NRC or Licensees suggest that continued storage of spent nuclear fuel in pools posed a danger to the public.

In July 2019, with the NRC's blessing, Licensees resumed fuel transfer operations at SONGS, with a goal of completing the burial of all spent nuclear fuel at SONGS as quickly as possible. [APP 000876.] Indeed, according to Licensees, all spent nuclear fuel will be removed from the relative safety of the spent fuel pools by July or August 2020, and the pools will be demolished shortly thereafter. [APP 002723,

002730-002731.] Thus, by the end of this summer, all spent nuclear fuel is expected to be buried in the defective and precariously located ISFSI, and soon thereafter there will be no alternative storage location at SONGS for the dangerous material, or any means to repackage the spent nuclear fuel that has already been buried.

E. Public Watchdogs' 2.206 Petition.

On September 24, 2019, Public Watchdogs filed the 2.206 Petition and asked the NRC to immediately suspend all decommissioning activities at SONGS and require Licensees to submit a new decommissioning plan that accounts for the reality that spent nuclear fuel will be stored at SONGS indefinitely.[3] [APP 000013-000037.] On December 18, 2019, the NRC's Petition Review Board preliminarily rejected the 2.206 Petition, but granted Public Watchdogs an opportunity to clarify or supplement the 2.206 Petition at a public meeting. [APP

[3] The NRC's month-long delay in even acknowledging receipt of the 2.206 Petition required Public Watchdogs to file an Emergency Petition for Writ of Mandamus with this Court. *In Re Public Watchdogs*, Case No. 19-72670, Docket No. 1 (9th Cir. Oct. 21, 2019). Although this Court denied this request, it recognized that the petition raised "serious issues about the present disposal of spent nuclear fuel" and expected the NRC "to rule on the petition expeditiously." *In Re Public Watchdogs*, Case No. 19-72670, Docket No. 19, at 4 (9th Cir. Dec. 20, 2019).

000008.] On January 21, 2020, Public Watchdogs participated in a public meeting in which it clarified the issues raised in the 2.206 Petition and provided supplemental information in support of the 2.206 Petition. *Id.* On February 26, 2020, the NRC again rejected the 2.206 Petition, and provided Public Watchdogs with a letter explaining the reasons for the rejection. [APP 000007-000010.] Significantly, the NRC failed to even address the primary issue raised by Public Watchdogs—namely, the various hazards to public health and safety caused by the NRC continuing to allow the SONGS licensees to implement their falsely predicated decommissioning plan. *Id.* The NRC's decision on the 2.206 Petition became final on March 23, 2020, *see* 10 C.F.R. § 2.206(c)(1), and on March 30, 2020, Public Watchdogs filed with this Court a Petition for Judicial Review of the NRC's decision.

ARGUMENT

A. Applicable Legal Standards.

When a party seeks judicial review of a final agency action, the reviewing court is statutorily authorized to "issue all necessary and appropriate process to postpone the effective date of an agency action or to preserve status or rights pending conclusion of the review

proceedings." 5 U.S.C. § 705. Similarly, the All Writs Act authorizes federal courts to "issue all writs necessary or appropriate in aid of their respective jurisdictions . . . " 28 U.S.C. § 1651(a).

"Typically, a preliminary injunction issued regarding APA review of agency decisionmaking preserves the court's jurisdiction to grant complete relief by simply suspending the implementation of the challenged agency action pending full court review." *Alto v. Black*, 738 F.3d 1111, 1120 (9th Cir. 2013). The standard for obtaining injunctive relief pending judicial review of an agency action is effectively the same as the standard for obtaining a preliminary injunction. *Humane Soc. of U.S. v. Gutierrez*, 558 F.3d 896, 896 (9th Cir. 2009). That is, the party seeking injunctive relief must show: (1) a likelihood of success on the merits; (2) a likelihood of irreparable harm absent injunctive relief; (3) the balance of equities favor injunctive relief; and (4) an injunction is in the public interest. *Winter v. Nat. Resources Def. Council, Inc.*, 555 U.S. 7, 20 (2008); *Alliance for the Wild Rockies v. Cottrell*, 632 F.3d 1127, 1131 (9th Cir. 2011).

The Ninth Circuit has adopted a "sliding scale" approach to these four factors, under which "a stronger showing of one element may offset

a weaker showing of another." *Cottrell*, 632 F.3d at 1131. For instance, "'the more net harm an injunction can prevent, the weaker the plaintiff's claim on the merits can be while still supporting some preliminary relief.'" *Id.* at 1133 (quoting *Hoosier Energy Rural Elec. Co-op, Inc. v. John Hancock Life Ins. Co.*, 582 F.3d 721 (7th Cir. 2009)). Under the sliding scale approach, so long as the two other *Winter* factors are met, "[a] preliminary injunction is appropriate when a plaintiff demonstrates that serious questions going to the merits were raised and the balance of hardships tips sharply in the plaintiff's favor." *Id.* at 1134-35.

B. The Court Should Order a Temporary Suspension of Spent Nuclear Fuel Transfer Operations at SONGS Pending Review of the NRC's Arbitrary and Capricious Denial of the 2.206 Petition.

1. Public Watchdogs is likely to succeed on the merits.

Under the Hobbs Act, the Courts of Appeals have original jurisdiction to review all final orders of the NRC concerning the granting, suspending, revoking, or amending of any license. 28 U.S.C. § 2342(4); 42 U.S.C. § 2239; *see also Fla. Power & Light Co. v. Lorion*, 470 U.S. 729, 737 (1985). This original jurisdiction extends to the NRC's final orders denying 2.206 petitions. *See Riverkeeper, Inc. v. Collins*, 359 F.3d 156, 164 (2nd Cir. 2004).

Although courts of appeals have original jurisdiction over the NRC's final orders denying 2.206 petitions, various courts have held that such orders may be presumptively unreviewable because they involve enforcement decisions that are committed to the NRC's discretion by law. *Id.* at 166; *see also Safe Energy Coalition of Michigan v. U.S. Nuclear Regulatory Comm'n*, 866 F.2d 1473, 1477 (D.C. Cir. 1989). Notably, however, this presumption of unreviewability may be rebutted when the NRC "has consciously and expressly adopted a general policy that is so extreme as to amount to an abdication of its statutory responsibilities." *See Heckler v. Chaney*, 470 U.S. 821, 833 n. 4 (1985); *see also Com. of Mass. v. U.S. Nuclear Regulatory Comm'n,* 878 F.2d 1516, 1525 (1st Cir. 1989). Indeed, the presumption of unreviewability "does not place the agency above the law," and the denial of a 2.206 petition may be reviewed and reversed if a court concludes that the NRC is "inexcusably defaulting on its fundamental responsibility to protect the public safety from nuclear accidents." *Com. of Mass.*, 878 F.2d at 1525.

Here, the NRC's denial of Public Watchdogs' 2.206 Petition is reviewable by this Court because the NRC has adopted a general policy that is so extreme as to amount to an abdication of its paramount

statutory responsibility to protect the public from nuclear accidents. Specifically, the NRC has adopted a general policy of allowing licensees to implement decommissioning plans predicated on the false assumption that spent nuclear fuel will be transferred from "temporary" on-site storage installations to a centralized permanent repository in the relatively near future. [APP 002553, 002571-002572.] By routinely allowing licensees to implement such falsely predicated decommissioning plans, the NRC is effectively permitting licensees to store spent nuclear fuel indefinitely at numerous locations across the United States, without any plan or strategy for monitoring, managing, or funding such indefinite on-site storage.

The NRC's general policy of willful ignorance taints various aspects of the NRC's regulatory mandate related to long-term storage and management of spent nuclear fuel and poses a dire threat to public health and safety throughout the country. For instance, at SONGS, the NRC has permitted licensees to bury millions of pounds of spent nuclear fuel a mere 108 feet from the Pacific Ocean, near one of California's most populated beaches, within a tsunami inundation zone surrounded by active fault lines, and little more than a foot above the mean high-tide

level. Because the NRC falsely assumes that the spent nuclear fuel will only be stored at this precarious location temporarily, it has not analyzed or required Licensees to demonstrate that this location will remain suitable for storage of spent nuclear fuel indefinitely. Moreover, the NRC is permitting Licensees to store spent nuclear fuel at SONGS in thin-walled canisters that have a limited useful lifespan but cannot be safely opened when the spent nuclear fuel inside inevitably needs to be repackaged. NRC regulations expressly require that "storage systems must be designed to allow ready retrieval of spent fuel . . . for further processing or disposal." 10 C.F.R. § 72.122. But because the NRC falsely assumes that spent nuclear fuel will only be stored in these canisters temporarily, it has not analyzed or required Licensees to demonstrate their ability to repackage the spent nuclear fuel when these canisters' useful lifespan expires. Finally, NRC regulations expressly require Licensees to provide assurance that they will have sufficient financial resources to pay for the full cost of decommissioning and spent fuel management. 10 C.F.R. §§ 50.75, 50.82. But because the NRC falsely assumes that spent nuclear fuel will only be stored at SONGS temporarily, it has not required Licensees to provide assurance that they

will have sufficient financial resources to pay for the cost of storage and management of spent nuclear fuel at SONGS beyond 2049.

In the 2.206 Petition, Public Watchdogs plainly raised the dire public health and safety hazards posed by the NRC allowing Licensees to continue implementing their falsely predicated decommissioning plan. In fact, Public Watchdogs expressly requested that the NRC suspend all decommissioning activities at SONGS and require "Licensees to submit an amended decommissioning plan that properly accounts for the reality that the spent nuclear fuel being buried at SONGS will remain there indefinitely." [APP 000015.] Remarkably, the NRC failed to even address the issue of Licensees' falsely predicated decommissioning plan in its decision to deny the 2.206 Petition. [APP 000007-000010.] Thus, the NRC has acted arbitrarily and capriciously both in permitting Licensees to implement their falsely predicated decommissioning plan, and in failing to address this important aspect of the problem raised by the 2.206 Petition. *See Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143, 1148 (9th Cir. 2010), *as amended* (Jan. 25, 2011) (explaining that an agency's decision is arbitrary and capricious if it, among other things, "entirely failed to consider an important aspect of the problem"). As such,

Public Watchdogs is likely to succeed on the merits of its petition for judicial review, or, at minimum, has shown there are serious questions going to the merits.

2. Public Watchdogs will likely suffer irreparable harm absent temporary injunctive relief.

Based on false assumptions that spent nuclear fuel will be buried at SONGS only temporarily, the NRC is permitting Licensees to transfer hundreds of tons of one of the deadliest substances known to mankind from the relative safety of spent fuel pools to the most hazardous location possible—a mere 108 feet from the Pacific Ocean, in a tsunami inundation zone surrounded by active fault lines, and in damaged and defective canisters that Licensees, through their demonstrated negligence, have already almost dropped on at least two occasions. Absent temporary injunctive relief, Licensees intend to bury all spent nuclear fuel at SONGS and demolish the pools in a matter of months. Once all spent nuclear fuel is buried at SONGS and the pools are demolished, there will be no facilities available onsite to safely retrieve and repackage the spent nuclear fuel. Millions of residents who live in the area will be forced to live with the specter of a nuclear disaster at SONGS for generations. In other words, absent a temporary suspension

of decommissioning at SONGS, the NRC will permit Licensees to set a proverbial ticking time bomb that will threaten indefinite irreparable harm to the residents and environment of Southern California.

Public Watchdogs is a 501(c)(3) non-profit corporation that advocates for public safety by ensuring that government agencies and special interests comply with all applicable laws, including public-safety and environmental protection laws, especially in the public-utilities industry. [APP 002754.] At least one of Public Watchdogs' members lives within the zone of exposure to a catastrophic release of radioactive material from SONGS, and may of Public Watchdogs' members regularly visit San Onofre State Beach to enjoy the world-famous surfing area, the beautiful sandstone bluffs, and the rare, even endangered, wildlife that make the riparian and wetland habitats their home. [APP 002755-002756.] Accordingly, Public Watchdogs is likely to suffer irreparable injury absent a temporary injunctive relief. *See Ecological Rights Found. v. Pac. Lumber Co.*, 230 F.3d 1141, 1147-1151 (9th Cir. 2000) (explaining that injury to a group's members is imputed to the group itself).[4]

[4] Likewise, the Court will likely lose its jurisdiction to review the denial of the 2.206 Petition absent temporary injunctive relief. This is because once all spent nuclear fuel is buried at SONGS and the spent fuel pools

3. The balance of equities tips sharply in favor of temporary injunctive relief.

It is impossible to overstate the likely harm to Public Watchdogs and millions of Southern California residents if the NRC continues to allow Licensees to implement their falsely predicated decommissioning plan. Indeed, absent an injunction, Southern California will face nothing less than a looming nuclear catastrophe for generations to come. On the other hand, the NRC will not suffer any harm if the Court temporarily suspends decommissioning at SONGS pending review of the NRC's denial of the 2.206 Petition. Spent nuclear fuel transfer operations have already been suspended at SONGS for nearly a year without any deleterious effect on the NRC's regulatory capabilities or other negative impact on the NRC, and there is no reason to expect that the NRC would be harmed by a temporary pause of spent nuclear fuel transfer operations at SONGS to allow this Court to review the serious public health and

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are demolished, it will be impossible for the Court to grant Public Watchdogs the relief it seeks in the 2.206 Petition. Therefore, this Court should grant temporary injunctive relief pending its review of the NRC's decision to deny the 2.206 Petition. *See FTC v. Dean Foods Co.*, 384 U.S. 597, 603 (1966).

safety issues raised by Public Watchdogs. Accordingly, the balance of equities tips sharply in favor of temporary injunctive relief.

4. Temporary injunctive relief is manifestly in the public interest.

It is axiomatic that there is a paramount public interest in avoiding a nuclear catastrophe that could cause incalculable loss of human life, devastating and lasting physical injuries, damage to property, and loss of economic opportunity throughout wide swaths of Southern California. Moreover, this Court has recognized a "well-established public interest in preserving nature and avoiding irreparable environmental injury." *Cottrell*, 632 F.3d at 1138 (internal quotations omitted). Conversely, no public interest would be injured by the granting of temporary injunctive relief. To be sure, if spent nuclear fuel transfer operations at SONGS are temporarily paused, spent nuclear fuel that has not already been buried in the SONGS ISFSI will remain in the relative safety of the spent fuel pools, where it has been stored for decades. Accordingly, temporary injunctive relief is manifestly in the public interest.

CONCLUSION

For the foregoing reasons, Public Watchdogs respectfully requests that the Court order the NRC to temporarily suspend all

decommissioning activities at SONGS relating to the transfer of spent nuclear fuel, pending this Court's review of the NRC's arbitrary and capricious decision to deny Public Watchdogs' 2.206 Petition.

Dated: March 31, 2020

Respectfully submitted,
BARNES & THORNBURG LLP

By: */s/ Charles G. La Bella*

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PUBLIC WATCHDOGS

STATEMENT OF RELATED CASES

Pursuant to Circuit Rule 28-2.6, Petitioner hereby identifies the following related case pending before this Court: *Public Watchdogs v. Southern California Edison Co.*, Case No. 19-56531 (9th Cir.), currently scheduled for oral argument on June 3, 2020.

/s/ Charles G. La Bella
Charles La Bella
Attorney for Petitioner
Public Watchdogs

CERTIFICATE OF CONFERENCE

Pursuant to Ninth Circuit Rule 27-1(d)(5), I hereby certify that counsel for Petitioner has informed counsel for Respondent of its intent to file this Motion and seek the relief requested herein. Counsel for Respondent has indicated that Respondent will not agree to suspend decommissioning activities at SONGS.

/s/ Charles G. La Bella
Charles G. La Bella
Attorney for Petitioner
Public Watchdogs

CERTIFICATE OF COMPLIANCE

I hereby certify that this motion complies with the requirements of Ninth Circuit Rules 27-1(1)(d) and 32-3, and the requirements of Federal Rule of Appellate Procedure 27(d)(2), because it is proportionately spaced, has a typeface of 14 points, and has 4,766 words.

/s/ Charles G. La Bella
Charles G. La Bella

CERTIFICATE OF SERVICE

I hereby certify that on March 31, 2020, I electronically filed the foregoing Motion with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit by using the appellate CM/ECF system. In addition, I served a copy of the foregoing Motion on Respondent by emailing a true and correct copy of the Motion to the following counsel for Respondent:

Andrew Averbach
Solicitor
Office of the General Counsel
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852
andrew.averbach@nrc.gov.

/s/ Charles G. La Bella
Charles G. La Bella

MOTION FOR TEMPORARY INJUNCTIVE RELIEF
EXHIBIT
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TAB 1

EXHIBIT 1

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW

No. 20-70899

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

PUBLIC WATCHDOGS,
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v.
UNITED STATES NUCLEAR REGULATORY COMMISSION,
Respondent.

DECLARATION OF CHARLES G. LA BELLA IN SUPPORT OF MOTION FOR TEMPORARY INJUNCTIVE RELIEF

I, Charles G. La Bella, hereby declare as follows:

1. I am an attorney at law duly licensed to practice before all of the courts of the State of California and admitted before the United States Court of Appeals for the Ninth Circuit. I am "Of Counsel" at the law firm Barnes & Thornburg LLP, which represents petitioner Public Watchdogs ("Petitioner") in connection with the above captioned action. I make this declaration in support of Petitioner's Motion for Temporary Injunctive Relief Pending Judicial Review of Agency Action.

2. Attached hereto are true and correct copies of the following exhibits for the Motion for Temporary Injunctive Relief:

a. Exhibit 2 is a letter dated February 29, 2020, from the United States Nuclear Regulatory Commission (NRC) rejecting Public Watchdogs' 10 C.F.R. § 2.206 Petition ("2.206 Petition");

b. Exhibit 3 is Public Watchdogs' 2.206 Petition, dated September 24, 2019, requesting immediate suspension of the decommissioning operations at San Onofre Nuclear Generating Station Units 2 and 3;

c. Exhibit 4 contains the exhibits (1 – 38) filed in support of Public Watchdogs' 2.206 Petition;

d. Exhibit 5 is Petitioner Public Watchdogs' written supplement to the 2.206 Petition, along with exhibits in support, dated January 21, 2020; and

e. Exhibit 6 is the Declaration of Nina J. Babiarz in Support of the instant Motion for Temporary Injunctive Relief.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct. Executed this 30th day of March, 2020.

Respectfully submitted,

/s/ Charles G. La Bella
Charles G. La Bella

TAB 2

EXHIBIT 2

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 26, 2020

Mr. Charles G. La Bella
Barnes & Thornburg LLP
655 West Broadway, Suite 900
San Diego, California 92101

SUBJECT: PETITION REQUESTING ENFORCEMENT ACTION UNDER SECTION 2.206 OF TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* AGAINST SOUTHERN CALIFORNIA EDISON RELATED TO DECOMMISSIONING OEPRATIONS AT THE SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

Dear Mr. La Bella:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to the petition submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 2.206, "Requests for action under this subpart," dated September 24, 2019 (Agencywide Documents Access and Management System [ADAMS] Accession Nos. ML19309D323 and ML19311C699), as supplemented on January 21, 2020 (ADAMS Accession No. ML20023A182). The NRC's Executive Director for Operations referred your petition to the Office of Nuclear Material Safety and Safeguards (NMSS) for appropriate review or action.

Petition

In the petition, you requested that the NRC immediately suspend all decommissioning operations at the San Onofre Nuclear Generating Station (SONGS) and require Southern California Edison (SCE or the licensee) to submit an amended decommissioning plan to account for spent nuclear fuel being placed in storage at SONGS. As the basis for the request you stated: burial of spent nuclear fuel at SONGS poses an immediate threat to public safety (for example, integrity of fuel canisters); the licensee's estimated cost of decommissioning SONGS is based on unreasonable and fundamentally flawed assumptions; and the NRC has not considered the environmental and safety effects of sea level rise caused by climate change and has not addressed the environmental impacts of decommissioning on environmental justice, threatened and endangered species, offsite land use, offsite aquatic and terrestrial ecology, and certain cultural and historic resources.

Staff Action

On October 25, 2019, the NRC provided a response to Public Watchdogs by e-mail (ADAMS Accession No. ML19326A969) stating that the NRC staff concluded, in accordance with Section II.B.1 of Management Directive (MD) 8.11 "Review Process for 10 CFR 2.206 Petitions" (ADAMS Accession No. ML18296A043), that the request does not warrant immediate action. The NRC staff has determined that the decommissioning activities at SONGS do not constitute an immediate threat to public health and safety.

On December 18, 2019, the NRC informed you via e-mail (ADAMS Accession No. ML19353A048) that the petition review board (PRB) concluded that the petition did not meet the criteria for consideration under 10 CFR 2.206 because it appears that all of the issues raised in the petition have previously been the subject of NRC staff review, and do not raise concerns that the NRC staff has not previously considered and resolved. On January 21, 2020, the PRB conducted a public teleconference with Public Watchdogs at your request, to discuss the PRB's initial assessment and any supplemental information for the PRB's consideration. The transcript for the January 21st public meeting can be found at ADAMS Accession No. ML20028E467. The PRB considered the information presented during the January 21, 2020, discussion, as well as the original petition and the supplemental information submitted in reaching its final determination, as discussed below.

NRC Staff Response to Specific Concerns

Protection of Public Health and Safety. The NRC has continued to carefully regulate the licensee's decommissioning activities at SONGS, which include its review of the fuel storage facility design, inspections encompassing the physical facility as well as the licensee's operational performance, and appropriate enforcement actions. More specifically, the NRC performed a thorough review of the UMAX Independent Spent Fuel Storage Installation (ISFSI) design used at SONGS, a design the NRC approved in 2017 through a public rulemaking (ADAMS Accession No. ML16341B061). In addition, NRC staff continually performs oversight to ensure that the storage of spent nuclear fuel at SONGS does not pose a threat to public health and safety. NRC inspections of decommissioning activities at SONGS, including inspections related to the ISFSI, are documented in inspection reports that are publicly available. See for example ADAMS Accession Nos. ML18200A400 and ML19316A762.

The NRC staff has also considered the events described in the petition regarding the licensee's fuel loading operations and potential scratching of the fuel canisters. See ADAMS Accession No. ML19190A217. The NRC's regulatory review and oversight actions included a detailed assessment of the significance of the events, specific enforcement actions, and subsequent consideration of the licensee's corrective actions. Specifically, regarding integrity of the fuel canisters, NRC inspectors concluded that localized scratches (peak stresses) on the canisters are not a safety concern (using the ASME Code Section III, Subsection NB stress intensity limits as reference). NRC inspectors also concluded that canister evaluations performed by SCE using visual scratch assessments and statistical evaluations acceptable. These evaluations were adequate to demonstrate that canister scratches from incidental contact for previous and future canisters, will continue to meet the confinement design functions as specified in the UMAX Final Safety Analysis Report and ASME Code Section III canister wall thickness tolerances.

As a result, the NRC remains confident that reasonable assurance of adequate protection of the public health and safety can be maintained for as long as fuel is stored in accordance with the requirements of the SONGS license, the certificate of compliance for the UMAX system (and any other licensed systems that may be implemented in the future at the SONGS site), and other applicable requirements.

Decommissioning Cost Estimate. Regarding your concern about the estimated cost of completing decommissioning at SONGS, the NRC staff concluded in its review of the SONGS Decommissioning Cost Estimate (DCE) (ADAMS Accession No. ML15204A383) that the site-specific DCE and the cost of long-term storage of spent fuel for SONGS, Units 2 and 3, are reasonable and provide a sufficient level of detail on the funding mechanisms to meet the

requirements of 10 CFR 50.82(a)(4)(i). In addition, the NRC staff reviewed the 2019 Decommissioning Funding Status (DFS) report for SONGS and determined that the licensee complies with the decommissioning funding assurance requirements of 10 CFR 50.75 and 10 CFR 50.82, as applicable, for the 2019 DFS reporting cycle (ADAMS Accession No. ML19346E375). The SONGS DFS reports are submitted and reviewed annually by the NRC staff to ensure continued compliance with the decommissioning financial assurance requirements. Finally, the NRC safety evaluation for the SONGS Irradiated Fuel Management Plan (IFMP) (ADAMS Accession No. ML15182A256) states that "the NRC staff finds the SONGS IFMP estimates to be reasonable, based on a cost comparison with similar decommissioning reactors...."

Environmental Impacts. Regarding your concern about the environmental impacts of the decommissioning activities, the NRC staff concluded in its review of the SONGS Post Shutdown Decommissioning Activities Report (ADAMS Accession No. ML15204A383) that these activities are bounded by the previously issued NUREG-0586, "Final Generic Environmental Impact Statement [GEIS] on Decommissioning of Nuclear Facilities," and its supplements, and did not find any deviations from the previously issued Environmental Statement for SONGS (ADAMS Accession No. ML18239A414). Therefore, the NRC is confident that the environment can be adequately protected, and all impacts bounded, during decommissioning activities at SONGS.

Retrievability of Spent Fuel. On January 21, 2020, you raised concerns regarding spent nuclear fuel currently stored at SONGS being non-retrievable, in violation of10 CFR 72.122(l), and with potential impacts from flooding. Specifically, you stated that "although the Holtec Final Safety Analysis Report and Certificates of Compliance clearly contemplate a potential flooding event and state that a site-specific analysis will be submitted by Licensees, Public Watchdogs is not aware that any such analysis has been performed or submitted."

Interim Staff Guidance No. 2, Revision 2, "Fuel Retrievability in Spent Fuel Storage Applications" (ADAMS Accession No. ML16117A080), defines ready retrieval as "the ability to safely remove the spent fuel from storage for further processing or disposal." A licensee can demonstrate the ability for ready retrieval by demonstrating that it can remove a canister loaded with spent fuel assemblies from a storage cask/overpack. As discussed in NRC Supplemental Inspection Report 2018-002 for SONGS (ADAMS Accession No. ML19190A217), the NRC inspection team observed the licensee implementing all the corrective action enhancements to download and retrieve a simulated canister at the SONGS ISFSI pad, during exercises conducted between January 28-30, 2019. SCE was fully successful in downloading and retrieving the canister during the exercises, and the corrective actions taken were determined by the NRC inspectors to be adequate.

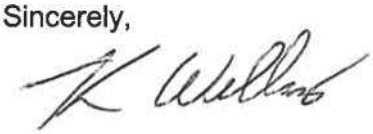
Flood Analysis. Regarding your concerns with flooding at the SONGS ISFSI, SCE's flood analyses determined that the UMAX maximum design flood parameters envelope the SONGS site flooding parameters. The NRC staff verified this flood evaluation in the SONGS 10 CFR 72.212 report to qualify the use of the UMAX system at SONGS, and the NRC documented this in an inspection report (ADAMS Accession No. ML18200A400). The NRC did not identify any issues as a result of its review of the flood evaluation for SONGS.

Having considered the results of recent inspections, the NRC's evaluation of past SONGS DFS reports, the applicable environmental documents, and the supplemental information provided, the PRB's final determination is that your petition does not meet the acceptance criteria in

MD 8.11, Section III.C.1(b), because the issues raised in the petition have been "the subject of a facility-specific or generic NRC staff review," and none of the circumstances in Section III.C.1(b)(ii) applies. The NMSS Office Director was briefed on and supported this conclusion.

Thank you for bringing these issues to the attention of the NRC.

Sincerely,



Kevin Williams, Deputy Director
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Office of Nuclear Material Safety
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Docket No(s). 50-361 and 50-362

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TAB 3

EXHIBIT 3

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UNITED STATES NUCLEAR REGULATORY COMMISSION

Before the Executive Director for Operations

PUBLIC WATCHDOGS, a California 501(c)(3) corporation, Petitioner, v. SOUTHERN CALIFORNIA EDISON COMPANY AND SAN DIEGO GAS & ELECTRIC COMPANY, Licensees.	**10 C.F.R. § 2.206 PETITION TO IMMEDIATELY SUSPEND DECOMMISSIONING OPERATIONS AT SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3**

Pursuant to 10 C.F.R. § 2.206, Petitioner Public Watchdogs ("Petitioner") hereby submits its Petition to Immediately Suspend Decommissioning Operations at San Onofre Nuclear Generating Station ("SONGS") Units 2 and 3:

PRELIMINARY STATEMENT

1. As part of the ongoing decommissioning of SONGS Units 2 and 3, Licensees Southern California Edison Company ("Edison") and San Diego Gas & Electric Company (collectively, "Licensees") are in the process of burying hundreds of tons of deadly spent nuclear fuel a mere 108 feet from one of California's most populated public beaches, within a tsunami zone surrounded by active fault lines, in canisters that are damaged, defective, and not properly designed to serve their intended purpose. Throughout the decommissioning process, the Nuclear Regulatory Commission ("NRC") has effectively turned a blind eye to multiple alarming safety hazards created by Licensees' burial of spent nuclear fuel at SONGS, including evidence that the canisters being used by Licensees are damaged and defective, and that Licensees do not have adequate safety procedures or competent staff to complete the transfer of the spent nuclear fuel from wet to dry storage.

2. What's more, the NRC's various actions permitting the implementation of Licensees' decommissioning plan and authorizing Licensees' dangerous burial of spent nuclear fuel at SONGS are based on unreasonable and fundamentally flawed assumptions that: (1) the United States Department of Energy ("DOE") will begin accepting spent nuclear fuel from nuclear generating stations like SONGS in 2024 or 2028; (2) all of the spent nuclear fuel currently being buried at SONGS will be permanently removed from the site by 2049; and (3) the SONGS site will be restored to a condition that is acceptable for unrestricted use by 2051. In fact, no central repository for permanent storage of spent nuclear fuel exists in the United States, there is no viable plan to open such a permanent repository, and the DOE undoubtedly will not begin accepting spent nuclear fuel for permanent storage from SONGS or any other nuclear generating station in 2024, 2028, or any other time in the foreseeable future. As the United States Court of Appeals for the District of Columbia Circuit has observed: "At this time, there is not even a prospective

site for a repository, let alone progress toward the actual construction of one." *New York v. Nuclear Regulatory Com'n*, 681 F.3d 471, 474 (D.C. Cir. 2012).

3. By ignoring the manifold safety hazards posed by Licensees' decommissioning operations and permitting Licensees to implement their decommissioning plan based on the unreasonable assumption that spent nuclear fuel will be stored at SONGS only temporarily, the NRC has abdicated its paramount responsibility to protect public health and safety and it has failed to ensure Licensees will have adequate funds to pay for the full cost of decommissioning and restoring the SONGS site through the termination of their license. Accordingly, Petitioners respectfully request that the NRC issue an order immediately suspending all decommissioning operations at SONGS, including the burial of spent nuclear fuel at the SONGS site, and requiring Licensees to submit an amended decommissioning plan that properly accounts for the reality that the spent nuclear fuel being buried at SONGS will remain there indefinitely.

FACTUAL BACKGROUND

I. LICENSEES' NEGLIGENT OPERATION OF SONGS

4. In August 1963, Congress enacted Public Law 88-82 authorizing the "construct[ion], operate[ion], maintain[enance], and use" of a nuclear power plant on approximately 90 acres of land located at the Camp Pendleton military base. In May 1964, the United States of America granted Licensees an easement for the sole purpose of "construction, operation, maintenance and use of a nuclear electric generating station" at the Camp Pendleton site.

5. Licensees operated three nuclear electric generating units at SONGS. Licensees operated Unit 1 from approximately 1968 until 1992, when they began the decommissioning process for that unit. Licensees operated Units 2 and 3 from approximately 1983 and 1984 (respectively) until June 12, 2013, when they submitted written certification to the NRC that they were permanently ceasing operation of those units.

6. Throughout its time as an operational nuclear power plant, SONGS was marred by numerous instances of poor safety and regulatory compliance, which ultimately contributed to the cessation of operations at the site. These compliance debacles included the backward installation of a 420-ton nuclear reactor vessel and the installation of replacement steam generators, without obtaining the requisite approval from the NRC, which ultimately malfunctioned and leaked deadly radioactive steam at the site.

II. LICENSEES' FUNDAMENTALLY FLAWED DECOMMISSIONING PLAN

7. On September 23, 2014, Licensees submitted their decommissioning plan to the NRC, including a Post-Shutdown Decommissioning Activities Report ("PSDAR"), an Irradiated Fuel Management Plan ("IFMP"), and a Site Specific Decommissioning Cost Estimate ("DCE"). *See* **Exhibits 1, 2, and 3.**

8. Licensees' PSDAR provided a general overview and timetable for the decommissioning, decontamination, restoration, and license termination activities at the SONGS site. The PSDAR specified that Licensees would begin transferring spent nuclear fuel to dry storage in the SONGS Independent Spent Fuel Storage Installation ("ISFSI") in 2014, and complete the transfer by June 2019. *See* **Exhibit 1**. Thereafter, Licensees proposed to store the spent nuclear fuel in the ISFSI during decommissioning from June 2019 to December 2031. *Id.* Finally, Licensees proposed to store spent nuclear fuel in the ISFSI during a post-decommissioning period from December 2031 to December 2049. *Id.* This timeline was based on the assumption that the DOE will begin accepting spent nuclear fuel from the industry in 2024, that all spent nuclear fuel will be permanently removed from the SONGS ISFSI and transferred to an off-site permanent repository by 2049, and that the SONGS site will be restored to a condition acceptable for unrestricted use and returned to the U.S. Navy by 2051. *Id.* Licensees expressly based this assumption on some unspecified "previously documented positions of the DOE, which indicates that shipments from the industry could begin as early as 2024 and SONGS place in the current queue." *Id.* Notably, however, Licensees acknowledged that both the date on which the

DOE would begin accepting spent nuclear fuel from the industry and SONGS place in the queue "are subject to change." *Id*.

9. Licensees' IFMP provides additional details regarding their strategy for storing, monitoring, and managing spent nuclear fuel at the SONGS ISFSI during and after the decommissioning period and through ultimate termination of the SONGS licenses. *See* **Exhibit 2**. Like the PSDAR, Licensees' IFMP is expressly based on the assumptions that the DOE would begin accepting spent nuclear fuel from the industry in 2024 and that all spent nuclear fuel would be permanently removed from the SONGS ISFSI by 2049. *Id.* Again, however, Licensees provided no objective evidentiary support for these critical assumptions.

10. Finally, Licensees' DCE provided a detailed estimate of the anticipated costs of the decommissioning and spent fuel management activities at SONGS. *See* **Exhibit 3**. Licensees projected that the total cost of decommissioning and restoring the SONGS site would exceed $4 billion, of which approximately $1.3 billion was allocated for spent fuel management through 2049. *Id*. Once again, Licensees based their DCE on the assumptions that the DOE will begin accepting spent nuclear fuel from the industry in 2024 and that all spent nuclear fuel will be removed from the SONGS ISFSI by 2049. *Id*. Significantly, however, Licensees' DCE expressly acknowledged that "DOE has not committed to accept [Edison's] canistered spent fuel." *Id*. Despite this acknowledgment, the DCE also confusingly stated: "But for purposes of this estimate, it is assumed that an [Edison-funded] dry storage facility will not be necessary." *Id.*

11. At the time Licensees submitted their PSDAR, IFMP, and DCE, there was, in fact, no viable plan or intention for the DOE to begin accepting spent nuclear fuel in 2024 or any other time. Indeed, Licensees submitted their PSDAR, IFMP, and DCE approximately 4 years after the DOE withdrew its application for a license to construct a permanent repository for spent nuclear fuel at Yucca Mountain in Nevada and approximately 3 years after the NRC suspended its adjudicatory proceeding regarding the withdrawal of the DOE's license application. *See* **Exhibit 4**. In other words, the

fundamental predicate for Licensees' decommissioning plan was, and remains today, a pure fiction that is completely untethered to objective reality.

III. LICENSEES' SELECTION OF HOLTEC'S HI-STORM UMAX STORAGE SYSTEM AND DEFECTIVE THIN-WALL CANISTERS

12. At the time Licensees submitted their decommissioning plan, they had not yet identified a location for the expanded SONGS ISFSI, nor had they selected storage equipment or vendors for the build out of the ISFSI. *See* **Exhibit 2**.

13. In December 2014, Licensees selected a location for the expanded SONGS ISFSI and selected Holtec International's ("Holtec") HI-STORM UMAX storage system for the "temporary" storage of spent nuclear fuel. *See* **Exhibit 5**. The location selected for the ISFSI is a mere 108 feet from the Pacific Ocean, within a tsunami zone surrounded by active fault lines, and little more than a foot above the mean high tide level, making it especially susceptible to flooding as sea levels rise. *See* **Exhibit 6**. Notably, although Licensees' decommissioning plan contemplated, albeit fancifully, that spent nuclear fuel would be stored at the SONGS ISFSI for at least 30 years, Holtec only warranted its storage system for 10 years. *See* **Exhibit 7**.

14. Moreover, the Holtec dry storage canisters in which the spent nuclear fuel is being stored at the SONGS ISFSI are defective and unfit for the indefinite storage of spent nuclear fuel. Each and every one of the 73 individual canisters will contain more deadly radioactive Cesium-137 than was released globally during the Chernobyl disaster, as well as dozens of other radioactive and toxic fission byproducts. The failure of even one of these canisters will have calamitous consequences. Severe problems with Licensees' decommissioning plan make this nightmare scenario a real possibility.

15. First, although the radioisotopes in each canister remain radioactive, toxic, and deadly for hundreds of years (and one, Plutonium-239, remains deadly for over 24,000 years), Holtec warrants the canisters for only 25 years. *See* **Exhibit 7**. Thus, the warranty on the canisters will expire long before 2049, when Licensees unreasonably assume that all spent fuel will be transferred to permanent storage, and there is no objective basis for

determining that the canisters will remain viable beyond 2049, even though they will likely remain in the SONGS ISFSI indefinitely.

16. Second, the design of the Holtec canisters the Licensees are using to store the spent nuclear fuel deviates from the acceptable minimum safety thresholds required for the design and manufacture of nuclear waste storage containers. Indeed, the Holtec canisters are so-called "thin-wall" canisters with only a 5/8-inch thick stainless-steel wall with an aluminum egg-crate structure designed to hold up to 37 spent fuel assemblies. Holtec designs, manufactures, and supplies the canisters under strict guidelines promulgated by the NRC and, more important, under the conditions of applicable certificates of compliance ("CoCs"). *See* **Exhibit 8**. The NRC issues a CoC conditioned on the holder strictly hewing to specific technical specifications and approved contents and design features. But after receiving CoCs for the thin-wall canisters being used at SONGS, Holtec secretly modified the design and manufacture of the canisters, apparently to reduce manufacturing costs and/or to correct a flaw in the original design. By making the change surreptitiously, Holtec avoided a costly and time-consuming NRC design review and attendant risk analysis. In any case, the design change introduced a critical flaw into the casks that is discussed in further detail below.

17. Third, due to the design of the canisters, the narrow slots in which they are loaded into the storage system, and the equipment used to load the canisters into the storage system, extensive gouging of the canisters occurs during routine loading into the storage system. Over time, the gouges in the canisters can grow into deeper cracks that make the canisters susceptible to leaking and make it impossible for the canisters to be safely removed from the ISFSI in the future. However, there is no way to adequately monitor or inspect the canisters once they are in the ground, and no way to fix them even if critical damage to them could be identified.

IV. NRC GRANTS A LICENSE AMENDMENT THAT PERMITS DECOMMISSIONING OF SONGS ACCORDING TO LICENSEES' FLAWED DECOMMISSIONING PLAN

18. Because the original license granted to the Licensees was narrow in scope—in that it only permitted them to operate the plant and temporarily store spent nuclear fuel and waste—a license amendment would be necessary to decommission the plant. However, when Licensees decided to permanently cease nuclear operations, they sought to utilize the nuclear power plant for an entirely different purpose—that is, the long-term storage of spent nuclear fuel. Thus, the grant or denial of the Licensees' request for a license amendment was a matter of significant public concern, requiring an opportunity for meaningful public participation.

19. Without meaningful public participation or an independent assessment, on July 17, 2015, the NRC granted Licensees' request for a license amendment that permitted them to begin decommissioning the SONGS facility. *See* **Exhibit 9**. Specifically, the NRC authorized Licensees to "Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition." *Id*. In so doing, the NRC "found" that there was "reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations." *Id*. In fact, the NRC simply relied on Licensees' own flawed analysis instead of objective criteria or independent analysis, enabling Licensees to present their internal, untested, and unchecked conclusions, without even a suggestion of an objective analysis or oversight.

20. In addition, the NRC repeatedly granted Licensees' numerous subsequent license amendments and exemptions, regardless of the scope and magnitude of the proposed changes. *See* **Exhibit 10**. Among these exemptions was a staggering reduction in the amount of onsite liability insurance required to be maintained by Licensees from the $1.06 billion required by NRC regulations to a paltry $50 million. *See* **Exhibit 11**.

V. LICENSEES' MULTIPLE DECOMMISSIONING DISASTERS

21. From the outset, Licensees' decommissioning operations have been marred by a series of miscues, lackadaisical managerial oversight, and attempts to conceal the same. Unsurprisingly, this behavior has caused Licensees to repeatedly fall short of the NRC's identified standards and promulgated regulations. Among the many failures of the Licensees' decommissioning efforts are the following:

A. Licensees compromised the structural integrity of twenty-nine canisters they buried at SONGS.

22. Licensees have consistently used fewer personnel than necessary to ensure that the Holtec canisters are safely and effectively loaded into the ISFSI. For example, Licensees have employed an inadequate number of "spotters" at different vantage points, resulting in limited visibility of the canister as it is being loaded into its enclosure. This negligent deviation from safe fuel-handling procedures has already caused substantial harm to the millions of people around the SONGS facility. *See* **Exhibit 12**.

23. On information and belief, and as revealed in NRC documents and noted at public hearings, the Licensees negligently gouged and then buried twenty-nine (29) fully loaded canisters at SONGS. Experts believe this gouging may lead to deeper, through-the-wall cracks, which will make the future safe movement of these canisters impossible (despite the fact that the safety of the canisters' storage location is only warranted for 10 years). Experts also point out that damage to the canisters will be exacerbated, *inter alia*, by the presence of salt air, fog, rain, and salt water—the precise weather conditions that the canisters will be exposed to at the current location just steps from the Pacific Ocean. *See* **Exhibit 6**.

24. Upon information and belief, many (if not all) of the canisters were negligently scratched during transportation to the ISFSI. According to an NRC inspection report, and as admitted at a Community Engagement Panel Meeting by NRC spokesperson Scott Morris, **every single canister was damaged** during the downloading process: "The canister involved in the near-drop event [and] all the other canisters . . . experienced a little

bit of scuffing, and a little bit of contact going into the ISFSI." *See* **Exhibit 13**. As discussed below, one NRC inspector concluded that the damage to the canisters during loading into the SONGS ISFSI caused them to fall out of compliance with requirements of the applicable CoC. *See* **Exhibits 27 and 29**. The NRC, however, simply ignored this assessment and cleared the way for even more defective and non-compliant canisters to be buried at SONGS.[1]

B. Licensees nearly dropped two 49-ton canisters full of deadly radioactive nuclear waste and attempted to cover it up.

25. On July 22, 2018, Licensees nearly dropped a 49-ton canister full of deadly radioactive nuclear waste more than 18 feet into the ISFSI when it was caught on a quarter inch thick steel guide ring. Licensees referred to this event as an "unsecured load event." In actuality, this event could have turned San Onofre State Beach Park into a permanently uninhabitable nuclear wasteland.

26. Pursuant to 10 C.F.R. § 72.75, any incident involving nuclear waste ***must*** be reported to the NRC within ***twenty-four hours***, yet the July 22 failure was not formally reported on the NRC's Event Notifications Report. The sole purpose of 10 C.F.R. § 72.75 is to insure that potentially hazardous events are promptly reported and investigated and to allow for public disclosure of potential safety risks.

27. Despite the regulation's clear obligation to provide a formal written report for events of this nature, Licensees ***never*** provided a formal report for the July 22 unsecured load event. As a result, the public was kept in the dark about the potentially disastrous incident in July.

28. Ten days later, on August 3, 2018, the Licensees once again lost control of a 49-ton canister full of deadly radioactive nuclear waste while it was being lowered into a

[1] Despite the Licensees' efforts to downplay the significance of the gouging found on Holtec canisters, the potential consequences are staggering. Holtec's CEO admitted as much during a public meeting, acknowledging that even a microscopic crack in a canister is enough to cause a release of "millions of curies of radioactivity." *Dr. Kris Singh, CEO, Holtec International, on Dry Canister Nuclear Waste Storage*, YouTube (Oct. 14, 2014), at 31:04-34:30(at https://www.youtube.com/watch?v=s5LAQgTcvAU). *See* **Exhibit 14**.

below-ground storage silo. While moving the canister, Licensees' employees snagged the 49-ton canister on the same quarter-inch wide steel flange that captured the canister during the July 22 event. Licensees' personnel did not realize that the equipment holding the canister had been caught on the flange.

29. A whistleblower, David Fritch, came forward and publicly reported the event six days later during the August 9 Community Engagement Panel Meeting. Prior to the whistleblower's disclosure, Licensees' representative did not disclose the August 3 "near-miss" disaster when discussing the work stoppage put in place after the event. In fact, Edison's then Vice President and Chief Nuclear Officer, Tom Palmisano, affirmatively misled the public and misrepresented that the work stoppage was a planned stop so that they could perform necessary maintenance, provide employees with time off, and analyze the overall efficiency and effectiveness of the decommissioning process at that point.

30. However, during the public comment portion of the event, Fritch (a Safety Professional employed as a contractor at the SONGS facility) disclosed the misconduct as the actual cause for the work stoppage. Fritch informed the public about the near-miss event of August 3rd, and directly contradicted Licensees' public statements that the work stoppage was a "planned event."

31. Fritch's whistle-blowing sparked widespread media attention on the safety hazards posed by the Defendants' negligence at the facility. This alone should have prompted the NRC to perform a professional and independent risk assessment to determine the actual risks at the site, and take appropriate remedial steps to avoid or minimize future risks. Again, however, the NRC abdicated its responsibilities and continued to do nothing to protect the public or adequately monitor the situation.

32. As before, the Licensees failed to issue an NRC Event Notification Report within twenty-four hours of the Friday, August 3 event as required the NRC's regulations. Instead, they waited more than six weeks to report the incident. Moreover, rather than submitting the legally required written report, Licensees waited until Monday, August 6, to informally call the NRC. Licensees' private phone call deprived the public not only of

a written contemporaneous report of the near fatal disaster but prevented transparency of their actions at SONGS. This oral notification both failed to comply with the NRC's own "Event Reporting Requirements" under 10 CFR § 72.75, and failed to notify the public of the significant public safety hazards being posed by Licensees' decommissioning operations. In this way, Licensees attempted to keep the August 3 near-catastrophic-miss a secret.

33. This concealment was not accidental. In fact, the July 22 and August 3 near-miss events occurred during a required public comment period for the California State Lands Commissions Draft Environmental Impact Report ("EIR") directly related to the SONGS decommissioning project. That period ran from June 28 until August 30. By delaying formal written notice of the events, Licensees were able to avoid meaningful public participation in connection with the interrelated EIR.

34. Rather than taking precautionary steps to protect the public in light of the Licensees' demonstrated negligence, upon information and belief, the NRC completely deferred to Licensees and blindly relied upon their assurances that everything was under control. Indeed, the NRC went so far as to summarily reject a written request by Congressman Mike Levin for the installation of permanent NRC inspectors at the facility. *See* **Exhibit 15**.

35. On August 17, 2018, in response to the August 3 "near-miss," the NRC issued an Inspection Charter for SONGS, which found five violations that were ultimately penalized by the imposition of a wrist-slapping fee of $116,000 on Edison. *See* **Exhibits 16 and 17**. Perhaps more troubling, the NRC has not required Licensees to file an Event Notification Report for the July 22 event, and has ignored their flagrant violation of federal law for not filing an Event Notification Report for 47 days after the August 3 event.

36. Instead of ordering the Licensees to cease operations at SONGS, the NRC seemingly accepted the Licensees' "verbal commitment" to discontinue loading until the NRC issued its final Inspection Report.

VI. HOLTEC'S SURREPTITIOUS REDESIGN OF THE DRY STORAGE CANISTERS

37. In February 2018, while preparing to load one of the thin-wall canisters with spent nuclear fuel, Licensees discovered a loose bolt inside. After reporting the issue to Holtec, Holtec revealed that it had redesigned the already defective canisters to include a different "stand-off shim." The purpose of these shims is to enhance convection cooling of the hot fuel assemblies by creating additional space to allow cooling helium gas to flow throughout the canister so that the spent nuclear fuel does not overheat. The newly designed shims included bolts that were not part of the original design. As Licensees discovered, the newly introduced bolts are susceptible to breaking loose inside the canister, which could ultimately cause a restriction of airflow within the canister and a failure of the canister's cooling mechanism. Left uncooled, spent nuclear fuel will heat up to the point of a critical—and deadly—nuclear reaction. Thus, a failure of the canister's cooling mechanism would be disastrous.

38. Under NRC regulations, Holtec was required to obtain a CoC amendment prior to implementing any proposed change to the design of its canisters if the change would result in more than a minimal increase in the frequency or likelihood of an accident, malfunction, or the consequences of such accident or malfunction. Despite the serious risks posed by Holtec's design changes, however, Holtec failed to even notify the NRC, much less obtain a CoC amendment, before changing the design of the canisters.

39. On March 22, 2018, Licensees' admitted during a Community Engagement Panel Meeting that four canisters with the defective shim design had already been filled with spent nuclear fuel and buried at SONGS. To make matters worse, Mr. Palmisano made a stunning admission that there is no existing method for safely opening defectively designed canisters to see if the stand-off shims were broken in the four buried canisters. Thus, the SONGS Defendants have no way of ensuring that the fuel assemblies and/or cooling mechanisms have not been critically compromised. Mr. Palmisano admitted that

it would be at least three years before the techniques necessary to unload and inspect a canister ***could possibly*** be developed:

> So nobody has unloaded a commercial canister, either a bolted cask or a welded cask or canister. . . . What you would do is basically have a mechanism, either to do it in a fuel pool or do it in a dry transfer facility. . . . The real challenge as we would understand it today, and nobody has had to do it yet, is the reflood. Certainly, technically possible. What I would tell you is just I was back in Washington with the NRC last week, if you were just to brainstorm, ***this would probably be a two- to three-year project to develop the techniques***, pile up the techniques. The NRC would want to have explicit approval on this because of the ***radiological hazards***.

See **Exhibit 18** (emphasis added).

40. Although the NRC found that Holtec failed to establish adequate design control measures of components important to safety, and failed to perform evaluations before making the design changes, it failed to impose any fine or other penalty on Holtec for these violations.

41. Notably, this was not the first time Holtec flouted its obligations to disclose critical information to a regulator. In October 2010, Holtec was "debarred" as a contractor by the Tennessee Valley Authority ("TVA") in connection with improper and undisclosed payments made to a federal official to secure a contract to design and construct a dry cask storage system for spent nuclear fuel rods at the Brown Ferry Nuclear Plant. *See* **Exhibit 25**. Following that debarment, Holtec sought a $260 million tax break related to a nuclear plant project in Camden New Jersey. As part of that process, Holtec's CEO Kris Singh submitted certified forms where he answered "no" to the question of whether Holtec had ever been barred from doing business with a state or federal agency. In June 2019, New Jersey regulators froze Holtec's $260 million tax-incentive award pending further investigation. *See* **Exhibit 26**. Despite Holtec's history of misconduct and deceit, the NRC has continued to blindly accept its representations regarding its defective and dangerous canisters and has approved multiple amendments to the applicable CoCs to permit the continued use of Holtec's defective and dangerous canisters at SONGS and elsewhere.

VII. LICENSEES' UPDATED, BUT NO LESS FLAWED, DCE, AND DECOMMISSIONING FUNDING STATUS REPORTS

42. As required by the California Nuclear Facilities Decommissioning Act of 1985, Licensees updated their DCE for SONGS Units 2 & 3 in 2017. *See* **Exhibit 19**. Although Licensees' updated DCE continued to estimate that all spent nuclear fuel will be removed from the SONGS ISFSI by 2049, and that the site will be acceptable for unrestricted use by the end of 2051, Licensees changed their assumptions regarding the date the DOE will commence accepting spent nuclear fuel from the industry. Specifically, Licensees' 2017 DCE assumed the DOE will begin accepting spent nuclear fuel from the industry in 2028, rather than 2024, because of the "DOE's continued failure to perform its contractual obligation to remove spent fuel from commercial nuclear reactors in the past four years." Licensees' 2017 DCE does not explain, however, why pushing back the estimated date on which the DOE will begin accepting spent nuclear fuel from the industry by four years would not also necessitate pushing back the estimated date for removal of all spent nuclear from the SONGS ISFSI by four years and concomitantly increasing the estimated cost of storing that fuel for an extra four years. Nor does Licensees' 2017 DCE provide any objective evidence supporting its updated assumption that the DOE will, in fact, begin accepting spent nuclear fuel from the industry in 2028.

43. In subsequent decommissioning funding status reports submitted to the NRC, Licensees repeated this updated assumption regarding the date on which the DOE will begin accepting spent nuclear fuel from the industry. *See* **Exhibits 20 and 21**. Specifically, Licensees' status reports expressly acknowledge that the "current site-specific decommissioning cost estimates for San Onofre Unit 1 and San Onofre Units 2 and 3 assume that the DOE will commence transporting fuel in 2028." As in the 2017 DCE, however, Licensees' status reports do not provide any basis for the 2028 assumption, nor do they explain how pushing back the estimated date on which the DOE will begin accepting spent nuclear fuel from the industry would not also necessitate pushing back the date for removal of all spent nuclear fuel from SONGS and concomitantly increasing the

estimated cost of storing that fuel for an extra four years. Notably, however, Licensees' status reports do effectively acknowledge that their fundamental assumptions regarding the DOE's acceptance of spent nuclear fuel are uncertain at best. Indeed, the status reports expressly state that the 2028 assumption "may be updated periodically due to the ongoing uncertainties regarding the availability of a permanent repository for spent fuel."

VIII. DESPITE SERIOUS PUBLIC CONCERNS AND HAZARDOUS CONDITIONS THE NRC PERMITS LICENSEES TO RESUME DANGEROUS BURIAL OF SPENT NUCLEAR FUEL

44. In March 2019, an NRC inspector, Lee Brookhart, issued an internal report concluding that the damaged and defective Holtec canisters would require a formal design change, approved by the NRC, if they were to continue in service under the applicable CoCs, which require loading into the ISFSI to be accomplished without any scratching or damage to the canisters. *See* **Exhibits 27 and 29**. On May 21, 2019, however, the NRC disregarded Mr. Brookhart's warnings, Licensees' string of poor project oversight, Holtec's history of incompetence and malfeasance, and the fanciful assumptions underlying Licensees' entire decommissioning plan, and announced its determination that burial of spent nuclear fuel could continue at SONGS. *See* **Exhibit 22**. Thereafter, in July 2019, Licensees resumed their decommissioning operations, including the burial of spent nuclear fuel at the SONGS ISFSI.

45. Given the uncertainty surrounding the renewed canister burial, as well as litigation seeking to halt the process pending development of a record, Counsel for Petitioner—on September 6, 2019—requested that Licensees briefly abate further interment. *See* **Exhibit 23**. Licensees declined the request and are apparently poised to "continue the transfer operations" and complete the burial of spent nuclear fuel at SONGS as fast as possible. *See* **Exhibit 24**; *see also* **Exhibit 15**.

GROUNDS FOR ORDER IMMEDIATELY SUSPENDING DECOMMISSIONING OPERATIONS

I. APPLICABLE STANDARDS

46. Under 10 C.F.R. § 2.206, "Any person may file a request to institute a proceeding pursuant to § 2.202 to modify, suspend, or revoke a license, or for any other action as may be proper." Upon the filing of a petition under § 2.206, the NRC "may institute a proceeding to modify, suspend, or revoke a license or take such other action as may be proper by serving on the licensee or other person subject to the jurisdiction of the Commission an order that will," among other things, "[a]llege the violations with which the licensee or other person subject to the Commission's jurisdiction is charged, or the potentially hazardous conditions or other facts deemed to be sufficient ground for the proposed action, and specify the action proposed." Petitioner respectfully requests that the NRC issue an order immediately suspending all decommissioning operations at SONGS, including the burial of spent nuclear fuel at the SONGS ISFSI, and requiring Licensees to submit an amended decommissioning plan that properly accounts for the reality that the spent nuclear fuel being buried at SONGS will remain there indefinitely.

II. LICENSEES' BURIAL OF SPENT NUCLEAR FUEL AT SONGS POSES AN IMMINENT THREAT TO PUBLIC SAFETY

47. As detailed above, Licensees are burying hundreds of tons of deadly spent nuclear fuel in thin-wall canisters that cannot be loaded into the storage system without being critically damaged, and cannot be monitored, inspected, repaired, or safely removed once they are loaded. Moreover, at least some of the canisters were surreptitiously redesigned in a way that makes them even more susceptible to failure, and there is no way for anyone to determine whether or when those canisters might fail and cause a nuclear disaster. To make matters worse, Licensees have a proven track record of negligence, if not recklessness, in their past attempts to load the canisters into the SONGS ISFSI, nearly dropping a 49-ton canister full of spent nuclear fuel on at least two occasions.

48. As if this weren't enough, Licensees have elected to bury these defective canisters in perhaps the most hazardous location possible—merely 108 feet from, and only

inches above, a rising Pacific Ocean, in a tsunami zone surrounded by active fault lines, and in a humid environment that is likely to corrode and cause stress-induced cracking of the canisters' outer walls.

49. In other words, the SONGS ISFSI is a proverbial "ticking time bomb," and it is not a matter of whether a nuclear disaster will occur at the site, but a matter of when and how damaging the nuclear disaster will be. Accordingly, the NRC should immediately suspend all decommissioning operations at the SONGS site, including, and especially, the continued burial of spent nuclear fuel, and require Licensees to submit a proposed decommissioning plan that will not pose an imminent threat to public safety.

III. LICENSEES' ESTIMATED COST OF DECOMMISSIONING SONGS IS BASED ON UNREASONABLE AND FUNDAMENTALLY FLAWED ASSUMPTIONS

50. The fundamental premise for Licensees' various decommissioning cost estimates is that the spent nuclear fuel being buried at SONGS will remain there only temporarily. Indeed, Licensees initial DCE was based on the assumption that the DOE will begin accepting spent nuclear fuel from the industry in 2024 and that all spent nuclear fuel will be permanently removed from SONGS by 2049. Accordingly, Licensees' have allocated only enough funds to store and monitor spent nuclear fuel at SONGS through 2049.

51. Both Licensees and the NRC know full well that these assumptions are unreasonable and untethered to reality because there is currently no viable plan for the DOE to construct a permanent repository for spent nuclear fuel and there is certainly no plan or intention for the DOE to begin accepting spent nuclear fuel from the industry in 2024. In fact, the NRC states in its own publications that, although it "considers that 25 to 35 years is a reasonable timeframe for repository development, it acknowledges that there is sufficient uncertainty in this estimate that the possibility that more time will be needed cannot be ruled out." *See* **Exhibit 28**.

52. Although Licensees' 2017 DCE and decommissioning funds status reports push back to 2028 the assumed date on which the DOE will begin accepting spent nuclear

fuel from the industry, this is no more realistic or supported by any actual evidence than the initial 2024 estimate. Furthermore, this updated assumption renders Licensees' cost estimates even more fanciful, because, while they push back the date on which they assume the DOE will begin accepting spent nuclear fuel from the industry, they inexplicably maintain the assumption that all spent nuclear fuel will be permanently removed from SONGS by 2049.

53. By unreasonably assuming that all spent nuclear fuel will be permanently removed from SONGS by 2049, and only allocating sufficient funds to store and monitor the spent nuclear fuel at the site through that date, Licensees grossly understate the full cost of decommissioning SONGS and storing and monitoring spent nuclear fuel at the site through the termination of the SONGS licenses. Among other things, Licensees' cost estimates fail to account for the costs associated with: (1) storing and monitoring fuel beyond 2049 and perhaps permanently; (2) replacing and/or repairing canisters that have degraded, been damaged, and/or outlived their 40-year certifications; and (3) transferring canisters to another location when the storage system itself inevitably degrades and becomes unfit for storage of spent nuclear fuel. Accordingly, the NRC should suspend all decommissioning operations currently underway at SONGS and require Licensees to submit a new decommissioning cost estimate that is grounded in the reality that spent nuclear fuel will be stored at SONGS indefinitely.

IV. LICENSEES' FLAWED DECOMMISSIONING PLAN POSES A LONG TERM THREAT TO PUBLIC SAFETY

54. By falsely assuming that spent nuclear fuel will be stored at SONGS only temporarily, Licensees have not only understated the total cost associated with their decommissioning operations but they have set a disaster off on the horizon that will be unavoidable if not addressed immediately. As already discussed at length, Licensees' entire decommissioning plan, including all decisions related to the location of the SONGS ISFSI, the selection of the Holtec storage system and canisters, and the estimated cost of

decommissioning and monitoring spent fuel at SONGS, are predicated on the false assumption that spent nuclear fuel will be stored at SONGS only temporarily.

55. Licensees selected a storage system with an extremely limited warranty and usable life based on the false assumption that it will be empty and demolished in thirty years. Licensees selected defective canisters with limited warranties that cannot be safely replaced when damaged based on the false assumption that the DOE would be removing them in thirty years. And Licensees selected a hazardous storage location near a rising sea based on the false assumption that the spent nuclear fuel will be permanently removed by the time the storage facility is underwater. If the NRC does not suspend decommissioning operations now, these fanciful assumptions will inevitably lead to a disastrous reality for the millions of people who reside in the vicinity of SONGS. Accordingly, the NRC should immediately suspend all decommissioning operations at SONGS, including and especially the burial of spent nuclear fuel in the SONGS ISFSI, and require Licensees to submit a new decommissioning plan that is grounded in the reality that the spent nuclear fuel being buried at SONGS will remain there indefinitely, if not permanently.

V. THE NRC'S FAILURE TO PREPARE AN ENVIRONMENTAL ASSESSMENT OR SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT PRIOR TO APPROVING DECOMMISSIONING ACTIVITIES VIOLATES NEPA AND THE APA

56. The NRC failed to prepare either an environmental assessment ("EA") or an environmental impact statement ("EIS") prior to issuing the July 17, 2015 license amendment or otherwise approving decommissioning activities at SONGS Units 2 and 3, in violation of the National Environmental Policy Act ("NEPA"), the Administrative Procedure Act ("APA"), and the NRC's own regulations.

57. NEPA requires all federal agencies to conduct environmental evaluations of any "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). "Major federal actions" are defined broadly to include "new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies." 40 C.F.R.

§ 1508.18. When an agency is uncertain whether a proposed action will significantly affect the environment, it must prepare an EA to determine whether the preparation of a more detailed EIS is necessary. 40 C.F.R §§ 1508.9(a), 1508.13 (2009); *see also California Wilderness Coal. v. U.S. Dep't of Energy*, 631 F.3d 1072, 1097 (9th Cir. 2011) ("If the proposed action does not categorically require the preparation of an EIS, the agency must prepare an EA to determine whether the action will have a significant effect on the environment."). In either case, NEPA obligates federal agencies to take a "hard look" at the potential environmental consequences of proposed actions. *California Wilderness Coal.*, 631 F.3d at 1097 (9th Cir. 2011).

58. The NRC's issuance of a license amendment and approval of decommissioning activities at SONGS Units 2 and 3 constituted a "major federal action" that required NEPA compliance. As an initial matter, the NRC has historically prepared either an EA or EIS upon issuing a license amendment at SONGS Units 2 and 3. In 1981, the NRC prepared an EIS when it issued the initial operating license to Edison for Units 2 and 3. *See* **Exhibit 30**. The NRC then prepared EAs each time it amended the license. For example, in 1996, it prepared an EA prior to approving a license amendment to allow an increase in fuel enrichment. *See* **Exhibit 31**. In 2001, it prepared an EA prior to approving a license amendment to allow Edison to increase its maximum reactor core power level. *See* **Exhibit 32**. And in 2015, it prepared an EA prior to approving an amendment allowing security personnel to use certain firearms and ammunition on site. *See* **Exhibit 33**. The NRC's failure to prepare either an EA or EIS prior to issuing a license amendment and approving decommissioning activities is contrary to its prior practice at SONGS.

59. Furthermore, the NRC's own regulations and guidance documents state that the NRC will prepare an EA or EIS prior to authorizing decommissioning. The NRC's regulations provide that "[i]n connection with the amendment of an operating or combined license authorizing decommissioning activities . . . the NRC staff will prepare a supplemental environmental impact statement for the post operating or post combined

license stage or an environmental assessment." 10 C.F.R. part 51.95(d). Similarly, the NRC's Environmental Review Guidance for Licensing Actions Associated with NMSS Programs NUREG-1748 (2003) states that the NEPA review process is "usually initiated by . . . a decommissioning plan submitted to the NRC." *See* **Exhibit 34** at 1-2.

60. Numerous federal courts have also noted that "decommissioning is an action which, even under the [NRC's] new policy, requires NEPA compliance." *See, e.g.*, *Citizens Awareness Network, Inc. v. U.S. Nuclear Regulatory Comm'n*, 59 F.3d 284, 293 (1st Cir. 1995); *see also New Jersey v. U.S. Nuclear Regulatory Comm'n*, 526 F.3d 98, 103 (3d Cir. 2008) ("[T]he NRC will conduct site-specific environmental analyses when licensees decommission…"); *see also Benton Cty. v. U.S. Dep't of Energy*, 256 F. Supp. 2d 1195, 1202 (E.D. Wash. 2003) ("Prior to committing any resources to any one of the options for decommissioning, the [agency] must prepare an EIS."). Thus, the NRC was required to prepare either an EA or EIS prior to approving the Decommissioning Plan.

61. The NRC partially discharged its duty to comply with NEPA prior to decommissioning through the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586 (1988), as supplemented by NUREG-0586, Supplement 1 (2002) (collectively, the "Decommissioning GEIS"). *See* **Exhibit 35**. The generic EIS analyzed the environmental impacts of decommissioning that are common to all sites. But the Decommissioning GEIS concluded that a site-specific supplemental EIS would be necessary to evaluate non-generic issues, such as the environmental impacts of decommissioning on environmental justice and threatened and endangered species:

> The staff has considered available information on the potential impacts of decommissioning on environmental justice, including comments received on the draft of Supplement 1 of NUREG-0586. Based on this information, the staff has considered that the adverse impacts and associated significance of the impacts must be determined on a site-specific basis . . . . Subsequent to the submittal of the PSDAR, the NRC staff will consider the impacts related to environmental justice from decommissioning activities.

See **Exhibit 35** Supp. 1 at 4-65.

> The staff has considered available information on the potential impacts of decommissioning on threatened and endangered species, including comments received on the draft of Supplement 1 of NUREG-0586. Based on this information, the staff has considered that the adverse impacts and associated significance of the impacts must be determined on a site-specific basis.

See **Exhibit 35** Supp. 1 at 4-30. The NRC's regulations and guidance documents purport to fill these gaps in the Decommissioning GEIS by requiring the NRC to prepare either an EA or supplemental EIS prior to approving a decommissioning plan. *See, e.g.*, 10 C.F.R. 51.95(d). The NRC, however, failed to prepare either an EA or supplemental EIS when it approved Edison's license amendment and authorized decommissioning at SONGS Units 2 and 3.

62. The City of Laguna Beach ("City") notified the NRC of this failure to comply with NEPA at SONGS in its August 12, 2016 letter. *See* **Exhibit 36**. Notably, the California State Lands Commission ("CSLC") correctly determined that the decommissioning activities required the CSLC to prepare an Environmental Impact Report ("EIR") under California's Environmental Quality Act ("CEQA"), which is the State of California's NEPA analog. In connection with preliminary scoping of the CSLC EIR, the City insisted that the NRC prepare a supplemental EIS, as required by NEPA, or alternatively prepare a joint EIS with the CSLC, as authorized by NEPA's implementing regulations. *See* 40 C.F.R. 1506.2. The City expressed specific concern over the following issues:

- The NRC has not considered the environmental and safety effects of sea level rise caused by climate change.

- The NRC has not addressed the environmental impacts of decommissioning on environmental justice, threatened and endangered species, offsite land use, offsite aquatic and terrestrial ecology, and certain cultural and historic resources.

- The NRC has not approved the design of the Holtec UMAX system that Edison has proposed for the ISFSI and that a partially subterranean design may reduce radiation safety.

- The NRC has not addressed certain radiological safety concerns, such as the site-specific radiological safety concern of storing SNF in a seismically active marine environment, which is not addressed in the Decommissioning GEIS.

- The proposed changes and alterations to the SONGS facility's design associated with decommissioning, including the Spent Fuel Pool Island Project and the expanded and modified ISFSI, were never addressed in the SONGS Final Safety Analysis Report ("FSAR") and thus require a separate license amendment.

63. Despite the City's letter, the NRC failed to take corrective action. Instead, the NRC took the incorrect and inconsistent position that it was not required to prepare an EA or supplemental EIS in connection with approving decommissioning, because the "decommissioning activities remain within the scope of the Decommissioning GEIS [and] applicable site-specific NEPA analyses conducted in support of previous licensing actions." *See* **Exhibit 37**. Specifically, the NRC claimed that review of "site-specific environmental impacts (*i.e.*, those not dispositioned generically in the Decommissioning GEIS) are first addressed in the [1981 EIS]" and were additionally "analyzed in the EA/FONSIs for license amendment or exemption requests during the plant's operation," such as the 1996 EA, 2001 EA, and 2015 EA. But this is plainly untrue. The prior site-specific analyses at SONGS never addressed the potential environmental impacts of decommissioning. They addressed the potential environmental impacts of the proposed actions stated therein (*e.g.*, a license amendment to allow security personnel to carry certain ammunition on-site). *See* **Exhibit 33**. These prior analyses do not act to satisfy the NRC's duty to prepare a site-specific supplemental EIS for non-generic decommissioning issues, as contemplated by the Decommissioning GEIS and NRC.

64. This is not the first time the NRC has failed to comply with its own regulations in the context of preparing site-specific supplemental EISs that tier off of a

generic EIS. In August 2013, the Office of the Inspector General ("OIG") audited the NRC's NEPA compliance and concluded that the NRC had an "incorrect understanding of the regulations related to scoping for EISs that tier off of a generic EIS." *See* **Exhibit 38** at 24. The issue here is similar. The NRC's reasoning for refusing to prepare a supplemental site-specific EIS is based on an incorrect understanding of its own regulations and the role of the Decommissioning GEIS.

65. The NRC's failure to prepare either an EA or supplemental EIS prior to approving Edison's license amendment and authorizing decommissioning at SONGS Units 2 and 3 is contrary to the Decommissioning GEIS, NRC regulations, and federal court opinions. In addition, it violates NEPA, 42 U.S.C. § 4332(2)(C), and constitutes arbitrary and capricious conduct under the Administrative Procedure Act, 5 U.S.C. § 706. Petitioner therefore requests that the NRC immediately suspend all decommissioning operations at SONGS and prepare a supplemental EIS that evaluates site-specific environmental issues not addressed in the Decommissioning GEIS or prior site-specific NEPA analyses, such as the those issues referenced herein. In so doing, the NRC should (1) discuss mitigation measures the agency could take to reduce environmental impacts; (2) discuss the direct, indirect, and cumulative impacts that may result from decommissioning activities; and (3) ensure the use of "accurate scientific analysis" and "high quality" information. 40 C.F.R. §§ 1500.1(b), 1508.25(b).

Dated: September 24, 2019

BARNES & THORNBURG LLP

By: /s/ Charles G. La Bella
Charles G. La Bella
Attorneys for Plaintiff
Public Watchdogs

TAB 4

EXHIBIT 4

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW

EXHIBIT 1

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Thomas J. Palmisano
Vice President & Chief Nuclear Officer

10 CFR 50.82(a)(4)(i)

September 23, 2014

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C. 20555-0001

Subject: **Docket Nos. 50-361 and 50-362,**
San Onofre Nuclear Generating Station, Units 2 and 3
Post-Shutdown Decommissioning Activities Report

Reference Letter from P.T. Dietrich (SCE) to the U.S. Nuclear Regulatory Commission dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station, Units 2 and 3

Dear Sir or Madam:

On June 12, 2013, in accordance with 10 CFR 50.82(a)(1)(i), Southern California Edison (SCE) submitted the referenced letter to the U.S. Nuclear Regulatory Commission (NRC) certifying the permanent cessation of operations at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. In accordance with 10 CFR 50.54(bb) and 10 CFR 50.82(a)(4)(i), SCE is required to submit an Irradiated Fuel Management Plan (IFMP), Site Specific Decommissioning Cost Estimate (DCE) and Post-Shutdown Decommissioning Activities Report (PSDAR) within two years of permanent cessation of operations.

The SONGS, Units 2 and 3 PSDAR is attached. The SONGS, Units 2 and 3 IFMP and DCE are being concurrently submitted under separate cover letters. The descriptions of decommissioning activities and phases in the PSDAR are consistent with those described in the DCE. Both the PSDAR and DCE represent SCE's current plans and are subject to change as the project progresses.

Changes to significant details will be included in subsequent revisions to the PSDAR as required by 10 CFR 50.54(bb). Financial assurance information will be provided on an annual basis as required by 10 CFR 50.75(f)(1).

This letter does not contain any new commitments.

If there are any questions or if additional information is needed, please contact me or Ms. Andrea Sterdis at (949) 368-9985.

Sincerely,

P.O. Box 128
San Clemente, CA 92672
(949) 368-6575 PAX 86575
Fax: (949) 368-6183
Tom.Palmisano@sce.com

A001
KIRR

Enclosure: San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

cc: M. L. Dapas, Regional Administrator, NRC Region IV
T. J. Wengert, NRC Project Manager, San Onofre Units 2 and 3 Decommissioning
R. E. Lantz, NRC Region IV, San Onofre Units 2 and 3
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3
S. Y. Hsu, California Department of Health Services, Radiologic Health Branch

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AIF	Atomic Industrial Forum
ALARA	As Low As Reasonably Achievable
BMP	Best Management Practices
CCC	California Coastal Commission
CFR	Code of Federal Regulations
CRWQCB	California Regional Water Quality Control Board
CSLC	California State Lands Commission
DBA	Design Basis Accident
DCE	Decommissioning Cost Estimate
Decon Pd	License Termination Period
DGC	Decommissioning General Contractor
DOE	United States Department of Energy
DOT	United States Department of Transportation
DSC	Dry Storage Canister
FES	Final Environmental Statement, SONGS Units 2 and 3 (NUREG-0490)
GEIS	Generic Environmental Impact Statement (NUREG-0586)
GTCC	Greater than Class C
HSM	Horizontal Storage Modules
IFMP	Irradiated Fuel Management Plan
ISFSI	Independent Spent Fuel Storage Installation
LTP	License Termination Plan
LLRW	Low Level Radioactive waste
MARRSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MWDOC	Municipal Water District of Orange County
MWt	Megawatt-thermal
NEI	Nuclear Energy Institute
NPDES	National Pollutant Discharge Elimination System
NRC	United States Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
PSDAR	Post-Shutdown Decommissioning Activities Report
PWR	Pressurized Water Reactor
RCS	Reactor Coolant System
REMP	Radiological Environmental Monitoring Program
RV	Reactor Vessel
SONGS	San Onofre Nuclear Generating Station
SCE	Southern California Edison
SDAPCD	San Diego Air Pollution Control District
SFP	Spent Fuel Pool
SNF Pd	Spent Fuel Period
SFSM	Spent Fuel Storage Modules
SPCC	Spill Prevention Control and Countermeasures
SR Pd	Site Restoration Period
SSC	Structures, Systems, and Components
UFSAR	Updated Final Safety analysis Report
USCB	United States Census Bureau

I. INTRODUCTION AND SUMMARY

A. Introduction

1. Historical Perspectives

San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 have been owned by four entities. Two are municipalities (Riverside and Anaheim) and two are investor owned utilities: San Diego Gas & Electric (SDG&E) and Southern California Edison (SCE, the Owner-Operator and agent for the participants). The relative obligation for operation and decommissioning varies by unit and entity. The term "SONGS Participants" is used in this report to represent the four entities that have continuing decommissioning obligations.

SONGS Unit 1 was shut down in 1992 with on-shore facilities largely dismantled by 2009 and off-shore conduits being fully dispositioned this year (2014). The decision has been made to shut down and decommission Units 2 and 3. Since the decision to shut down SONGS Units 2 and 3, the focus of SONGS staff and other personnel has been to plan and begin execution of the necessary steps to achieve timely, cost-effective, and safe decommissioning and restoration of the SONGS site.

In developing its plans, SONGS has benchmarked the experiences of commercial decommissioning projects in the 1990s and 2000s and has sought the input from experienced individuals and groups with a wide range of such experience. SONGS maintains close communications with those facilities currently undergoing decommissioning and with many of the organizations supporting those efforts. In particular, both the Zion and Humboldt Bay plants are currently undergoing active decommissioning. Three others (Kewaunee, Crystal River 3, and Vermont Yankee) are, or soon will be, entering SAFSTOR conditions of varying durations prior to dismantlement.

Earlier decommissioning projects faced a number of first-time technical challenges, such as cutting reactor vessel (RV) internals in a high radiation environment. SONGS' reviews indicate that many of the technical challenges confronting SONGS decommissioning now have mature solutions. Similarly, our predecessors provide a wealth of knowledge to minimize worker radiation exposure, efficiently plan, and sequence a decommissioning project and safely manage and transport waste.

The SONGS Participants have the responsibility to restore the site in accordance with applicable regulations and agreements. The SONGS Participants have a responsibility to their stakeholders and the communities they serve to do so in a transparent and effective manner while striving to attain high standards of safety and environmental protection. Further, the SONGS Participants will have a limited, if any, role in the future use of the site. The ultimate use for the site is for the land-owner (U.S. Navy) to determine with input from the community at large.

2. Community Engagement

A key lesson-learned in our review of other decommissioning projects is the continued importance of community engagement during the decommissioning process. The SONGS Participants are committed

to engaging the local community and its leaders in an open, transparent, and proactive manner. SONGS is actively engaged with external stakeholders to: understand their priorities; inform them of SONGS plans; and, to seek their input on the safe, timely, and cost-effective decommissioning of SONGS.

The SONGS Participants are actively engaging with the community through public outreach including briefings for community groups and routine educational updates for local, state, and federal officials. The SONGS participants have formed the Community Engagement Panel (CEP) with members representing a broad range of stakeholders to advise SONGS on decommissioning matters. The panel meets at least quarterly to facilitate dialogue and includes several representatives of government, members from academia, labor, business, environmental organization, and a local anti-nuclear leader. Members of the CEP were provided with the opportunity to review and provide input on this document as well as the Decommissioning Cost Estimate (DCE) and the Irradiated Fuel Management Plan (IFMP). As a precursor to review of these submittals, SONGS hosted two workshops with external technical experts to provide the CEP members with a depth of knowledge in these areas. Feedback from the panel was addressed prior to finalization and SCE senior management authorization of the submittals.

SONGS also has established a website, www.SONGScommunity.com, as a dedicated online source for information on the plant and the decommissioning process. The website includes background information on decommissioning, links to other websites including the NRC, and an "opt-in" feature that allows members of the community to register for automatic updates on decommissioning matters.

3. Regulatory Basis

In accordance with the requirements of 10 CFR 50.82, "Termination of License," paragraph (a)(4)(i), this report constitutes the Post-Shutdown Decommissioning Activities Report (PSDAR) for SONGS Units 2 and 3. The PSDAR contains the following:

1. A description of the planned decommissioning activities along with a schedule for their accomplishment.
2. A site-specific DCE including the projected cost of managing irradiated fuel and site restoration (being submitted concurrently).
3. A discussion that provides the basis for concluding that the environmental impacts associated with the site-specific decommissioning activities will be bounded by the appropriate previously issued generic and plant specific environmental impact statements.

The PSDAR has been developed consistent with NRC Regulatory Guide 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report." This report is based on currently available information; however, the plans discussed may be modified as additional information becomes available or as circumstances change. As required by 10 CFR 50.82(a)(7), SCE will notify the Nuclear Regulatory Commission (NRC) in writing before performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning cost.

The IFMP and DCE are being submitted concurrently with the PSDAR. The technical, schedule, and cost information provided is consistent among these submittals.

B. Background

The SONGS site is located on the coast of southern California in San Diego County, approximately 62 miles southeast of Los Angeles and 51 miles northwest of San Diego. The site is located entirely within the boundaries of the United States Marine Corps Base Camp Pendleton. The site is approximately 4,500 feet long and 800 feet wide, comprising 84 acres. The site does not include office buildings and related facilities located east of Interstate 5 (I-5) referred to as "the Mesa" or other adjacent parcels.

The property on which the station is built is subject to an easement from the United States Government through the U. S. Navy. The nearest privately owned land is approximately 2.5 miles from the site.

SONGS Units 2 and 3 is a two-unit site with supporting facilities. The reactors were previously licensed to produce 3,438 MWt each. An on-site Independent Spent Fuel Storage Installation (ISFSI) used to store SONGS Units 1, 2 and 3 fuel, located on the portion of the site previously occupied by SONGS Unit 1. Storage at the ISFSI was initiated in 2003 and the pad was subsequently (2007) expanded to support the currently placed 63 Horizontal Storage Modules in which 51 Dry Storage Containers (DSCs) have been installed to-date: 50 containing irradiated fuel and one (1) containing Greater-Than-Class-C (GTCC) materials. The most recent loading campaign was conducted in 2012. As discussed in the Spent Fuel Management Period details and the concurrently submitted IFMP, it will be necessary to further expand the current ISFSI capacity to store the complete inventory of Units 2 and 3 spent fuel. The location, capacity, and technology to be employed have not yet been finalized.

A brief history of the major milestones related to plant construction and operation is as follows:

	UNIT 2	UNIT 3
• Construction Permit Issued	October 18, 1973	October 18, 1973
• Operating License Issued	February 16, 1982	November 15, 1982
• Full Power Operation	June 15, 1983	November 18, 1983
• Final Reactor Operation	January 9, 2012	January 31, 2012

On June 7, 2013, SCE announced its decision to permanently cease power operations and decommission SONGS Units 2 and 3. By letter dated June 12, 2013 (Reference 3), SCE notified the NRC of its decision to permanently cease power operations. SCE has submitted two letters dated July 22, 2013 (Reference 5) and June 28, 2013 (Reference 4) certifying that fuel has been removed from the Unit 2 and 3 reactors, respectively.

Pursuant to 10 CFR 50.51(b), "Continuation of License," the license for a facility that has permanently ceased operations, continues in effect beyond the expiration date to authorize ownership and possession of the facility until the NRC notifies the licensee in writing that the license has been

terminated. During the period that the license remains in effect, 10 CFR 50.51 (b) requires the licensee to:

(1) Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition, and

(2) Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the provisions of the specific 10 CFR part 50 licenses for the facility.

C. Summary of Decommissioning Alternatives

The NRC has evaluated the environmental impacts of three general methods for decommissioning power reactor facilities in NUREG-0586, "Final Generic Environmental Impact Statement (GEIS) on Decommissioning Nuclear Facilities," Supplement 1 (Reference 6). The three general methods are:

- **DECON:** The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license after cessation of operations.
- **SAFSTOR:** The facility is placed in a safe stable condition and maintained in that state (safe storage) until it is subsequently decontaminated and dismantled to levels that permit license termination. During SAFSTOR, a facility is left intact or may be partially dismantled, but the fuel has been removed from the reactor vessel and radioactive liquids have been drained from systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thus reducing the levels of radioactivity in and on the material and potentially the quantity of radioactive material that must be disposed of during the decontamination and dismantlement.
- **ENTOMB:** Radioactive structures, systems, and components are encased in a structurally long-lived substance such as concrete. The entombed structure is appropriately maintained and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

The SONGS Participants have chosen the DECON method. SONGS is currently in the planning period during which the site is preparing for safe and orderly transition to dismantlement. More specifically:

- Permanent cessation of operations was announced on June 7, 2013.
- DECON methodology was selected (prompt decontamination and dismantlement after initial planning period).
- Additional ISFSI capacity will be added to meet all of the site's needs.
- Initial site characterization activities are underway.
- Plans to isolate the Spent Fuel Pools (referred to as "islanding") are in development.
- Other necessary actions to facilitate safe system retirement and removal (referred to as "cold and dark") are in development.

When the required regulatory reviews, planning, and preparation are sufficiently complete, the site will move into active decontamination and dismantlement. Current plans are for that period to overlap with completion of the relocation of spent fuel from the Spent Fuel Pools to the ISFSI.

The SONGS facility will be decontaminated and dismantled (D&D) to levels that permit termination of the NRC licenses and in accordance with the requirements agreed to by the United States Navy in the easement for the site. In support of this and in accordance with 10 CFR 50.82(a)(9), a License Termination Plan will be developed and submitted for NRC approval at least two years prior to termination of the license.

The decommissioning approach for SONGS is described in more detail in the following sections:

- Section II summarizes the planned decommissioning activities and general timing of their implementation.
- Section III summarizes the cost estimating methodology employed by Energy*Solutions* and references the site specific DCE being submitted concurrently.
- Section IV describes the basis for concluding that the environmental impacts associated with decommissioning SONGS Units 2 and 3 are bounded by the most recent site-specific environmental impact statement and NRC GEIS related to decommissioning.

II. DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES

The SONGS Units 2 and 3 decommissioning project is currently in the planning period transitioning to DECON as soon as necessary planning, approvals, and conditions permit doing so in a safe and cost-effective manner. DECON is defined in Section I.C of this report.

Table II-1 provides a summary of the current decommissioning plan and schedule for SONGS Units 2 and 3. The major decommissioning periods and general sequencing of the activities that will occur during each period identified in Table II-1 are discussed in more detail in the sections that follow. The periods are logical groupings of activities. The categories are also consistent with the Nuclear Decommissioning Trust (NDT) funds which are allocated based on specific regulatory requirements. The activities executed during these periods will, in many cases progress in parallel, and may not be as completely segregated as the description implies. For instance, while distinct decontamination and dismantlement activities are listed, it may be determined to be more effective from dose, labor, or waste disposal perspectives to dismantle structures and systems and dispose of them as radioactive waste rather than decontaminate them and dispose of the balance as non-radioactive waste.

The planning required for each decommissioning activity, including the selection of the process to perform the work, will be performed in accordance with appropriate governance and oversight processes. Based on current plans, no decommissioning activities unique to the site have been identified and no activities or environmental impacts outside the bounds considered in the GEIS have been identified. Appropriate radiological and environmental programs will be maintained throughout

the decommissioning process to ensure radiological safety of the workforce and the public and environmental compliance is maintained.

Table II-1
San Onofre Nuclear Generating Station Units 2 and 3
Current Schedule of Decommissioning Periods

Task Name	Start	Finish
Part 50 License Termination (other than ISFSI)		
Announcement of Cessation of Operations	06/07/2013	N/A
Decon Period 1 – Transition to Decommissioning	06/07/2013	12/31/2013
Decon Period 2 – Decommissioning Planning and Site Modifications	01/01/2014	06/30/2015
Decon Period 3 – Decommissioning Preps/Reactor Internals Segmentation	06/30/2015	06/01/2019
Decon Period 4 – Plant Systems and Large Component Removal	06/01/2019	09/24/2022
Decon Period 5 – Building Decontamination	09/24/2022	07/13/2024
Decon Period 6 – License Termination During Demolition	07/13/2024	12/24/2032
Spent Fuel Management		
SNF Period 1 – Spent Fuel Management Transition	06/07/2013	12/31/2013
SNF Period 2 - Spent Fuel Transfer to Dry Storage	01/01/2014	06/01/2019
SNF Period 3 – Dry Storage During Decommissioning – Units 1, 2 & 3	06/01/2019	12/05/2031
SNF Period 4 – Dry Storage Only – Units 1, 2 & 3	12/05/2031	12/31/2035
SNF Period 5 – Dry Storage Only – Units 2 & 3	12/31/2035	12/31/2049
SNF D&D Period 1 – ISFSI Part 50 License Termination	12/31/2049	05/06/2050
SNF D&D Period 2 – ISFSI Demolition	05/06/2050	09/08/2051
Site Restoration		
SR Period 1 – Transition to Site Restoration	06/07/2013	06/30/2015
SR Period 2 – Building Demolition During Decommissioning	06/30/2015	07/11/2017
SR Period 3 – Subsurface Demolition Engineering and Permitting	10/01/2019	07/13/2024
SR Period 4 – Building Demolition to 3 Feet Below Grade	07/13/2024	10/14/2028
SR Period 5 – Subgrade Structure Removal Below -3 Feet	10/14/2028	12/5/2031
SR Period 6 – Final Site Restoration and Easement Termination	05/06/2050	12/15/2051
Final Easement Termination	12/15/2051	N/A

Note [1]: Shipping dates are assumed based on the previously documented positions of the DOE, which indicates that shipments from the industry could begin as early as 2024 and SONGS place in the current queue. Both are subject to changes.

A. Detailed Breakdown of License Termination Periods

The License Termination Periods (referred to as decontamination periods) include those activities necessary to remove or reduce the levels of radioactive contamination to levels necessary to terminate the Part 50 licenses for the site (other than the ISFSI) and release it back to the Navy. Also included are the development, submittal, and support for the review of the primary decommissioning documents.

Periods 1 and 2 generally consist of planning and transition of the site to a condition where it is ready for significant decontamination and dismantlement activities. As detailed below, these periods include: system abandonment and isolation of the remaining structures, systems and components (SSC) from normal power and water sources. System abandonment and isolation allow the decontamination and dismantlement to proceed safely and in an efficient sequence. Additionally, the selection of the contractor for managing the bulk of the decommissioning activities will be made.

Period 3 is focused on decontamination and dismantlement of the major components in the containment building (RV internals, vessel, head, steam generators, pressurizer, and main piping).

Period 4 addresses the decontamination and dismantlement of SSCs known to be substantially contaminated and the removal of the components from both Periods 3 and 4.

Period 5 is focused on decontamination of the various buildings. As noted elsewhere it may be more appropriate to simply proceed with dismantlement if it is more timely and cost-effective to simply dispose of building material as radioactive waste.

Period 6 is focused on the final site survey to confirm that the site is acceptable for release back to the Navy. The process for doing so "Multi-Agency Radiation Survey and Site Investigation Manual" (MARRSIM) was developed by the four federal agencies having authority over radioactive materials (Department of Defense, Department of Energy, the Environmental Protection Agency and the NRC) and is the consensus standard endorsed by other stakeholders. Its application will be validated by the NRC.

Decontamination Period 1 – Transition to Decommissioning

- Announcement of Cessation of Operations
- Defuel Reactors
- Notification of Permanent Fuel Removal
- Disposition of legacy Low Level Radioactive Waste (LLRW)

Decontamination Period 2 – Decommissioning Planning and Site Modifications

- Preparation of Decommissioning Related Licensing Submittals
  - Permanently Defueled Technical Specifications (Submitted March 21, 2014)
  - Permanently Defueled Radiological Emergency Plan (Submitted March 31, 2014)
- Submit PSDAR, DCE and IFMP to NRC
- Perform Historical Site Assessment and Site Characterization
- Planning, Design, and Implementation of Cold and Dark (Site Repowering)
- Design and Install Spent Fuel Pool Islanding, Control Room Relocation, and Security Modifications
- Select Decommissioning General Contractor (DGC)

Decontamination Period 3 – Decommissioning Preparations and Reactor Internal Segmentation

- DGC Mobilization and Planning
- System Decontamination
- Reactor Internals Removal Preparations

- Reactor Internals Segmentation Planning and Implementation
- Purchase Dry Storage Canisters for GTCC Waste
- Segment and Package Reactor Internals for Storage in the ISFSI

Decontamination Period 4 – Plant Systems and Large Component Removal

- Upgrade Rail Spur in Owner Controlled Area
- Install Large Array Radiation Detection System to Monitor Shipments In/Out of Site
- Remove, Package, and Dispose of Non-Essential Systems
- Asbestos and Lead Abatement
- Spent Fuel Pool Closure
- Remove Spent Fuel Pool Racks, Spent Fuel Pool Island Equipment, and Bridge Crane
- Remove and Dispose of Legacy Class B and C Wastes
- Remove, Package, and Dispose of Essential Systems
- Removal and Disposal of Spent Resins, Filter Media, and Tank Sludge
- Large Component Removal
- Prepare License Termination Plan

Decontamination Period 5 – Building Decontamination

- Decontaminate Containment Buildings
- Decontaminate Turbine Buildings
- Decontaminate Fuel Handling Buildings
- Decontaminate Auxiliary Rad-waste Building
- Decontaminate Auxiliary Control Building
- Decontaminate Penetration Buildings
- Decontaminate Safety Equipment and Main Steam Isolation Valve (MSIV) Buildings
- Radiological Survey of Structures During Decontamination

Decontamination Period 6 – License Termination

- Final Status Survey
- Verification and NRC Approval

B. Detailed Breakdown of Spent Fuel Management Periods

The Spent Nuclear Fuel Management Periods began with all spent fuel off-loaded from the reactor vessel into the Spent Fuel Pools and the certification of permanent defueling letters submitted to the NRC in accordance with 10 CFR 50.82(a)(1)(ii) (References 4 and 5).

During Period 1 measures will be planned, designed, and implemented to ensure spent fuel storage and handling systems will continue to function to support fuel storage in the spent fuel pool and to facilitate transfer of the spent fuel to the ISFSI. Systems, structures, and programs needed to support the safe storage and transfer of spent fuel such as security, fire protection, and environmental and radiological monitoring will be maintained in accordance with applicable requirements. Equipment maintenance, inspection, and operations will be performed on these systems and structures as appropriate.

During Period 2 the ISFSI capacity will be expanded to accommodate transfer of all spent fuel to dry storage. All spent fuel for Units 1, 2 and 3 will be transferred to the ISFSI and stored there until it is accepted by the Department of Energy (DOE) and transferred to an off-site facility.

The next three periods reflect slightly different ISFSI conditions. Period 3 is concurrent with ongoing site decontamination and dismantlement activities. Period 4 reflects the ISFSI with spent fuel from all three units in dry storage and Period 5 recognizes the potential that Unit 1 fuel may be accepted by the DOE earlier than Units 2 and 3 fuel and ends with DOE acceptance of all Units 2 and 3 fuel.

The SNF D&D Periods (1 and 2) follow DOE acceptance and may be well after License Termination for the balance of the site.

Spent Nuclear Fuel Period 1 – Spent Fuel Transfer Management Transition
- Implementation of Initial Security Enhancements Required for Reductions in Staff
- Design and Fabricate Dry Storage Canisters for Current ISFSI Scope

Spent Nuclear Fuel Period 2 – Spent Fuel Transfer to Dry Storage
- Submit IFMP
- Select Dry Storage System Canister Design and Vendor for Balance of the ISFSI
- Design and Construct ISFSI Expansion
- Purchase, Deliver, and Load Dry Storage Canisters and Storage Models for Balance of the ISFSI
- Complete Transfer of Spent Fuel to ISFSI

Spent Nuclear Fuel Period 3 – Dry Storage during Decommissioning Units 1, 2, and 3 Fuel

Spent Nuclear Fuel Period 4 – Dry Storage Only – Units 1, 2, and 3 Fuel

Spent Nuclear Fuel Period 5 – Dry Storage Only – Units 2 and 3 Fuel

Spent Nuclear Fuel Period D&D 1 – ISFSI License Termination
- Preparation and NRC Review of ISFSI Portion/Revision of License Termination Plan

Spent Nuclear Fuel Period D&D 2 – ISFSI Demolition

- Decontamination of Storage Modules (SFSMs)
- Final Status Survey of ISFSI
- Clean Demolition of HSM's and ISFSI Pad
- Clean Demolition of ISFSI Support Structures
- Restore ISFSI Site
- Preparation of Final Report on ISFSI Decommissioning and NRC Review

C. Detailed Breakdown of Site Restoration Periods

The Site Restoration periods reflect the planning and implementation of dismantlement activities not associated with radioactive materials. The DCE and descriptions below conservatively include activities

from which the SONGS Participants will plan to seek alternatives. These include the complete removal of the intake and discharge conduits in the Pacific Ocean currently required by the California State Lands Commission (CSLC) easement. Previously, the CSLC and SONGS developed an alternative for the SONGS Unit 1 conduits. Another is associated with removal of all subsurface structures that may be required by the US Navy easement. The typical practice has been to remove structures to that depth necessary to remove contaminated materials.

Also included as part of site restoration are severance costs and cost associated with returning the Mesa and other parcels to the U. S. Navy.

Site Restoration Period 1 –Transition to Site Restoration

- Severance Costs Associated with Staffing Reduction in Accordance with State Law
- Other off-site activities are included in the DCE but are not considered part of the Units 2 and 3 PSDAR activities

Site Restoration Period 2 –Building Demolition During Decommissioning

- Demolish South Access for Decommissioning, South Yard Facility
- Other off-site activities are included in the DCE but are not considered part of the Units 2 and 3 PSDAR activities

Site Restoration Period 3 – Subsurface Demolition Engineering and Permitting

- Hydro-geologic Investigation and Outfall Conduit Survey
- Subsurface Structure Removal Analyses for Lease Termination Activities
- Final Site Grading and Shoreline Protection Engineering Planning and Design

Site Restoration Period 4 – Building Demolition to Three Feet Below-Grade

- Demolition Preparations
- De-tension and Remove Containment Building Tendons
- Demolish Diesel Generator Buildings
- Demolish Condensate Buildings and Transformer Pads
- Demolish Full Flow Areas and Turbine Buildings
- Demolish Auxiliary Rad-waste Building
- Demolish Auxiliary Control Building
- Remove Systems and Demolish Make-up Demineralizer Structures
- Demolish Penetration Buildings
- Demolish Safety Equipment and MSIV Buildings
- Demolish Fuel Handling Buildings
- Demolish Containment Buildings
- Demolish Intake and Discharge Structures

Site Restoration Period 5 – Subgrade Structure Removal below Three Feet (if required)

- Install Sheet Piling and Excavation Shoring, Dewatering System, and Effluent Treatment and Discharge Controls

- Demolish and Backfill Subsurface Structures
- Demolish and Backfill Intake Structure Inside Seawall
- Remove Off-shore Intake and Outfall Conduits
- Remove Sheet Piling and Excavation Shoring, and Perform Dewatering and Effluent Treatment
- Finish Grading and Re-vegetate Site As Needed/Required

Site Restoration Period 6 – Final Site Restoration and Easement Termination [details subject to final resolution of negotiations with the U. S. Navy]

- Install Dewatering System and Effluent Treatment and Discharge Controls
- Remove and Stockpile Existing Seawall Erosion Protection
- Remove Seawall and Pedestrian Walkway
- Remove Remaining Intake Structure Beneath Seawall
- Backfill and Compaction of Excavation
- Remove Dewatering System and Effluent Treatment
- Remove Railroad Tracks, Stabilized Slopes, Access Road, and North Parking Lot
- Finish Grading and Re-vegetate Site as Needed/Required

D. General Decommissioning Considerations

1. Major Decommissioning Activities

As defined in 10 CFR 50.2, "Definitions," a "major decommissioning activity" is "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than Class C waste in accordance with 10 CFR 61.55." The following discussion provides a general summary of the major decommissioning activities currently planned for SONGS Units 2 and 3. These activities may be modified as conditions dictate.

Prior to starting a major decommissioning activity, the plant components will be radiologically surveyed and decontaminated, as required, to minimize worker radiation exposure. Shipping casks and other equipment necessary to conduct decommissioning activities will be designed and procured.

The initial major decommissioning activities will focus on removal, packaging and disposal of piping and components. Following RV and cavity reflood and RV head removal and disposal; the reactor vessel internals will be removed from the reactor vessel and segmented as necessary to separate the GTCC waste which will be placed in storage canisters and modules on the ISFSI designated for that purpose. Using this approach, the internals will be packaged and disposed of independent of the reactor vessel (RV). When the internals segmentation effort is completed, the RV and cavity will be drained and any remaining debris will be removed.

Removal of the reactor vessel follows the removal of the reactor internals. It is likely that the components will be removed by sectioning or segmenting performed remotely. These activities may be

performed in air, rather than underwater, using a control envelope to preclude the spread of contaminated materials.

Additional major decommissioning activities that will be conducted include removal and disposal of the steam generators, pressurizer, spent fuel storage racks, and spent fuel bridge crane. The dismantling of the containment structure will be undertaken as part of the reactor building demolition. As detailed in Section 3 (below) appropriate radiation protection and contamination control measures will be employed to manage these activities.

2. Other Decommissioning Activities

In addition to the major decommissioning activities discussed above, plant components will be removed from the Turbine Building including the turbine generator, condenser, feedwater heaters, moisture separator/reheaters, and miscellaneous system and support equipment. As detailed in Section 3 (below) appropriate radiation protection and contamination control measures will be employed to manage these activities.

3. Decontamination and Dismantlement Activities

The objectives of the decontamination effort are two-fold. The first objective is to reduce radiation levels throughout the facility to minimize personnel radiation exposure during dismantlement. The second objective is to clean as much material as possible to 'unrestricted use' levels, thereby allowing non-radiological demolition and disposal and minimizing the quantities of material that must be disposed of by costly burial as radioactive waste. The second objective will be achieved by decontaminating structural components including steel framing and concrete surfaces. The methods to accomplish this are typically mechanical, requiring the removal of the surface or surface coating and are used regularly in industrial and contaminated sites.

The decontamination and/or dismantlement of contaminated SSCs may be accomplished by: decontamination in place; decontamination and dismantlement; or dismantlement and disposal. A combination of these methods may be utilized to reduce contamination levels, worker radiation exposures, and project costs. Material below the applicable radiological limits may be released for unrestricted disposition (e.g., scrap, recycle, or general disposal). Radioactive contaminated or activated materials will be removed from the site as necessary to allow the site to be released for unrestricted use.

LLRW will be processed in accordance with plant procedures and existing commercial options. Contaminated material will be characterized and segregated for additional onsite decontamination or processing, off-site processing (e.g., disassembly, chemical cleaning, volume reduction, waste treatment), and/or packaged for controlled disposal at a low-level waste disposal facility.

Contaminated concrete and structural steel components will be decontaminated and removed as required to gain access to plant SSCs. After the SSCs are removed and processed as described above,

the remaining contaminated concrete and structural steel components will be decontaminated and/or removed. Contaminated concrete will be packaged and shipped to a low-level waste disposal facility. Contaminated structural steel components may be removed to a processing area for decontamination, volume reduction, and packaging for shipment to processing facility or to a low-level waste disposal facility, as necessary.

Buried and embedded contaminated components (e.g., piping, drains) will be decontaminated in place, or excavated and decontaminated. Appropriate contamination controls will be employed to minimize the spread of contamination and to protect personnel.

4. Radioactive Waste Management

A major component of the total cost of decommissioning SONGS Units 2 and 3 is the cost of safely packaging and disposing of contaminated SSCs, contaminated soil, resins, water, and other plant process liquids. A waste management plan will be developed consistent with regulatory requirements for each waste type. Currently, LLRW Classes B and C may be disposed of at the Waste Control Services (WCS) waste disposal site in Andrews County, Texas. The waste management plan will be based on the evaluation of available methods and strategies for processing, packaging, and transporting radioactive waste in conjunction with the available disposal facility and associated waste acceptance criteria.

Class A LLRW will be disposed at a licensed disposal site. (SONGS has contracted with Energy*Solutions* to use the facility located in Clive, Utah as well as WCS). If other licensed Class B and C LLRW facilities become available in the future, SONGS may choose to use them as well.

5. Removal of Mixed Wastes

Mixed wastes (hazardous and radioactive) generated during decommissioning, if any, will be managed in accordance with applicable Federal and State regulations. If technology, resources, and approved processes are available, the processes will be evaluated to render the mixed waste non-hazardous. Otherwise, mixed wastes from SONGS will be transported by authorized and licensed transporters and shipped to authorized and licensed facilities.

6. Site Characterization

During the decommissioning process, a site characterization will be performed in which radiological, regulated, and hazardous wastes will be identified, categorized, and quantified. Surveys will be conducted to establish the contamination and radiation levels throughout the plant. The information will be used in developing procedures to ensure the contaminated areas are removed and ensure that worker exposure is controlled. Surveys of the selected outdoor areas will also be performed including surveys of soil and groundwater near the site. As decontamination and dismantlement work proceeds, surveys will be conducted to maintain the site characterization current and ensure that decommissioning activities are adjusted accordingly.

7. Groundwater Protection

A groundwater protection program was initiated at SONGS in accordance with NEI 07-07, "Industry Groundwater Protection Initiative, Final Guidance Document," in August 2007 (Reference 11). A site hydrology study was initially completed as part of this initiative and was updated in 2012. Monitoring wells were installed around the plant to monitor for radionuclides. Acceptable levels of contaminants, as defined by the program, have been observed throughout the sampling program implemented as part of this initiative. Appropriate program elements will be maintained during decommissioning.

8. Change to Management and Staffing

With the plant shut down and defueled, plant management and staffing levels have been and continue to be adjusted to reflect the transition from an operating plant to a plant in decommissioning status. Staffing plans are addressed in the DCE.

III. ESTIMATE OF EXPECTED DECOMMISSIONING AND SPENT FUEL MANAGEMENT COSTS

10 CFR 50.82(a)(8)(iii) requires that a site-specific decommissioning cost estimate be prepared, and submitted within two years following permanent cessation of operations. 10 CFR 50.82 (a)(4)(i) requires that the PSDAR contain a site-specific decommissioning cost estimate including the projected costs of managing irradiated fuel.

Energy*Solutions* has prepared a site-specific DCE for SONGS, which also provides projected costs of managing irradiated fuel, as well as non-radiological decommissioning and other site restoration costs,. The site-specific decommissioning cost analysis is being submitted concurrent with the IFMP and this PSDAR and fulfills the requirements of 10 CFR 50.82(a)(4)(i) and 10 CFR 50.82(a)(8)(iii). A summary of the annual costs associated with decommissioning, irradiated fuel management and site restoration are provided in the Irradiated Fuel Management Plan also being concurrently submitted in accordance with 10 CFR 50.54(bb).

The methodology used by Energy*Solutions* to develop the site-specific decommissioning cost analysis follows the approach originally developed by the Atomic Industrial Forum (now Nuclear Energy Institute) in their program to develop a standardized model for decommissioning cost estimates. The results of this program were published as AIF/NESP-036, "A Guideline for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (Reference 7). This document includes a unit cost factor method for estimating direct activity costs, simplifying the estimating process. The unit cost factors used in the study reflect the latest available data at the time of the study concerning worker productivity during decommissioning.

The decommissioning of the SONGS site will be funded from Nuclear Decommissioning Trusts established by each SONGS Participant for each unit. The relative liabilities of each SONGS Participant are detailed in the DCE. Sufficient funds (based on balances and earnings) are projected to be available to complete the planned decommissioning activities.

As discussed in Section IV of the IFMP the CPUC will establish processes for oversight of withdrawals from the nuclear decommissioning trusts by SCE and SDG&E, and designate the specific amounts from the existing fund balances that are available for the three decommissioning cost categories: (1) spent fuel management; (2) site restoration; and (3) license termination. As entities not subject to CPUC jurisdiction, Anaheim and Riverside are not required to obtain CPUC authorization with respect to withdrawals from their respective Nuclear Decommissioning Trusts.

IV. ENVIRONMENTAL IMPACTS

As shown in this section, SCE has evaluated the environmental impacts of decommissioning SONGS Units 2 and 3 to determine if anticipated impacts are bounded by existing environmental impact statements, the NRC's generic decommissioning EIS (GEIS, Reference 6) and the SONGS Final Environmental Statement (FES, Reference 8). As noted in Regulatory Guide 1.185, C.4 "the PSDAR does not need to include the analysis of the specific environmental impacts associated with decommissioning activities....the licensee must ensure that supporting documentation and analyses are available at the reactor site for inspection by the NRC Staff." Such detailed documentation and analyses are contained in the Environmental Impact Evaluation (EIE) and its supporting references as noted in the Developmental References. They are available on-site for NRC review as well as on the SONGScommunity.com website and are summarized below. Both the detailed documentation and analyses and the following summary were reviewed by internal and external subject matter experts, independent third-party reviewers and the Community Engagement Panel discussed in the Introduction to this report.

In the GEIS, the NRC reviewed the environmental impacts resulting from decommissioning on a generic basis, and identified a need for site-specific analyses for: (1) threatened and endangered species and (2) environmental justice. In addition, site-specific analyses are called for whenever decommissioning plans indicate that activities will impact areas beyond the operational portions of a facility. The SONGS FES addresses decommissioning, but does not establish bounding environmental impacts specific to decommissioning. However, the FES' discussion of impacts for construction does describe bounding impacts as it related to potential dewatering during decommissioning.

The NRC, in its GEIS, identified additional activities that are performed in conjunction with decommissioning. These activities are regulated by the NRC but any associated environmental impacts are addressed directly in conjunction with those regulated activities. These activities include those related to the decision to permanently cease operations, irradiated fuel management in wet or dry storage, irradiated fuel transport and disposal, and the treatment, and/or disposal of LLRW. SCE similarly excluded consideration of such activities to remain consistent with the NRC's approach.

A. Environmental Impacts of Decommissioning SONGS

SCE assessed the potential for environmental impacts to each resource area from decommissioning activities using the evaluations in the GEIS as a guide. Like the GEIS, the analysis assumed that operational mitigation measures will be continued and did not rely on the implementation of new

mitigation measures unless specified. Releases to the environment, waste volumes, and other environmental interfaces were estimated in the DCE or other sources referenced in the EIE. This information was then assessed against the potential for impact and the existing environmental conditions at SONGS to identify impacts and determine whether the GEIS and FES remain bounding. The GEIS categorizes significance levels as SMALL (impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource or do not exceed permissible levels in the NRC's regulations), MODERATE (impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource), or LARGE (impacts are clearly noticeable, and are sufficient to destabilize important attributes of the resource).

To support the evaluation, SCE established the baseline environmental and societal conditions through site-specific information as well as vicinity and regional data available from local, state, and federal agencies. In addition, the evaluation considered the existing permit conditions and limitations for water and air permits and NRC regulatory requirements, including those focused on occupational dose, public dose, radiological effluents, and LLRW shipping. Federal, state, and local requirements for non-radiological interfaces with the environment were considered. These include regulatory limits on water withdrawal and discharges, air emissions including fugitive dust, noise levels, and protection of avian, terrestrial and aquatic species, protection of cultural resources, disposal of non-radiological waste, and worker health protection.

SCE reviewed the planned decommissioning activities for SONGS Units 2 and 3 and compared these to the decommissioning activities that NRC evaluated in the GEIS. The planned activities fall within the activities that NRC evaluated. While each decommissioning site is unique, no unusual site-specific features or aspects of the planned SONGS Units 2 and 3 decommissioning have been identified. Furthermore, the practices used to accomplish the individual decommissioning tasks will employ conventional methods.

SCE's review confirmed that the anticipated or potential impacts are within the bounds of the generic impacts that the NRC described in the GEIS. There are no applicable bounding impacts for threatened and endangered species and environmental justice. The site-specific analyses determined that the planned SONGS Units 2 and 3 decommissioning activities are not likely to result in significant impacts to threatened and endangered species nor have disproportionate impacts on minority or low-income populations. The following discussions summarize the full Environmental Impact Evaluation focusing on the reasons for reaching this conclusion.

1. Onsite/Offsite Land Use

SCE's decommissioning plans include building demolition and removal within the 84-acre easement hosting the SONGS Units 2 and 3 reactor units and infrastructure. SCE plans to seek an easement lease amendment from the CSLC for the partial removal or abandonment in-place of the SONGS Units 2 and 3 intake and discharge conduits. In addition, the existing rail spur serving the site will most likely be used in support of waste shipments.

The SONGS site is currently used for utility-related industrial land uses, with the majority of the property within the easement having been previously disturbed during construction and operation of the plant. The coastal bluff areas located in the northwest and southeast portions of the 84-acre easement have remained undeveloped in compliance with the California Coastal Commission (CCC) Guarantee Agreement, in which SCE provided assurance that they will be protected and that they will remain in their natural state. It is anticipated that there will be no changes in onsite land use patterns during decommissioning.

The GEIS assessment for land use concluded that the impact would be SMALL for sites that did not require additional land for decommissioning activities. If additional land was needed the impact should be determined on a site-specific basis. Because no additional lands are needed SONGS onsite land use impacts during decommissioning are bounded by the GEIS and are categorized as SMALL.

2. Water Use

SONGS Units 2 and 3 acquires potable water through the South Coast Water District, a member agency of the Municipal Water District of Orange County (MWDOC). The site historically used water from the Pacific Ocean for its condenser cooling and service water cooling functions. The operational demand for cooling and makeup water has been significantly reduced since SONGS Units 2 and 3 permanently ceased operation. Condenser cooling is not required when the plant is not operating and service water cooling demands have been reduced to the extent possible (primarily spent fuel pool cooling). The normal operation demand was previously over 830,000 gpm per unit and is currently approximately 34,000 gpm total for both Units 2 and 3. During the decommissioning period, SONGS intends to continue to reduce cooling water demands with the intent to eliminate such demands on the Pacific Ocean as soon as possible.

The GEIS assessment of water use concluded the impact on water use would be SMALL if the decommissioning did not significantly increase water use. Water uses for decommissioning include staff usage, fuel storage (replacement of evaporative losses, etc.), fuel transfer (washing down transport casks), large component segmentation generally performed underwater, decontamination and dismantlement (if water-jet or similar techniques are employed). Water uses are anticipated to be significantly less than during operation. Thus water use impacts during decommissioning are bounded by the GEIS.

3. Water Quality – Non-Radiological

Major activities that could impact surface and groundwater quality during decommissioning include site excavation, stabilization, decontamination, dismantlement, and dewatering. These activities present the potential of spills, migration of low concentrations of radioactivity or hazardous substances not previously identified, and leaching from subsurface structures.

As discussed in Section 2 above, the site uses water from the Pacific Ocean for its condenser cooling and service water cooling functions. Water used for cooling functions is discharged through the ocean outfalls for Units 2 and 3, and is currently regulated under individual National Pollutant Discharge Elimination System (NPDES) Permits from the San Diego Regional Water Quality Control Board (SDRWQCB). The individual unit permits may be merged into a single NPDES Permit which would also continue to address groundwater dewatering discharges, and multiple minor waste stream discharges from within SONGS Units 2 and 3.

Storm water discharge is regulated and controlled through an industrial storm water general permit issued by the SDRWQCB. This permit requires SONGS to develop, maintain, and implement a storm water pollution prevention plan (SWPPP) for the facility. Storm water-related monitoring plans and reporting protocols will be updated as necessary to address permit requirements and decommissioning activities.

A previous SCE study concluded that no drinking water pathway exists for exposure from SONGS operations. Furthermore, the nearest drinking water well is more than one mile inland. Previous studies indicate that even under extreme pumping conditions, a seaward gradient will exist. Therefore, any dewatering is not expected to result in saltwater intrusion.

The GEIS assessment of water quality impacts concluded the impacts would be SMALL based on compliance with regulatory requirements including the appropriate application of best management practices (BMPs) and controls. SCE will follow standard storm water BMPs as documented in the current Industrial SWPPP and implement the current SPCC plan to minimize the chance of both groundwater and surface water contamination. In the event an unknown area of hazardous substances is identified during sub-grade soil excavation and structures removal, the area will be assessed and controlled. Due to the implementation of BMPs and compliance with permits, the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater are bounded by those addressed in the GEIS.

4. Air Quality

Emission sources in San Diego County are primarily mobile sources (vehicular traffic) and ambient air quality standards are frequently exceeded for ozone and particulate matter due to routine vehicular traffic. Relatively minor stationary sources, such as those planned for use at SONGS, are projected to be a fraction of the average daily emissions permitted by the San Diego Air Pollution Control District (SDAPCD).

The most likely impact of decommissioning on air quality will be due to dust. SCE will employ standard dust control measures during decommissioning in accordance with SDAPCD dust abatement and visible emissions requirements. Air emissions due to commuting workers will actually be less since the work force during all phases of decommissioning is expected to be smaller than the peak number of workers used for construction or refueling outages.

The NRC's GEIS generically determined air quality impacts associated with decommissioning to be SMALL due to the sufficiency of current and commonly used control and mitigation measures. SCE will implement standard mitigation measures to reduce emissions during decommissioning per the requirements of the SDAPCD. Therefore, air quality impacts related to decommissioning of SONGS Units 2 and 3 are bounded by the GEIS.

5. Aquatic Ecology

SCE has characterized the aquatic environment in the vicinity of the SONGS Units 2 and 3 intake and discharge conduits prior to construction of and during the operation of SONGS. There are a variety of habitat types surrounding the SONGS Units 2 and 3 conduits. The marine habitat offshore of SONGS consists of a mixture of sand, cobble, and isolated areas of exposed rock. The area of high marine productivity in the immediate vicinity of the plant site is the shallow sub-tidal zone, approximately 1,300 feet north of SONGS. This area supports a biological community dominated by surfgrass, and feather boa kelp. The San Onofre kelp bed is approximately 650 feet south of SONGS Unit 2 diffusers in a water depth of 40 to 50 feet. The benthic fish community is generally dominated by queenfish; northern anchovy; white croaker and speckled sanddab.

Since ceasing permanent operations at SONGS Units 2 and 3, SCE has reduced ocean water withdrawals and discharge by approximately 96 percent from normal operating flows. The remaining flow is primarily associated with cooling spent fuel while in wet storage. As noted earlier, spent fuel storage and cooling are existing operational activities and is not re-addressed as part of this environmental review. SONGS will continue to comply with its applicable regulatory and permit requirements associated with reduction of impingement and entrainment impacts due to water withdrawals.

SCE sought and obtained an amendment to the CSLC easement lease for Unit 1 which allowed the intake and discharge conduits to remain buried beneath the seafloor. SCE is planning to pursue similar amendments for SONGS Units 2 and 3. If the CSLC approves the amendment to allow SCE to abandon the conduits in place, the environmental impacts are projected to be SMALL with the application of appropriate mitigation measures enumerated in the lease amendment. Complete removal of the conduits, as is currently required by the CSLC lease, is anticipated to have significant adverse environmental impacts. The detailed Environmental Impact Evaluation assumes the CSLC lease is amended. If the CSLC lease is not amended, the environmental impacts from complete removal of the conduits will have to be further addressed. If necessary, SCE will update the PSDAR and initiate other regulatory interactions to address the results of this analysis.

There are no surface water bodies on the SONGS site, but the Pacific Ocean borders the site and vernal pools are found northwest of SONGS Parking Lot 4. Decommissioning activities for SONGS Units 2 and 3 will include the application of common BMPs, compliance with the SONGS storm water permit, and implementation of the storm water pollution prevention plan, which will be updated as necessary to address decommissioning activities. These measures will ensure that any changes in surface water quality will be non-detectable and non-destabilizing.

The NRC determined aquatic ecology impacts to be SMALL when only aquatic resources within a plant's operational areas are disturbed. The potential impacts to aquatic ecology are bounded by the GEIS and no additional mitigation measures beyond those anticipated as conditions of the CSLC easement lease amendment are likely to be warranted.

6. Terrestrial Ecology

The SONGS site is almost entirely paved and developed. However, there are small strips of intact scrub-shrub habitat and ornamental vegetation surrounding the parking lots and between developed areas of the plant. The SONGS site also has undeveloped coastal bluffs that are explicitly protected from development under the CCC Guarantee Agreement. The onsite coastal bluff in the northwest area of SONGS is sparsely vegetated, California desert-thorn scrub habitat. The larger onsite coastal bluff in the southeast area of SONGS is approximately 5 acres and is dominated by California sagebrush scrub vegetation. This bluff is contiguous with the San Onofre bluffs of the San Onofre State Beach, which supports two native vegetation associations (Diegan coastal sage scrub and southern foredune) and small areas of disturbed coastal sage scrub habitat. The coastal bluff areas provide opportunity to support wildlife; however, the light, noise, and frequent human presence due to the proximity of SONGS and the state beach result in a more disturbed habitat than will otherwise be optimal for many species. Avian species are highly mobile and not subject to barriers such as roads and developed areas and may utilize scrub habitat or open surfaces for nesting and temporary perching.

The decommissioning activities will include noise and dust from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and the potential for bird interactions with crane booms or other construction equipment. These activities will be conducted in compliance with air quality and noise regulations, and SCE will use avoidance and minimization measures to address potential impacts. Compliance with applicable regulations, air permits, noise restrictions along with the temporary nature of the various decommissioning tasks (e.g., use of cranes) will minimize the impacts to terrestrial species as well as the human community. Decommissioning plans do not currently include the use of explosives, which could disturb terrestrial resources. Should those plans change the environmental impacts will be reevaluated.

SONGS is located within the coastal zone and prior to active dismantlement, SCE will file a coastal development permit application with the CCC. As part of this permitting process, decommissioning activities within the coastal sage habitat areas, coastal bluff, and beach areas will be reviewed by the CCC and United States Fish and Wildlife Service (USFWS) for potential environmental impacts including

the federally listed coastal California gnatcatcher and other protected species and species of concern. Any necessary mitigation measures will be included as conditions of the CCC permit. The removal of various current SONGS features along the perimeter of the developed plant adjacent to and within the natural area could potentially require ground disturbance in unpaved areas. Appropriate avoidance and minimization measures will be used to minimize the impact of any ground disturbance.

With the implementation of appropriate avoidance and minimization measures and compliance with permit conditions as discussed above, decommissioning of SONGS Units 2 and 3 is not anticipated to adversely impact any terrestrial resources and the impacts will be bounded by the GEIS which determined them to be SMALL.

7. Threatened and Endangered Species

Seventeen federally or state protected species utilize habitat within the vicinity (a 6-mile radius) of the SONGS site. These species are listed in Table IV-1, along with their protection status and critical habitat designation. Other species of concern are also addressed in the detailed Environmental Impact Evaluation including both the critically imperiled and imperiled species listed in the California Natural Diversity Data Base and located within one mile of the site but are not otherwise addressed here.

The list includes four federally listed marine turtles. However, none is considered a full-time resident in the vicinity of SONGS and they only migrate through the vicinity. Another federally listed marine reptile, the Hawksbill turtle, sporadically nests in the southern part of the Baja peninsula and foraging sub-adults and juveniles have been sighted along the California coast. Given the SMALL impacts on water use and water quality during decommissioning and the ability of these species to migrate away from the site, these species should not be adversely impacted by decommissioning.

The decommissioning activities will indirectly impact protected species through dust generation from structure demolition, noise from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and potential bird interactions with crane booms or other construction equipment. The decommissioning activities will be conducted in compliance with air quality and noise regulations and SCE will use appropriate avoidance and minimization measures. Compliance with applicable regulations, air permits, and noise restrictions related to daylight working along with the temporary nature of the various decommissioning tasks will minimize any such impacts. Decommissioning plans do not currently include the use of explosives, which could disturb protected species. These measures will minimize impacts to protected terrestrial species that inhabit or visit the SONGS site.

Although rare on the site, there has historically been one protected plant species in the vicinity of SONGS, the thread-leaved brodiaea. Decommissioning activities will generally be confined to previously disturbed areas (e.g., paved, high traffic areas). Otherwise, the SCE environmental staff will conduct an environmental assessment per established procedures. The procedure requires an assessment prior to any land disturbance, soil addition, digging, grading, or trenching outside the paved and concreted areas; maintenance activities near surface water, and wetlands and trimming or removal of native plants

other than landscape maintenance. Therefore, adverse impacts on protected plant species are not anticipated.

Decommissioning of SONGS Units 2 and 3 is not anticipated to adversely impact any federally or state-listed species. As discussed above, decommissioning activities will generally be limited to previously disturbed areas on-site, near-shore and off-shore. SCE will employ mitigation measures as required by the regulatory agencies to minimize impacts to the environment and protect listed species. In addition, SCE will implement BMPs and conduct assessments as called for in its environmental protection procedure(s), as well as comply with permit and regulatory requirements to minimize indirect impacts from noise, air emission, dust, and runoff. Therefore, impacts to threatened or endangered species from decommissioning are expected to be SMALL.

Table IV-1

Threatened and Endangered Species Identified within the Vicinity of SONGS

Scientific Name	Common Name	State Status[a]	Federal Status[b]	Critical Habitat within Vicinity
AMPHIBIAN SPECIES				
Anaxyrus californicus	Arroyo toad	—	FE	yes[c]
AVIAN SPECIES				
Charadrius alexandrinus nivosus	Western snowy plover	—	FT	yes[c]
Empidonax traillii extimus	Southwestern willow flycatcher	SE	FE	No
Haliaeetus leucocephalus	Bald eagle	SE	delisted	No
Polioptilacalifornica californica	Coastal California gnatcatcher	—	FT	yes[c]
Vireo bellii pusillus	Least Bell's vireo	SE	FE	yes[c]
FISH SPECIES				
Orcorhynchus mykiss	Steelhead trout	—	FE	yes[c]
INVERTEBRATE SPECIES				
Branchinecta sandiegoensis	San Diego fairy shrimp	—	FE	yes[c]
Streptocephalus woottoni	Riverside fairy shrimp	—	FE	No
MAMMALIAN SPECIES				

Scientific Name	Common Name	State Status[a]	Federal Status[b]	Critical Habitat within Vicinity
Dipodomys stephensi	Stephen's kangaroo rat	ST	FE	No
Perognathus longimembris pacificus	Pacific pocket mouse	—	FE	No
PLANT SPECIES				
Brodiaea filifolia	Thread-leafed brodiaea	SE	FT	yes[c]
REPTILIAN SPECIES				
Caretta caretta	Loggerhead sea turtle	—	FE	No
Chelonia mydas	Green sea turtle	—	FT	No
Dermochelys coriacea	Leatherback sea turtle	—	FE	No
Lepidochelys olivacea	Olive Ridley's turtle	—	FT	No

a. SE = state endangered; ST = state threatened;
b. FE = federally endangered; FT = federally threatened
c. The USFWS has critical habitat delineated within the SONGS site vicinity. However, the designation explicitly excludes Camp Pendleton and thus the SONGS site. Further, the term vicinity includes any area within a 6 mile radius of the site and is not limited to the site itself.

8. Radiological

Decommissioning activities have the potential to contribute to radiological impacts. SONGS Units 2 and 3 may continue to have limited gaseous and liquid radiological effluents until most of the decommissioning activities are complete and the irradiated fuel is transferred to dry storage. SCE is evaluating options to significantly reduce, if not eliminate, routine liquid effluents through the use of self-contained clean-up systems for ongoing systems and activities.

Occupational Dose

The GEIS estimates for the reference pressurized water reactor (PWR) dose is 1,215 person-rem for DECON. In the most recent supplement to the GEIS, the NRC reviewed data available from decommissioning experience subsequent to their initial review (in 1988). Because the range of cumulative occupational doses reported by reactors undergoing decommissioning was similar to the range of estimates for reference plants presented in the 1988 revision of the GEIS, the NRC did not update its estimates for occupational dose.

SCE expects the SONGS dose to be bounded by the referenced PWR dose since: a number of major components which often contribute to area dose rates are relatively new (steam generators and reactor vessel head); and, as a result of SONGS operational dose reduction efforts (i.e., zinc injection). A more detailed estimate will be developed to support evaluation of decontamination scope.

The regulatory standard for worker exposure is a dose limit per worker rather than a cumulative dose. Detailed occupational dose estimates will be performed as part of the work planning process. Such planning will address means to reduce occupational dose where appropriate. SCE remains committed to keeping dose to plant personnel 'As Low as Reasonably Achievable' (ALARA). The activities that have potential radiological impacts will be conducted in a manner to keep doses ALARA and well within regulatory limits.

Public Dose

The NRC generically concluded that reactors undergoing decommissioning could reasonably be expected to have emissions and public doses comparable to or substantially less than the levels experienced during normal operation of those facilities. The Radiological Environmental Monitoring Program (REMP) results demonstrate that the radiological environmental impact of the operation of SONGS Units 2 and 3, and the resulting dose to a member of the general public, is negligible.

SCE will continue to monitor effluents, comply with all applicable regulatory limits, and continue its REMP to assess the impacts to the environment from these effluents.

In summary, SCE estimates that SONGS Units 2 and 3 decommissioning activities will result in occupational and public doses within NRC estimates. Therefore, SONGS' radiological impacts during decommissioning are bounded by the GEIS which determined the radiological impacts to be SMALL.

9. Radiological Accidents

Many activities that occur during decommissioning are similar to activities that commonly take place during maintenance outages at operating plants such as decontamination and equipment removal. Accidents that could occur during these activities may result in injury and local contamination. However, they are not likely to result in contamination off-site.

The limiting design basis accidents (DBAs) applicable to a decommissioning plant are those involving the spent fuel pool. All DBAs and severe accidents involving the reactor are precluded as a result of transfer of spent fuel from the reactor vessels to the pools and ultimately the ISFSI. The environmental impacts of DBAs, including those associated with the spent fuel pool, were evaluated during the initial licensing process and documented in the FES. Furthermore, the impacts of these events are less than previously evaluated due to the time since the fuel was most recently irradiated.

The NRC's GEIS analysis relies in part on the waste confidence rule regarding spent nuclear fuel related severe accidents. The waste confidence GEIS (Reference 9) continues to consider severe accidents involving the spent fuel pool to be a SMALL risk.

Thus, SONGS' radiological accident impacts during decommissioning are bounded by NRC's Decommissioning GEIS which determined such risks to be SMALL.

10. Occupational Issues

SONGS currently has an industrial safety program and safety personnel to promote safe work practices and respond to occupational injuries and illnesses. Equivalent safety programs will continue to be in effect during decommissioning activities.

SONGS has an average occupational injury rate well below that of the heavy construction industry sector and consistent with the power generation and nuclear power industry. Decommissioning activities will be conducted in a manner reflecting personnel safety as a critical element. Therefore, SONGS occupational safety impacts are considered to be bounded by the GEIS which generically determined occupational safety impacts to be SMALL.

11. Cost

Decommissioning costs for SONGS are discussed in the DCE being submitted concurrently.

12. Socioeconomics

The primary socioeconomic impacts of decommissioning are related to staffing changes and decreasing tax revenues. Impacts related to the decision to permanently cease operations are outside the scope of this evaluation. SCE determined the staff reduction impacts from the decision to be minimal. The staff reductions represent 0.04 percent and 0.03 percent of San Diego County's and Orange County's workforces, respectively. Any impacts will be deferred somewhat due to the employment of temporary staff necessary to accomplish the various decommissioning activities.

Similarly, SONGS is located in San Diego County and its property assessment is a relatively small portion of San Diego County's total tax collections. Historically, SONGS' contribution to the county property tax collections has been consistently less than 1 percent. SONGS' tax obligations will be reduced due to decommissioning, but SCE and SONGS will continue to contribute to county tax revenues.

It is anticipated that there will be limited or no changes or impacts to the local community and socioeconomic conditions and less impact than would be expected generically where other nuclear facilities have a higher relative impact on the job market or tax base. Thus, SONGS' impacts are bounded by those considered in the GEIS in which the NRC generically determined socioeconomic impacts to be SMALL.

13. Environmental Justice

Decommissioning activities that may potentially affect identified minority and low-income populations include those related to staffing changes and offsite transportation. However, the assessment of environmental justice also considered other specific issues (e.g., water use, air quality). SCE has determined that no significant offsite impacts will be created by SONGS 2 & 3 decommissioning activities. As generic NRC guidance recognizes, if no significant offsite impacts occur in connection with the proposed action, then no member of the public will be substantially affected. Therefore, there can

be no disproportionately high and adverse impacts on members of the public, including minority and low-income populations. In addition, staffing is not anticipated to be an impact due to the large population and robust job market in the area (see Section 12 above).

The environmental justice evaluations utilize a 50-mile radius around the plant as the potentially impacted area. To complete this evaluation, the 2006–2010 low-income data and 2010 minority population data for California were obtained from the United States Census Bureau (USCB) and processed using ESRI ArcGIS 10.1 software. All census data were downloaded in USCB block group level geography so that the environmental justice evaluations were consistent between the minority and low-income analyses. The evaluations and results are detailed in the EIE which concluded there were no disproportionate impacts.

In its GEIS, the NRC concluded that adverse environmental justice impacts and associated significance of the impacts must be determined on a site-specific basis. Unlike many nuclear sites, SONGS is located in and near relatively large communities with significant other commercial and industrial activities. Thus, the impact of SONGS shutdown is less severe than may otherwise be the case. Further, SCE has determined that no significant offsite environmental impacts will be created by SONGS Units 2 and 3 decommissioning activities. Since no significant offsite impacts occur in connection with the proposed action, no member of the public will be substantially affected. Therefore, it is unlikely for there to be a disproportionately high and adverse impact or effects on specific groups or members of the public, including minority and low-income populations, resulting from the decommissioning of SONGS Units 2 and 3.

14. Cultural Historic and Archeological Resources

No prehistoric or historic archaeological sites or historic sites eligible for listing or listed on the National Register of Historic Places, California Register of Historical Resources, or San Diego County Local Register of Historical Resources are located within the SONGS site lease easement and no traditional cultural properties are known to be present. Two prehistoric archaeological sites and three historic archaeological sites were identified within 0.5 miles of SONGS Units 2 and 3.

All of these areas are outside the operational/decommissioning site. In its GEIS, the NRC concluded that for plants where the disturbance of lands beyond the operational areas is not anticipated, the impacts on cultural, historic, and archeological resources will be SMALL. Since decommissioning activities are confined to the SONGS site, no adverse impacts are anticipated. SONGS' impacts on cultural, historical, and archeological resources during decommissioning fall well within the bounds established by the NRC in the GEIS.

15. Aesthetic Issues

In its GEIS, the NRC stated that removal of structures is generally considered to be a beneficial aesthetic impact and drew the generic conclusion that for all plants, the potential impacts from decommissioning on aesthetics are SMALL and that any mitigation measures are not likely to be beneficial enough to be

warranted. Similarly, the aesthetic impact of final result of decommissioning SONGS Units 2 and 3 will be less than that of the current aesthetic impact of the plant. During dismantlement, any adverse visual intrusion will be temporary and will ultimately serve to reduce the aesthetic impact of the site. Therefore, the impacts of SONGS on aesthetic resources during decommissioning are bounded by the GEIS.

16. Noise

Offsite noise sources that affect the ambient noise environment in the vicinity of SONGS include Interstate-5, the San Diego Northern Railroad, and military operations. During the decommissioning process, the sounds that might be heard at offsite locations include noise from construction vehicles and tools. The timing of noise impacts and the duration or intensity will vary. The nearest sensitive receptors to SONGS are recreational users of San Onofre State Beach where the ambient noise environment can exceed 70 dBA. The more intense decommissioning activities will occur 400 ft or more from the beach access public walkway in front of the SONGS sea wall.

Due to the relatively high ambient noise levels surrounding SONGS, decommissioning activities are not expected to produce noise levels that could impact the activities of humans or threatened and endangered species. In addition, SCE will comply with the local noise regulations for construction sites, which restrict the average sound level at the property boundary to 75 dBA between 7 a.m. and 7 p.m., and any additional agency permit requirements including any lower allowed limits during evenings and overnight. Therefore, noise impacts during decommissioning of SONGS Units 2 and 3 are bounded by the previously issued GEIS, which generically determined the noise impacts associated with decommissioning to be SMALL.

17. Transportation

Transportation impacts are dependent on the number of shipments to and from the facility, the type of shipments, the distance that material is shipped, and the number of workers commuting to and from the site.

Transportation infrastructure within the vicinity of SONGS includes one major north- and south-bound freeway, I-5, an assortment of local and county roads, passenger and cargo rail service (part of the Los Angeles–San Diego corridor), and an existing rail spur serving the SONGS site. The 2011 average annual daily traffic (AADT) count for this portion of I-5 was 132,000 vehicles.

SCE compared the assumptions and analysis inputs used for NRC's analysis with waste volumes estimated for SONGS Units 2 and 3 decommissioning, transport mode, and disposal facility options. Due to the availability of the rail line, a substantial portion of the shipments will likely use that mode of transportation. The NRC indicates use of rail reduces radiological impacts by more than a factor of 10 over truck shipments. Furthermore, disposal facilities available for SONGS Units 2 and 3 radiological wastes are less than half the distance assumed by NRC in its analysis. Therefore the generic impacts bound those associated with SONGS Units 2 and 3.

Furthermore, SCE will comply with all applicable NRC and U.S. Department of Transportation (DOT) regulations, including Federal Railroad Administration regulations and requirements, and will use approved packaging and shipping containers for waste shipment. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol. The NRC has generically concluded that the radiological impacts of transporting radiological waste from decommissioning will be SMALL and those for SONGS Units 2 and 3 are bounded by the GEIS.

SCE estimated a peak of approximately 560 workers during decommissioning and the vehicular traffic due to commuting will likely exceed the 200 per peak hour threshold, prompting review for potential to impact traffic congestion as required under the local congestion management plan. SCE estimated peak truck traffic due to waste shipments to be approximately 150 per day. The decommissioning traffic associated with SONGS is considered negligible compared to existing traffic volumes and will not be expected to significantly alter congestion on roadways. In addition, this amount of traffic is not expected to significantly deteriorate roadways; therefore the GEIS is bounding and the non-radiological transportation impacts of decommissioning are SMALL.

Offshore activities to remove vertical risers on the intake and discharge conduits will increase marine vessel traffic in the area. It is expected that these activities will not cause either a navigational safety hazard or a substantial delay in the normal movements of commercial or recreational vessels. The environmental impacts review for the Unit 1 conduit disposition indicated that impacts to recreational and commercial transportation will be insignificant.

18. Irreversible and Irretrievable Commitment of Resources

SONGS Units 2 and 3 decommissioning will involve dismantlement and removal of structures and restoration of the property to a state for unrestricted release per NRC regulations in accordance with the criteria for license termination in 10 CFR 20, Subpart E. Furthermore, the property will be returned to the U.S. Navy under negotiated terms of the easement. The activities necessary to decommission SONGS Units 2 and 3 involve a minor irretrievable commitment of consumable materials (including materials for decontamination, solvents, industrial gases, tools, fuel, etc.). The irreversible commitment of such resources is not unique and is bounded by those considered by the NRC in the GEIS which concluded consumption to be minor.

Waste from decommissioning of SONGS Units 2 and 3 will consume space at waste facilities. California has multiple facilities permitted for the storage, treatment, and disposal of hazardous and universal waste. The nonradioactive waste is assumed to be shipped to an out-of-state landfill due to the moratorium on disposal of decommissioned materials at California nonhazardous landfills. The decommissioning of SONGS Units 2 and 3 will result in minor irretrievable or irreversible commitment of resources bounded by the GEIS in which the NRC determined will be SMALL impacts.

B. Environmental Impacts of License Termination – NUREG-1496

The License Termination Plan (LTP) has not yet been developed. As noted earlier, it is required to be submitted at least two years prior to the proposed termination date. In general, the LTP outlines the basis for an administrative/legal activity. No physical work beyond that already addressed is anticipated. Thus, there are no environmental impacts beyond those already addressed that need to be addressed at this point in the process.

C. Discussion of Decommissioning in the FES

Applicable portions of the FES were addressed as noted in each of the topics previously summarized.

D. Additional Considerations

SCE has not identified any unique considerations that need to be further addressed. The previous topic summaries address a sufficiently wide range of issues.

E. Conclusion

SCE has performed an environmental review to evaluate environmental impacts associated with decommissioning activities, confirming that the anticipated or potential impacts are within the bounds of the generic impacts that NRC described in the GEIS. Further, while there are no applicable bounding impacts for threatened and endangered species and environmental justice discussed in the GEIS, the SONGS Units 2 and 3 decommissioning activities are not anticipated to result in significant impacts to threatened and endangered species or disproportionate impacts on minority or low-income populations. This is principally due to the following:

- Planned activities fall within the activities that the NRC evaluated. There are no unique aspects of the plant or decommissioning techniques that will invalidate previously drawn conclusions.
- Methods to be employed to dismantle and decontaminate the site are standard construction-based techniques fully considered in the GEIS.
- SCE will continue to comply with NRC dose limits and conduct activities in accordance with ALARA principles.
- SCE will continue to comply with the SONGS Offsite Dose Calculation Manual, Radiological Effluent Monitoring Program, and the Ground Water Protection Initiative Program during decommissioning. Each will likely be modified somewhat to reflect changes in site configuration, etc.
- SCE will comply with all applicable NRC and DOT regulations, including Federal Railroad Administration regulations and requirements, and use approved packaging and shipping containers for the shipping of radiological waste. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol.

- SCE will continue to comply with federal, state, and local requirements for non-radiological interfaces with the environment including limitations on water withdrawal and discharges, air emissions including criteria pollutants and fugitive dust, noise levels, protection of avian, terrestrial and aquatic species, cultural resources, disposal of non-radiological waste, and worker health protection.
- SCE will seek and comply with an amendment to its CSLC easement lease to largely abandon the intake and discharge conduits in place.
- SCE will seek and comply with a coastal development permit from the CCC for decommissioning.

V. REFERENCES

A. GENERAL DEVELOPMENTAL REFERENCES

1. NRC Regulatory Guide 1.185, Revision 1, June 2013, Standard Format and Content Guide for Post-Shutdown Decommissioning Activities Report
2. Energy*Solutions* Document No. 164001, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2 and 3"
3. Enercon Technical Data Record No. SONGS002, "SONGS Units 2 and 3 Environmental Impact Evaluation"

B. SPECIFIC REFERENCES IN TEXT

1. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission dated February 13, 2014; Subject: Access to Nuclear Decommissioning Trust Funds, San Onofre Nuclear Station, Units 2 and 3.
2. Letter from Richard C. Brabec (SCE) to the U. S. Nuclear Regulatory Commission dated March 31, 2014; Subject: Decommissioning Funding Status Report, San Onofre Nuclear Generating Station Units 2 and 3
3. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations San Onofre Nuclear Generating Station, Units 2 and 3
4. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated June 28, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 3
5. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated July 22, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 2
6. U. S. Nuclear Regulatory Commission; NUREG-0586, "Final Generic Environmental Impact Statement (GEIS) on Decommissioning Nuclear Facilities" (November 2002)
7. AIF/NESP-036, "A Guideline for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates"
8. U.S. Nuclear Regulatory Commission, NUREG-0490, "Final Environmental Statement related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3" (April 1981)
9. U. S. Nuclear Regulatory Commission, NUREG-2157, "Waste Confidence Generic Environmental Impact Statement, Report for Comment" (August 2014)
10. U. S. Nuclear Regulatory Commission, NUREG-1496, Volume 1, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities" (July 1997)
11. NEI 07-07, "Industry Groundwater Protection Initiative, Final Guidance Document," in August 2007

EXHIBIT 2

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Thomas J. Palmisano
Vice President & Chief Nuclear Officer

10 CFR 50.82(a)(4)(i)

September 23, 2014

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C. 20555-0001

Subject: **Docket Nos. 50-361 and 50-362,**
San Onofre Nuclear Generating Station, Units 2 and 3
Irradiated Fuel Management Plan

Reference Letter from P.T. Dietrich (SCE) to the U.S. Nuclear Regulatory Commission, dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station, Units 2 and 3

Dear Sir or Madam:

On June 12, 2013, SCE submitted the referenced letter to the U.S. Nuclear Regulatory Commission (NRC) certifying the permanent cessation of operations at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, in accordance with 10 CFR 50.54(bb) and 10 CFR 50.82(a)(4)(i), Southern California Edison (SCE) is required to submit an Irradiated Fuel Management Plan (IFMP), Site Specific Decommissioning Cost Estimate (DCE) and Post-Shutdown Decommissioning Activities Report (PSDAR) within two years of permanent cessation of operations.

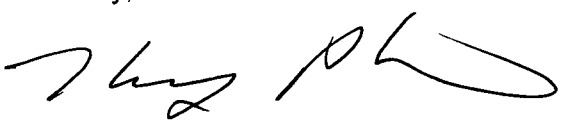
The SONGS, Units 2 and 3 IFMP is attached. The DCE and PSDAR are being concurrently submitted under separate cover letters. The IFMP represents SCE's current plans and is subject to change as the project progresses. In particular, the Independent Spent Fuel Storage Installation location, and storage equipment and vendor(s) have not been selected. The decision making and procurement activities are underway but have not been finalized.

Changes to significant details will be included in subsequent revisions to the IFMP as required by 10 CFR 50.54(bb). Financial assurance information will be provided on an annual basis as required by 10 CFR 50.75(f)(1).

This letter does not contain any new commitments.

If there are any questions or if additional information is needed, please contact me or Ms. Andrea Sterdis at (949) 368-9985.

Sincerely,



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A001
NRR

Enclosure: San Onofre Nuclear Generating Station Units 2 and 3 Irradiated Fuel Management Plan

cc: M. L. Dapas, Regional Administrator, NRC Region IV
T. J. Wengert, NRC Project Manager, SONGS, Units 2 and 3
T. J, Warnick, NRC Project Manager, San Onofre Units 2 and 3 Decommissioning
R. E. Lantz, NRC Region IV, San Onofre Units 2 and 3
S. Y. Hsu, California Department of Health Services, Radiologic Health Branch

SONGS Units 2 and 3 Irradiated Fuel Management Plan

I. Background and Introduction

On June 12, 2013, Southern California Edison (SCE) submitted a letter to the U.S. Nuclear Regulatory Commission (NRC) (Reference 1) certifying the permanent cessation of operations at San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 effective June 7, 2013, in accordance with 10 CFR 50.82(a)(1)(i). All fuel was removed from the SONGS Units 2 and 3 reactor vessels and placed in their respective spent fuel pools as certified in accordance with 10 CFR 50.82(a)(1)(ii) (References 2 and 3).

Pursuant to 10 CFR 50.54(bb), licensees are required to submit a plan for the management of irradiated fuel until title and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository. The Irradiated Fuel Management Plan (IFMP) is required to be submitted to the Commission either five years before expiration of the Operating License or within two years following permanent cessation of operations, whichever occurs first. Therefore, the SONGS Units 2 and 3 plans are required to be submitted prior to June 7, 2015, two years following the cessation of operations. This submittal constitutes SCE's IFMP for SONGS Units 2 and 3, submitted on behalf of itself and the other SONGS Participants responsible for the funding of the SONGS decommissioning. The other SONGS Participants are the City of Anaheim, the City of Riverside, and San Diego Gas & Electric Company (SDG&E).

Energy*Solutions*, LLC has prepared a site-specific decommissioning cost estimate (DCE) for SONGS Units 2 and 3 (Reference 15). The DCE identifies the details, schedules, and costs of spent fuel management activities associated with the IFMP, along with license termination and site restoration activities and costs. This DCE is being submitted concurrent with the Post-Shutdown Decommissioning Activities Report (PSDAR, Reference 4) and this plan. The assumptions regarding the United States Department of Energy (US DOE) acceptance of irradiated fuel is consistent with the Energy*Solutions* DCE and is based on testimony filed with the California Public Utility Commission (Reference 13). The SONGS Units 2 and 3 DCE and this IFMP are based on commencement of industry-wide acceptance of spent fuel by US DOE in 2024.

II. Irradiated Fuel Management Strategy

The safe initial interim storage of SONGS Units 2 and 3 irradiated fuel will be "wet storage" in each unit's respective spent fuel pool. The spent fuel pools will be isolated from their normal support systems and those systems replaced by stand-alone cooling and filtration units (also termed a "spent fuel pool island"). Doing so facilitates earlier system abandonment and parallel decommissioning activities.

Subsequently, all irradiated fuel in the SONGS Units 2 and 3 spent fuel pools will be safely transferred to "dry storage" at the common Independent Spent Fuel Storage Installation (ISFSI) located on the SONGS site. Dry storage is also considered interim storage pending transfer to the US DOE.

A total of 1,726 irradiated fuel assemblies have been generated in SONGS Unit 2 and 1,734 irradiated fuel assemblies have been generated in SONGS Unit 3, for a total of 3,460 irradiated fuel assemblies. At present, 792 SONGS Units 2 and 3 irradiated fuel assemblies have already been transferred to the common ISFSI. The remaining 2,668 irradiated fuel assembles will be loaded into Dry Shielded Canisters (DSCs) and transferred to the ISFSI.

The current ISFSI is located inside the Owner Controlled Area. It was constructed to accommodate SONGS Unit 1 irradiated fuel and provides additional capacity for a limited amount of SONGS Units 2 and 3 irradiated fuel.

The ISFSI currently contains 18 DSCs storing Unit 1 fuel and Greater than Class C (GTCC) waste. The ISFSI also contains 33 DSCs which store Units 2 and 3 fuel. All of the fuel on the ISFSI is stored in Transnuclear NUHOMS Model Number-24PT1 or PT4 DSCs.

The major IFMP activity phases, including start and end dates and associated costs for each period are identified in Table 1. The identified Spent Nuclear Fuel (SNF) Periods are developed in and align with the site-specific DCE (Reference 15).

The current plans are to obtain necessary permits for the ISFSI to be expanded to accommodate the remaining inventory of the SONGS Units 2 and 3 spent fuel pools. SONGS plans to commence the movement of irradiated fuel from the Unit 2 and Unit 3 pools to the ISFSI in 2017. SONGS expects to complete the transfer in 2019. Additional DSCs will be procured from one or more of the available dry storage system suppliers beginning in 2014. An additional 47 DSCs will be required for the SONGS Unit 2 irradiated fuel and an additional 44 DSCs will be required for the SONGS Unit 3

irradiated fuel (depending on the capacity of the selected system and the number of DSCs needed to store GTCC waste and other materials). The spent fuel pool inventory is forecast to be transferred to the ISFSI no later than the end of 2019.

The US DOE Standard Contracts for acceptance and disposal of spent nuclear fuel and high level waste contain the basis for the initial ranking of industry-wide spent fuel acceptance obligations based upon the date of permanent removal of the spent nuclear fuel from service ("oldest fuel first" allocation). Those Standard Contracts also contain provisions allowing for "exchanges" of acceptance obligations, and priority for retired units. Given the US DOE's lack of performance, a common assumption for purposes of this fuel management plan is to base acceptance projections upon application of an "oldest fuel first" allocation scheme to a projected start date for repository operations. This plan is based upon a 2024 start date (Reference 13) for US DOE acceptance of spent fuel from the industry and the SONGS Units 2 and 3 positions in the queue. As indicated in Table 3, SCE is therefore assuming all fuel will be removed from the SONGS site as of 2049. Based on this assumption, the ISFSI will be subsequently decommissioned by the 2051 final license termination date.

III. Financial Assurance

The regulations (10 CFR 50.54(bb)) also require that funding adequacy be demonstrated to support the irradiated fuel management plan.

The cost of twelve (12) additional DSCs to be stored on the current ISFSI was funded from sources other than the Nuclear Decommissioning Trusts (NDT) (Reference 5), as are the costs associated with ongoing storage of Unit 1 spent fuel at the GE-Hitachi Nuclear America LLC's Morris Operation ISFSI located in Morris, Illinois. Table 1 includes the costs of procurement and construction of the expanded ISFSI capacity and all loading costs. Operation of the spent fuel pools is modeled as being discontinued in 2019 after all of the fuel has been transferred to dry storage. ISFSI operations continue until the US DOE is able to complete the transfer of the SONGS fuel to a repository or interim storage facility, which is currently assumed to occur by 2049.

SONGS management is committed to providing consistent and up-to-date information to all of its stakeholders and regulators. Aspects of the SONGS Nuclear Decommissioning Trust Fund are regulated by both the California Public Utilities Commission (CPUC) and the NRC. Previous Decommissioning Cost Estimates (DCEs) were updated and submitted to the CPUC as part of the Nuclear Decommissioning Cost Triennial Proceedings (Reference 5). Financial assurance reports including the balances and expenditures for SONGS Unit 1 were supplied to the NRC (as required by 10 CFR

50.82(a)(8)(v)) annually (most recently in Reference 6) and balances for SONGS Units 2 and 3 were submitted on a biennial basis (as required by 10 CFR 50.75(f)(1)) (most recently in Reference 7). Reports regarding ISFSI costs and decommissioning funding assurance for these costs were summarized triennially as required by 10 CFR 72.30(c) (most recently in Reference 8). Going forward, balances and expenditures will be supplied annually to the NRC for all three units and the ISFSI.

An updated site-specific DCE will be concurrently submitted to the NRC. As summarized in Table 1, this plan is based on decommissioning and the termination of the license by 2051, approximately 38 years following the permanent cessation of operations. The summary in Table 1 includes the funds for dry storage through 2049 and final release of the ISFSI in 2051.

Tables 4A and 4B summarize the estimated annual spending for all decommissioning activities (License Termination, Spent Fuel Management, and Site Restoration), and combined NDT current balances in 2014 dollars. Table 2 reflects key tasks addressed by the NRC staff in a recent safety evaluation.

The total of all Nuclear Decommissioning Trust funds balances for SONGS Units 2 and 3 was $3,926 million as of December 31, 2013 (Reference 9). Evaluation of the projected cash flows assuming earnings on existing balances as permitted by NRC regulations demonstrates the adequacy of the existing funds to cover all aspects of decommissioning, including the costs of irradiated fuel management. This demonstrates that the balance in the decommissioning trust is adequate to fund all aspects of decommissioning as well as the costs of irradiated fuel management. As decommissioning proceeds the DCE will be updated as appropriate and annual updates of spending and trust fund balances will be docketed as required.

IV. Regulatory Activities

The IFMP assumes that the SONGS Participants will make withdrawals from their nuclear decommissioning trusts for spent fuel management purposes. The SONGS Participants have collected funds from ratepayers and accumulated funds in the nuclear decommissioning trusts for the purpose of funding three primary categories of costs: (1) License Termination; (2) Spent Fuel Management; and (3) Site Restoration. On November 18, 2013, SCE filed a Tier 3 Advice Letter (Reference 10) with the CPUC to obtain authorization for the use of funds in the near term and to establish processes for further CPUC oversight of withdrawals from the nuclear decommissioning trusts. On February 21, 2014, SDG&E filed a similar letter (Reference 14) with the CPUC. In addition to authorizing and overseeing the withdrawals, the CPUC is expected to

designate the specific amounts from the existing fund balances that are available for License Termination and therefore subject to 10 CFR 50.82(a)(8)(i)(A) and 10 CFR 50.75(h)(2). The fund balances would then be allocated to separate subaccounts within each trust fund and, as such, available for spent fuel management and site restoration, consistent with the requirements of 10 CFR 50.75, 10 CFR 50.82, and 10 CFR 72.30.

To confirm such access, SCE requested (Reference 11) an exemption from 10 CFR 50.75 and 50.82 to authorize the use of trust funds to pay for spent fuel management and site restoration including other transitional costs. The regulations limit the use of the nuclear trust fund to decommissioning costs. This exemption was granted on September 5, 2014 (Reference 12).

The SONGS Participants responsible for decommissioning will periodically review the amount of cash contributions required for the decommissioning fund to ensure that withdrawals do not inhibit the ability of the licensee to complete NRC License Termination, Spent Fuel Management, and Site Restoration. The SONGS Participants will obtain authorization as necessary through the ratemaking processes to provide for further contributions if required.

In accordance with 10 CFR 50.82(a)(8)(vii), SONGS will annually submit to the NRC by March 31st a report on the status of the funding for managing spent fuel. The report will include, current through the end of the previous calendar year, the amount of funds accumulated to cover the cost of managing the spent fuel, the projected cost of managing spent fuel until title to the fuel and possession of the fuel is transferred to the Secretary of Energy, and if the funds accumulated do not cover the projected cost, a plan to provide additional funding assurance using one of the methods allowed by NRC regulations.

V. References

1. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Dockets 50-361 and 50,362, Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station Units 2 and 3, dated June 12, 2013

2. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Dockets 50-361 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2, dated July 22, 2013

3. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Dockets 50-362 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 3, dated June 28, 2013

4. SONGS Units 2 and 3 Post-Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station

5. Decommissioning Cost Estimate, 2013 Scenario, dated July 11, 2013, ABZ, Incorporated. Used in support of Nuclear Decommissioning Cost Triennial Proceeding, Exhibit SCE-12

6. Letter from Richard C. Brabec, Southern California Edison to U. S. Nuclear Regulatory Commission, Subject: 10 CFR 50.75(f)(1) and 10 CFR 50.82(a)(8)(v-vii) Decommissioning Funding Status Report San Onofre Nuclear Generating Station Unit 1 dated March 31, 2014

7. Letter from Richard C. Brabec, Southern California Edison to U. S. Nuclear Regulatory Commission, Subject: 10 CFR 50.75(f)(1) Decommissioning Funding Status Report, San Onofre Nuclear Generating Station Units 2 and 3 dated March 31, 2014

8. Letter from Douglas R. Bauder, Southern California Edison U. S. Nuclear Regulatory Commission , Subject: 10 CFR 72.30 ISFSI Decommissioning Funding Plan, San Onofre Nuclear Generating Station Units 1, 2 & 3 dated December 14, 2012

9. Letter from Richard C. Brabec, Southern California Edison to U.S. Nuclear Regulatory Commission, Subject: San Onofre Nuclear Generating Station, Units 2 and 3 Access to Nuclear Decommissioning Trust Funds, Supplemental Information, Dated March 12, 2014

10. Letter from Megan Scott-Kakures, Southern California Edison, to Public Utilities Commission of the State of California Energy Division Submitting a Tier 3 Advice Letter Requesting (1) Authorization of Disbursements from the Master Trusts for San Onofre Nuclear Generating Station; (2) Approval of Tier 2 Advice Letter to Process for Future Disbursements; (3) Designation of Trust Amounts Set Aside for License Termination; and (4) Approval of Balancing Account, dated November 18, 2013

11. Letter from Tom J. Palmisano, Southern California Edison, to U. S. Nuclear Regulatory Commission, Subject: San Onofre Nuclear Generating Station Units 2 and 3, Access to Nuclear Decommissioning Trust Funds, dated February 13, 2014

12. Letter from Thomas Wengert, Nuclear Regulatory Commission to Tom J. Palmisano, Southern California Edison, Granting Exemptions from the Requirements of 10 CFR 50, Sections 50.82(a)(8)(i)(A) and 50.75(h)(2) (TAC Nos. MF3544 an MF 3545) dated September 5, 2014

13. Testimony on Nuclear Decommissioning of SONGS 2 & 3 and Palo Verde, exhibit No. SCE-2, dated December 21, 2012

14. Letter from Clay Faber, San Diego Gas & Electric, to Public Utilities Commission of the State of California submitting a Tier 3 Advice Letter Requesting (1) Designation of SONGS 2&3 Costs Incurred During and After June 2013 As Decommissioning Costs Eligible for Payment with Trust Funds; (2) Authorization of Disbursements from the Master Trusts for San Onofre Nuclear Generating Station; (3) Approval of Tier 2 Advice Letter Process for Future Trust Disbursements; (4) Acknowledgement That Funds Have Been Collected From Ratepayers and Have Been Accumulating In The Trusts To Be Used for NRC and Non-NRC Jurisdictional Decommissioning Cost Categories; and (5) Designation of an Allocation of the SDG&E SONGS 2&3 Trusts Among the Major Decommissioning Cost Categories, dated February 21, 2014

15. EnergySolutions Document No. 164001, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2 and 3"

SONGS Units 2 and 3 Irradiated Fuel Management Plan

Table 1

Irradiated Fuel Management Plan – Summary Schedule

Cost and Schedule Summary (2014 Dollars in thousands)							
Spent Fuel 10 CFR 50.54(bb)							
Period No.	**Period Description**	**Start**	**End**	**Years**	**Unit 2 Cost**	**Unit 3 Cost**	**Total Cost**
SNF Pd 1	Spent Fuel Management Transition	6/7/2013	12/31/2013	0.56	$63,891	$66,105	$129,997
SNF Pd 2	Spent Fuel Transfer to Dry Storage	1/1/2014	6/1/2019	5.41	$344,629	$372,193	$716,822
SNF Pd 3	Dry Storage During Decommissioning – Units 1, 2 and 3	6/1/2019	12/5/2031	12.51	$61,425	$61,425	$122,849
SNF Pd 4	Dry Storage Only – Units 1, 2 and 3	12/5/2031	12/31/2035	4.07	$29,383	$29,383	$58,765
SNF Pd 5	Dry Storage Only – Units 2 and 3	12/31/2035	12/31/2049	14.00	$107,326	$107,326	$214,653
SNF D&D Pd 1	ISFSI License Termination	12/31/2049	5/6/2050	0.34	$1,260	$1,260	$2,520
SNF D&D Pd 2	ISFSI Demolition	5/6/2050	9/8/2051	1.34	$15,295	$15,295	$30,590
	Category Total			**38.23**	**$623,209**	**$652,987**	**$1,276,196**

Table 2
Major Fuel Management Tasks

Major Fuel Management Task Direct Costs (Note 1)	Explanatory or Additional Details	Estimate in DCE (in Thousands)	Schedule in DCE
Estimated Costs to isolate spent fuel pools and fuel handling systems	• Estimated cost for Islanding • No additional costs are required for fuel handling systems. Cranes are single-failure proof	$ 22,183 (Note 2)	6/2015
Estimated cost to construct an ISFSI or a combination of wet/dry storage	• ISFSI in operation; so, current costs are for wet/dry combination. • Costs are associated with capacity expansion (pad and associated facility costs, DSCs and HSMs).	$ 396,391 (Note 3)	6/2019
Estimated annual cost for the operation of the selected option	• Operational and maintenance costs are NOT readily separable (fuel storage support vice other demands); but, are included in Table 4 cash flows.	N/A	Ongoing
Estimated cost for preparation, packaging and shipping of fuel to DOE	• Off-site transportation costs are part of contract with US DOE.	$ 6,742 (Note 4)	Thru 12/2049
Estimated cost to decommission the ISFSI	• Funded from both Unit 1 and Units 2&3 Decommissioning Trust Funds.	$ 33,110 (Note 5)	2049-2051
Brief discussion of selected storage method or methods and estimated time frame for these activities	• See Section II for selected methods. • See Table 1 for time frames.	N/A	N/A

Notes:

1. Tasks from NRC Safety Evaluation (SE) on Kewaunee Integrated Fuel Management Plan dated, September 28, 2009, publically available under ADAMS Accession No. ML092321079
2. Cost based on DCE, DECON Pd 2, Items 2.23 through 2.30
3. Cost based on DCE, SNF Pd 2, Items 8.05 through 8.13
4. Cost based on SNF Pd 4 and SNF Pd 5, Item 2.03
5. Cost based on DCE, total of SNF D&D Pd 1 and SNF Pd 2

SONGS Units 2 and 3 Irradiated Fuel Management Plan

Table 3

SONGS Unit 2 & Unit 3
Spent Fuel Shipping Schedule
2024 DOE Acceptance

	On-Site Inventory (Beginning of the Year)				On-Site Transfers (During Year)		Off-Site Transfers (During Year)			
Year	Unit 2 & 3 Fuel Assemblies in Wet Storage	Units 2 & 3 Fuel Assemblies in Dry Storage	Units 2 & 3 Fuel Assemblies in On-Site Storage	Units 2 &3 Canisters in ISFSI	Unit 2 & 3 Fuel Assemblies Transferred to ISFSI	Unit 2 & 3 Canisters Transferred to ISFSI	Unit 2 Assemblies Transferred to DOE	Unit 3 Assemblies Transferred to DOE	Unit 2 & 3 Assemblies Transferred to DOE	Unit 2 & 3 Canisters Transferred to DOE
2014	2668	792	3460	33	0	0	0	0	0	0
2015	2668	792	3460	33	0	0	0	0	0	0
2016	2668	792	3460	33	0	0	0	0	0	0
2017	2668	792	3460	33	768	24	0	0	0	0
2018	1900	1560	3460	57	1536	48	0	0	0	0
2019	364	3096	3460	105	364	13	0	0	0	0
2020	0	3460	3460	118	0	0	0	0	0	0
2021	0	3460	3460	118	0	0	0	0	0	0
2022	0	3460	3460	118	0	0	0	0	0	0
2023	0	3460	3460	118	0	0	0	0	0	0
2024	0	3460	3460	118	0	0	0	0	0	0
2025	0	3460	3460	118	0	0	0	0	0	0
2026	0	3460	3460	118	0	0	0	0	0	0
2027	0	3460	3460	118	0	0	0	0	0	0
2028	0	3460	3460	118	0	0	0	0	0	0
2029	0	3460	3460	118	0	0	0	0	0	0
2030	0	3460	3460	118	0	0	48	48	96	4
2031	0	3364	3364	114	0	0	192	96	288	12
2032	0	3076	3076	102	0	0	120	120	240	10
2033	0	2836	2836	92	0	0	0	96	96	4
2034	0	2740	2740	88	0	0	112	120	232	8
2035	0	2508	2508	80	0	0	96	96	192	6
2036	0	2316	2316	74	0	0	128	96	224	7
2037	0	2092	2092	67	0	0	0	0	0	0
2038	0	2092	2092	67	0	0	96	128	224	7
2039	0	1868	1868	60	0	0	96	96	192	6
2040	0	1676	1676	54	0	0	96	96	192	6
2041	0	1484	1484	48	0	0	0	0	0	0
2042	0	1484	1484	48	0	0	96	96	192	6
2043	0	1292	1292	42	0	0	96	96	192	6
2044	0	1100	1100	36	0	0	96	96	192	6
2045	0	908	908	30	0	0	128	96	224	7
2046	0	684	684	23	0	0	96	128	224	7
2047	0	460	460	16	0	0	96	230	326	11
2048	0	134	134	5	0	0	0	0	0	0
2049	0	134	134	5	0	0	134	0	134	5
2050	0	0	0	0	0	0	0	0	0	0

Note: The number of canisters listed are for storage of irradiated fuel not GTCC waste.

Table 4A
SONGS Unit 2
Decommissioning Funding Plan

Year	Radiological Decontamination	Spent Fuel Management	Site Restoration	Total Decommissioning Costs	Available Funds
2013	$25,749	$63,891	$49,067	$138,706	$1,847,000
2014	$79,799	$35,719	$15,089	$130,607	
2015	$69,196	$106,308	$7,439	$182,943	
2016	$54,541	$59,308	$3,730	$117,579	
2017	$111,903	$59,308	$1,957	$173,168	
2018	$47,520	$59,308	$0	$106,828	
2019	$108,328	$27,554	$13,539	$149,420	
2020	$185,482	$4,908	$36	$190,426	
2021	$79,081	$4,908	$36	$84,026	
2022	$54,785	$4,908	$1,927	$61,621	
2023	$158,207	$4,908	$36	$163,151	
2024	$37,930	$4,908	$16,848	$59.687	
2025	$2,922	$4,908	$44,621	$52,451	
2026	$2,922	$4,908	$19,412	$27,243	
2027	$2,922	$4,908	$22,469	$30,299	
2028	$2,922	$4,908	$31,688	$39,518	
2029	$2,922	$4,908	$66,873	$74,704	
2030	$2,922	$4,908	$71,867	$79,697	
2031	$2,055	$5,089	$23,181	$30.325	
2032	$2,122	$7,214	$0	$9,336	
2033	$0	$7,214	$0	$7,214	
2034	$0	$7,214	$0	$7,214	
2035	$0	$7,228	$0	$7,228	
2036	$0	$7,665	$0	$7,665	
2037	$0	$7,665	$0	$7,665	
2038	$0	$7,665	$0	$7,665	
2039	$0	$7,665	$0	$7,665	
2040	$0	$7,665	$0	$7,665	
2041	$0	$7,665	$0	$7,665	
2042	$0	$7,665	$0	$7,665	
2043	$0	$7,665	$0	$7,665	
2044	$0	$7,665	$0	$7,665	
2045	$0	$7,665	$0	$7,665	
2046	$0	$7,665	$0	$7,665	
2047	$0	$7,665	$0	$7,665	
2048	$0	$7,665	$0	$7,665	
2049	$0	$7,667	$0	$7,667	
2050	$0	$9,974	$20,177	$30,151	
2051	$0	$6,573	$11,928	$18,500	
2052	$0	$0	$1,377	$1,377	

Notes: Costs are in 2014 dollars (in thousands) and are not escalated from the base year
SONGS Unit 2 Trust fund balances at end of 2013 were $1,847,000

Table 4B
SONGS Unit 3
Decommissioning Funding Plan

Year	Radiological Decontamination	Spent Fuel Management	Site Restoration	Total Decommissioning Costs	Available Funds
2013	$26,566	$66,105	$49,067	$141,739	$2,079,400
2014	$78,964	$40,156	$15,969	$135,089	
2015	$74,096	$112,024	$9,390	$195,509	
2016	$61,451	$64,405	$25,227	$151,083	
2017	$40,631	$64,405	$3,799	$108,835	
2018	$86,348	$64,405	$0	$150,753	
2019	$96,521	$29,675	$13,908	$140.014	
2020	$120,873	$4,908	$2,135	$127,916	
2021	$194,090	$4,908	$575	$199,574	
2022	$135,313	$4,908	$2,467	$142,688	
2023	$114,581	$4,908	$1,511	$121,000	
2024	$26,874	$4,908	$36,778	$68,560	
2025	$2,922	$4,908	$40,655	$48,485	
2026	$2,922	$4,908	$21,676	$29,507	
2027	$2,922	$4,908	$25,848	$33,678	
2028	$2,922	$4,908	$20,945	$28,776	
2029	$2,922	$4,908	$117,321	$125,151	
2030	$2,922	$4,908	$116,672	$124,503	
2031	$2,055	$5,089	$25,501	$32,645	
2032	$2,122	$7,214	$0	$9,336	
2033	$0	$7,214	$0	$7,214	
2034	$0	$7,214	$0	$7,214	
2035	$0	$7,228	$0	$7,228	
2036	$0	$7,665	$0	$7,665	
2037	$0	$7,665	$0	$7,665	
2038	$0	$7,665	$0	$7,665	
2039	$0	$7,665	$0	$7,665	
2040	$0	$7,665	$0	$7,665	
2041	$0	$7,665	$0	$7,665	
2042	$0	$7,665	$0	$7,665	
2043	$0	$7,665	$0	$7,665	
2044	$0	$7,665	$0	$7,665	
2045	$0	$7,665	$0	$7,665	
2046	$0	$7,665	$0	$7,665	
2047	$0	$7,665	$0	$7,665	
2048	$0	$7,665	$0	$7,665	
2049	$0	$7,667	$0	$7,667	
2050	$0	$9,974	$23,120	$33,094	
2051	$0	$6,573	$45,566	$52,139	
2052	$0	$0	$1,377	$1,377	

Notes: Costs are in 2014 dollars (in thousands) and are not escalated from the base year
SONGS Unit 3 Trust Fund balances at end of 2013 were $2,079,400

EXHIBIT 3

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Thomas J. Palmisano
Vice President & Chief Nuclear Officer

10 CFR 50.82(a)(4)(i)

September 23, 2014

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C. 20555-0001

Subject: **Docket Nos. 50-361 and 50-362,**
San Onofre Nuclear Generating Station, Units 2 and 3
Site Specific Decommissioning Cost Estimate

References:

1. Letter from P. T. Dietrich (SCE) to the U.S. Nuclear Regulatory Commission dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations San Onofre Nuclear Generating Station, Units 2 and 3

2. Letter from Thomas J. Palmisano (SCE) to the U.S. Nuclear Regulatory Commission dated February 13, 2014; Subject: Access to Nuclear Decommissioning Trust Funds, San Onofre Nuclear Station, Units 2 and 3

3. Letter from Richard C. Brabec (SCE) to the U.S. Nuclear Regulatory Commission dated March 12, 2014; Subject: Access to Decommissioning Trust Funds, San Onofre Nuclear Generating Station Units 2 and 3

4. Letter from Richard C. Brabec (SCE) to the U.S. Nuclear Regulatory Commission dated March 31, 2014; Subject: 10 CFR 50.75(f)(1) Decommissioning Funding Status Report, San Onofre Nuclear Generating Station Units 2 and 3

Dear Sir or Madam:

On June 12, 2013, in accordance with 10 CFR 50.82(a)(1)(i), Southern California Edison (SCE) submitted a letter to the U.S. Nuclear Regulatory Commission (NRC) (Reference 1) certifying the permanent cessation of operations at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. In accordance with 10 CFR 50.54(bb) and 10 CFR 50.82(a)(4)(i), SCE is required to submit an Irradiated Fuel Management Plan (IFMP), Site Specific Decommissioning Cost Estimate (DCE) and Post-Shutdown Decommissioning Activities Report (PSDAR) within two years of permanent cessation of operations.

The SONGS, Units 2 and 3 DCE is attached. The SONGS, Units 2 and 3 IFMP and PSDAR are being concurrently submitted under separate cover letters. The DCE provides more current estimates of annual cash flow than were previously provided in the Nuclear Decommissioning Trust Fund Exemption Request (References 2 and 3) and annual funding assurance update (Reference 4). Future filings with the California Public Utilities Commission will be based on the SONGS, Units 2 and 3 DCE and subsequent revisions.

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A001
NRR

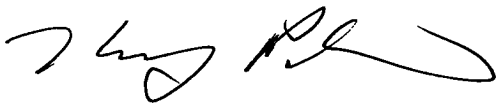
The descriptions of decommissioning activities and phases in the DCE are consistent with those described in the PSDAR. Both the DCE and PSDAR represent SCE's current plans and are subject to change as the project progresses. Much of the third-party contracting activities associated with decommissioning are underway but have not been finalized. As contracts are finalized and SCE progresses through the actual work of the decommissioning project, various risks will be realized or avoided and contingencies adjusted, accordingly.

Changes to significant details will be included in subsequent revisions to the DCE as required by 10 CFR 50.54(bb). Financial assurance information will be provided on an annual basis as required by 10 CFR 50.75(f)(1).

This letter does not contain any new commitments.

If there are any questions or if additional information is needed, please contact me or Ms. Andrea Sterdis at (949) 368-9985.

Sincerely,



Enclosure: San Onofre Nuclear Generating Station Units 2 and 3 Site Specific Decommissioning Cost Estimate

cc: M. L. Dapas, Regional Administrator, NRC Region IV
T. J. Wengert, NRC Project Manager, San Onofre Units 2 and 3 Decommissioning
R. E. Lantz, NRC Region IV, San Onofre Units 2 and 3
G. G. Warrick, NRC Senior Resident Inspector, San Onofre Units 2 and 3
S. Y. Hsu, California Department of Health Services, Radiologic Health Branch

ENERGY*SOLUTIONS* **Document No. 164001-DCE-001**

2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2 & 3

Project No. 164001 **Rev 1**

Prepared for:
Southern California Edison.
2244 Walnut Grove Avenue
Rosemead, CA 91770

Prepared by:
Energy*Solutions*, LLC
100 Mill Plain Road
Mailbox No. 106
Danbury, CT 06811

Authored By:	Michael S. Williams, Project Manager	September 5, 2014 Date
Reviewed By:	Barry S. Sims, Technical Advisor	September 5, 2014 Date
Approved By	Michael S. Williams, Project Manager	September 5, 2014 Date

- [ ] New Report
- [ ] Title Change
- [x] Report Revision
- [ ] Report Rewrite

Effective Date: Sept 5, 2014

SONGS UNIT-2 AND UNIT-3
DECOMMISSIONING COST ESTIMATE
DESCRIPTION OF REVISION

MAJOR REVISION _____ MINOR REVISION_X____
REVISION NUMBER – 1 EFFECTIVE DATE - 9/5/2014

The revisions contained in this MINOR REVISION to the SONGS Unit-2 and Unit-3 Decommissioning Cost Estimate are minor in nature and do not revise or otherwise impact the content or results of the cost estimate.

ITEM-1

A new Appendix-F is added to the DCE at the request of San Diego Gas & Electric Company (SDG&E) in order to provide information regarding its internal decommissioning costs which it expects to incur and to fund on its own behalf in addition to its 20% share of the Decommissioning Cost Estimate.

ITEM-2

The APPENDICES section of the DCE Table of Contents is revised to include the new APPENDIX-F SDG&E SONGS Decommissioning Costs (100%)

ITEM-3

Within the narrative section of the DCE the various appearances of the term "utility staff" have been revised to include a parenthetic statement "(Licensee)" to clarify that the utility staff means the NRC Licensee.

ITEM-4

On Table 6-1 "Cost and Schedule Summary" the title block for SPENT FUEL is revised to include "(72.30)" since this section also contains cost elements associated with ISFSI decommissioning.

ITEM-5

Added new SDG&E footnote for Table 1-1 referring to Appendix F

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Appendix A	List of Systems and Structures
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Appendix C	Detailed Project Schedule
Appendix D	Detailed Cost Table
Appendix E	Annual Cash Flow Table
Appendix F	SDG&E SONGS Decommissioning Costs (100%)

ACRONYMS AND ABBREVIATIONS

AHSM	Advanced Horizontal Storage Modules
AIF	Atomic Industrial Forum
ALARA	As Low As Reasonably Achievable
ARO	Asset Retirement Obligation
CFR	Code of Federal Regulations
CPM	Critical Path Method
DAW	Dry Active Waste
DGC	Decommissioning General Contractor
DOE	U.S. Department of Energy
DSC	Dry Shielded Canister
ESS	Essential System
FEMA	Federal Emergency Management Agency
FSS	Final Status Survey
FTE	Full Time Equivalent
GSA	U.S. General Services Administration
GTCC	Greater Than Class C
HP	Health Physics
ISFSI	Independent Spent Fuel Storage Installation
LLRW	Low-Level Radioactive Waste
LLW	Low Level Waste
LLWPA	Low-Level Waste Policy Act
LOP	Life-of-Plant
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MPC	Multi-Purpose Canister
MWt	Megawatt thermal
NON	Non-Essential System
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
ORISE	Oak Ridge Institute for Science and Education
PCB	Polychlorinated Biphenyl
PGE	Pacific Gas & Electric
PSDAR	Post-Shutdown Decommissioning Activities Report
PWR	Pressurized Water Reactor
RIF	Reduction In Force
SCE	Southern California Edison
SONGS	San Onofre Nuclear Generating Station
STRUCT	Structure
TCEQ	Texas Commission on Environmental Quality
WBS	Work Breakdown Structure
WCS	Waste Control Specialists LLC
UCF	Unit Cost Factor

1.0 EXECUTIVE SUMMARY

This report presents the 2014 Decommissioning Cost Estimate (DCE) Study of the San Onofre Nuclear Generating Station (SONGS) Units 2 & 3, hereinafter referred to as the 2014 Cost Study. The San Onofre Nuclear Generating Station is operated by the Southern California Edison Company (SCE).

On June 7, 2013, SCE announced its intention to permanently cease power generation operations and shut down SONGS Units 2 & 3. Units 2 & 3 had not produced power since January 9, 2012 and January 31, 2012, respectively. SCE now has the responsibility to decommission the site. In January 2014 SCE contracted with Energy*Solutions* to evaluate decommissioning alternatives and assist in the development of a detailed project schedule and DCE to support the preparation and submittal of a Post Shutdown Decommissioning Activities Report (PSDAR) in accordance with 10 CFR 50.82(a)(4)(i), which requires that a PSDAR be submitted within two years following the permanent cessation of operations.

This study has been performed to furnish an estimate of the costs for: (1) decommissioning SONGS Units 2 & 3 to the extent required to terminate the plant's operating license pursuant to 10 CFR 50.75(c); (2) post-shutdown management of spent fuel until acceptance by the U.S. Department of Energy (DOE) pursuant to 10 CFR 50.54(bb); (3) demolition of uncontaminated structures and restoration of the site in accordance with the United States Department of Navy Grant of Easement (Ref. No. 14); and the California State Lands Commission Easement Lease (Ref. No. 15); and (4) Independent Spent Fuel Storage Installation (ISFSI) decommissioning pursuant to 10 CFR 72.30. This study includes SCE's actual costs incurred in the transitional periods following cessation of permanent operations on June 7, 2013 until December 31, 2013. Costs presented herein commencing on January 1, 2014 are estimated.

SCE's December 2012 testimony to the CPUC provided the basis for the current spent fuel management costs. SCE is continuing to review available information from the DOE to determine if the DOE start date assumption of 2024 requires updating. The DCE will be revised accordingly as new information becomes available.

Accordingly, the costs and schedules for all activities are segregated for regulatory purposes as follows: costs for "License Termination" (10 CFR 50.75(c)); costs for "Spent Fuel Management" (10 CFR 50.54(bb)); costs for "Site Restoration" (clean removal and site restoration) final site conditions; and costs for "ISFSI Decommissioning" (10 CFR 72.30). Energy*Solutions* has established a Work Breakdown Structure (WBS) and cost accounting system to differentiate between these project accounts.

This study analyzes the following technical approach to decommissioning as defined by SCE:

- DECON methodology.
- Permanent cessation of operations on June 7, 2013.
- Termination of spent fuel pool operation six years after permanent shutdown.
- Spent fuel will be stored in Multi-Purpose Canisters (MPCs) at an on-site Independent Spent Fuel Storage Installation (ISFSI).

- A dry transfer facility will not be necessary for transfer of SNF canisters for transport.
- DOE begins accepting spent fuel from the industry in 2024 and completes the removal of all SONGS spent fuel by 2049.
- Decommissioning will be performed by a Decommissioning General Contractor (DGC) with oversight by the SONGS participants.
- Incorporation of Life-of-Plant (LOP) Disposal Rates for Class A Low-Level Radioactive Waste (LLRW).
- Incorporation of disposal rates for Class B and C LLRW based on recent quotes for disposal at the Waste Control Specialists LLC (WCS) site in Andrews County, Texas.

The cost estimate results are provided in Table 1-1. Table 1-1 gives License Termination costs (which correspond to 10 CFR 50.75 (c) requirements); Spent Fuel Management costs (which correspond to 10 CFR 50.54 (bb) requirements); and Site Restoration costs (which correspond to activities such as clean building demolition and site grading and end-state preparation as required under the Site Easement).

Table 1-1
Decommissioning Cost Summary[1][2]
(2014 Dollars in Thousands)

Cost Account	Unit 2	Unit 3	Total
License Termination 50.75(c)	$1,034,230	$1,078,016	**$2,112,246**
Spent Fuel Management 50.54(bb)	$623,209	$652,987	**$1,276,196**
Site Restoration	$423,297	$599,507	**$1,022,804**
Totals	**$2,080,735**	**$2,330,511**	**$4,411,246**

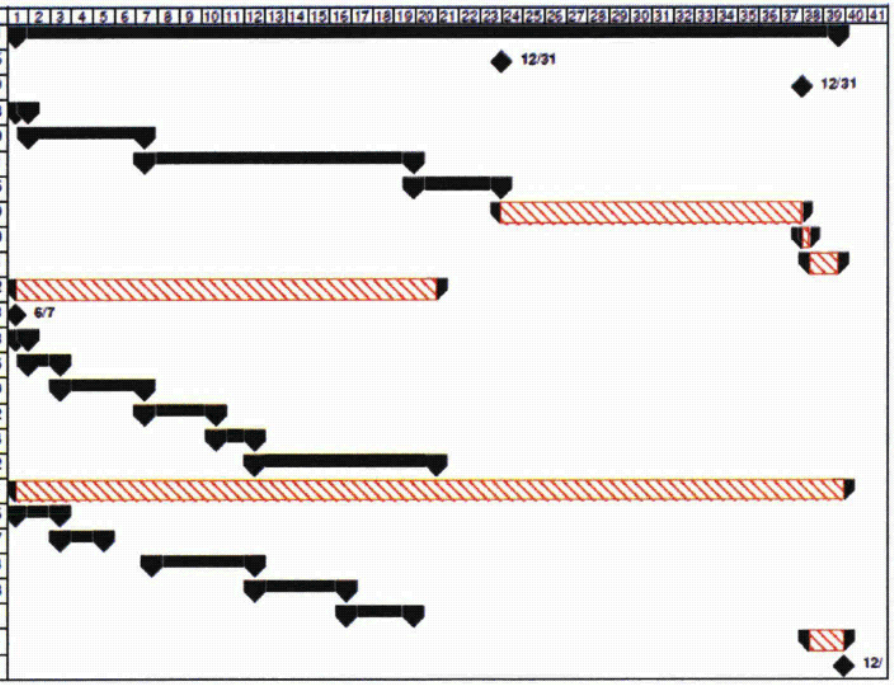
The estimate is based on site-specific plant systems and buildings inventories. These inventories, and Energy*Solutions*' proprietary Unit Cost Factors (UCFs), were used to generate required manhours, activity schedule hours and costs, and waste volume, weight, and classification. Based on the activity schedule hours and a decommissioning activities analysis, a Critical Path Method (CPM) analysis was performed to determine the decommissioning schedules. These schedules reflect the effects of sequenced activity-dependent or distributed decommissioning elements such as planning and preparations, major component removal, building decontamination, and spent fuel shipping. The schedules are divided into project phases (periods) and presented, as noted previously, by cost account "License Termination," "Spent Fuel Management," or "Site Restoration." The summary is shown in Figure 1-1, and may also be found in Section 6.0 of this report.

[1] In addition, the Decommissioning Cost Summary in Table 1-1 does not include separate internal costs that San Diego Gas & Electric Company (SDG&E) has indicated that it expects to incur. SDG&E provides information regarding these costs in Appendix F
[2] Rows and columns may not add correctly due to rounding.

Figure 1-1
Summary Schedule

DECON with Dry Storage, 2013 Shutdown and DOE Acceptance in 2024

Task Name	Start	Finish
Post-Shutdown Spent Fuel Management	06/07/2013	09/08/2051
Spent Fuel Shipping Complete - Unit 1	12/31/2035	12/31/2035
Spent Fuel Shipping Complete - Units 2 & 3	12/31/2049	12/31/2049
SNF Pd 1 - Spent Fuel Management Transition	06/07/2013	12/31/2013
SNF Pd 2 - Spent Fuel Transfer to Dry Storage	1/1/2014	06/01/2019
SNF Pd 3 - Dry Storage During Decommissioning - Units 1, 2 and 3	06/01/2019	12/05/2031
SNF Pd 4 - Dry Storage Only - Units 1, 2 and 3	12/05/2031	12/31/2035
SNF Pd 5 - Dry Storage Only - Units 2 and 3	12/31/2035	12/31/2049
SNF D&D Pd 1 - ISFSI D&D Planning	12/31/2049	05/06/2050
SNF D&D Pd 2 - ISFSI D&D	05/06/2050	09/08/2051
Part 50 License Termination	06/07/2013	12/24/2032
Announcement of Cessation of Operations (June 7, 2013)	06/07/2013	06/07/2013
Decon Pd 1 - Transition to Decommissioning	06/07/2013	12/31/2013
Decon Pd 2 - Decommissioning Planning and Site Modifications	1/1/2014	06/30/2015
Decon Pd 3 - Decommissioning Preparations and Reactor Internals Segmentation	06/30/2015	06/01/2019
Decon Pd 4 - Plant Systems and Large Component Removal	06/01/2019	09/24/2022
Decon Pd 5 - Building Decontamination	09/24/2022	07/13/2024
Decon Pd 6 - License Termination During Demolition	07/13/2024	12/24/2032
Site Restoration	06/07/2013	12/15/2051
SR Pd 1 - Transition to Site Restoration	06/07/2013	06/30/2015
SR Pd 2 - Building Demolition During Decommissioning	06/30/2015	07/11/2017
SR Pd 3 - Subsurface Demolition Engineering and Permitting	10/01/2019	07/13/2024
SR Pd 4 - Building Demolition to 3 Feet Below Grade	07/13/2024	10/14/2028
SR Pd 5 - Subgrade Structure Removal Below -3 Feet	10/14/2028	12/05/2031
SR Pd 6 - Final Site Restoration and Lease Termination	05/06/2050	12/15/2051
Final Easement Termination	12/15/2051	12/15/2051



2.0 INTRODUCTION

2.1 Study Objective

This report presents the 2014 Decommissioning Cost Estimate Study of the San Onofre Nuclear Generating Station (SONGS) Units 2 & 3, hereinafter referred to as the 2014 Cost Study. The San Onofre Nuclear Generating Station is owned by the Southern California Edison Company (SCE), San Diego Gas & Electric Company, and the City of Riverside. A former owner, the City of Anaheim, also has liability for decommissioning. SCE has provided the following information regarding the liability by owner for SONGS decommissioning costs:

Cost Categories	Owners			
	SDG&E	Riverside	Anaheim	SCE
SONGS 1	20%	0%	0%	80%
SONGS 2	20%	1.79%	2.4737%	75.7363%
SONGS 3	20%	1.79%	2.4625%	75.7475%
Common Facilities (Units 2 & 3)	20%	1.79%	2.4681%	75.7419%
SONGS 1 Fuel	20%	0%	0%	80%
SONGS 2/3 Fuel	20%	1.79%	2.3398%	75.8702%
ISFSI Maintenance and D&D	20%	1.6066%	2.2686%	76.1248%
San Diego Switchyard	100%	0%	0%	0%
Edison Switchyard	0%	0%	0%	100%
Interconnection Facilities	50%	0%	0%	50%
Nuclear Fuel Cancellation Charges	20%	1.79%	0%	78.21%

This study has been performed to support the development of a site-specific PSDAR and furnish an estimate of the costs for (1) decommissioning SONGS Units 2 & 3 to the extent required to terminate the plant's operating license, (2) post-shutdown management of spent fuel until acceptance by the U.S. Department of Energy (DOE), (3) demolition of uncontaminated structures and restoration of the site in accordance with the U.S. Department of Navy Grant of Easement (Ref. No. 14), and the California State Lands Commission Easement Lease (Ref. No. 15), and (4) Independent Spent Fuel Storage Installation (ISFSI) decommissioning. This study also includes SCE's actual costs incurred in the transitional periods following cessation of permanent operations until December 31, 2013. Estimated costs begin on January 1, 2014.

The study methodology follows the basic approach originally presented in the Atomic Industrial Forum/National Environmental Studies Project Report AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (Ref. No. 2). The report was prepared in accordance with Nuclear Regulatory Commission (NRC) Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," (Ref. No. 3). The estimate is based on compliance with current regulatory requirements and proven decommissioning technologies.

NRC requirements, set forth in Title 10 of the Code of Federal Regulations (CFR), differentiate between the post-shutdown costs associated with the decommissioning of the nuclear plant facility, those associated with storage of spent fuel on-site, and those associated with the decommissioning of the spent fuel storage facility. The Code of Federal Regulations, however, does not address the entire scope of the decommissioning liability for each nuclear facility. 10 CFR 50.75(c) requires funding by the licensee(s) of the facility for the decommissioning program, but specifically excludes the cost of removal and disposal of spent fuel and structures that do not require disposal as radioactive material. 10 CFR 50.75(c) also excludes the cost of site restoration activities that do not involve the removal of residual radioactivity necessary to terminate the NRC license(s). 10 CFR 50.54 (bb) requires funding by the licensee(s) "for the management of all irradiated fuel at the reactor upon expiration of the reactor operating license(s) until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository." 10 CFR 72.30 requires funding for decommissioning of the on-site spent fuel storage facility after the irradiated fuel is accepted by the DOE.

In addition to the NRC Decommissioning requirements described above, the Site Easements require the demolition and removal of all improvements installed on both the on-shore and off-shore sites, including all substructures regardless of depth, and site restoration to the satisfaction of the Grantors.

This study analyzes the following technical approach to decommissioning as defined by SCE and the co-owners:

- DECON methodology.
- Permanent cessation of operations and commencement of decommissioning planning on June 7, 2013.
- Termination of spent fuel pool operation within six years after permanent shutdown.
- Spent fuel will be stored in transportable Multi-Purpose Canisters (MPCs) at an on-site Independent Spent Fuel Storage Installation (ISFSI).
- A dry transfer facility will not be necessary for transfer of SNF canisters for transport.
- DOE begins accepting spent fuel from the industry in 2024 and completes the removal of all SONGS spent fuel by 2049.
- Decommissioning will be performed by a Decommissioning General Contractor (DGC) with oversight by the SONGS participants.

In addition, this study includes the following assumptions:

- Incorporation of Energy*Solutions*' Life-of-Plant (LOP) Disposal Rates for Class A Low-Level Radioactive Waste (LLRW), (Ref. No. 7).
- Incorporation of disposal rates for Class B and C LLRW based on recent quotes for disposal at the Waste Control Specialists LLC (WCS) site in Andrews County, Texas.

2.2 Regulatory Framework

Provisions of current laws and regulations affecting decommissioning, waste management, and spent fuel management are as follows:

1. NRC regulations require a license for on-site storage of spent fuel. Wet storage in a spent fuel pool is authorized by a facility's 10 CFR Part 50 license. On-site dry storage of spent fuel at an Independent Spent Fuel Storage Installation (ISFSI) is licensed by either: (a) the general license set forth in 10 CFR 72.210, which requires that a Part 50 license be in place; or (b) a site-specific ISFSI license issued pursuant to 10 CFR Part 72.

2. 10 CFR 50.75(c) requires funding by the licensee(s) of the facility for decommissioning.

3. 10 CFR 50.54 (bb) requires the licensee(s), within two years following permanent cessation of operation of the reactor or five years before expiration of the operating license(s), whichever occurs first, to submit written notification to the NRC for its review and preliminary approval of the program by which the licensee intends to manage and provide funding "for the management of all irradiated fuel at the reactor upon expiration of the reactor operating license until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository."

4. 10 CFR 961 (Ref. No. 4), Appendix E, requires spent fuel to be cooled for at least five years before it can be accepted by DOE as "standard spent fuel."

5. 10 CFR 72.30 requires funding by the licensee(s) for termination of the ISFSI license.

Decommissioning Alternatives

The three basic methods for decommissioning are DECON, SAFSTOR, and ENTOMB, which are summarized as follows:

1. DECON: The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license after cessation of operations.

2. SAFSTOR: The facility is placed in a safe, stable condition and maintained in that state (safe storage). The facility is decontaminated and dismantled at the end of the storage period to levels that permit license termination. NRC regulations require decommissioning to be completed within 60 years of cessation of operation.

3. ENTOMB: Radioactive structures, systems, and components are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained and monitored until radioactivity decays to a level that permits termination of the license. Since entombment will exceed the requirement

for decommissioning to be completed within 60 years of cessation of operation, NRC handles entombment requests on a case-by-case basis.

Post-Shutdown Spent Fuel Management Alternatives

The options for long-term post-shutdown spent fuel management currently available to power plant operators are (1) wet storage consisting of continued maintenance and operation of the spent fuel pool, and (2) dry storage consisting of transfer of spent fuel from the fuel pool to on-site dry storage modules after a cooling period or any combination of the two as is the present case at SONGS. Maintaining the spent fuel pool for an extended duration following cessation of operations prevents termination of the Part 50 license and typically has a higher annual maintenance and operating cost than the dry storage alternative. Transfer of spent fuel to an ISFSI requires additional expenditures for purchase and construction of the ISFSI and dismantlement and disposal of the ISFSI following completion of spent fuel transfer to DOE.

The spent fuel shipping schedules furnished by SCE for this study are based on projections that DOE will commence accepting spent fuel from domestic commercial nuclear power plants in 2024, and that the DOE will accept spent fuel at the rate published in DOE's July 2004 Acceptance Priority Ranking & Annual Capacity Report (DOE/RW-0567) (Ref. No. 12). These assumptions are in accordance with SCE testimony to the Public Utilities Commission of the State of California (Ref. No. 17). Additionally, SCE is reviewing available information from the DOE to determine if the DOE start date assumption requires updating. The DCE will be revised accordingly as new information becomes available.

3.0 STUDY METHODOLOGY

3.1 General Description

Energy*Solutions* maintains a proprietary decommissioning cost model based upon the fundamental technical approach established in AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," dated May 1986 (Ref. No. 2). The cost model has been updated frequently in accordance with regulatory requirements and industry experience. The cost model includes elements for estimating distributed and undistributed costs. Distributed costs are activity specific and include planning and preparation costs as well as costs for decontamination, packaging, disposal, and removal of major components and systems. For example, costs for the segmentation, packaging, and disposal of the reactor internals are distributed costs. Undistributed costs, sometimes referred to as collateral costs, are typically time dependent costs such as utility (Licensee) and decommissioning general contractor staff, property taxes, insurance, regulatory fees and permits, energy costs, and security staff.

The methodology for preparing cost estimates for a selected decommissioning alternative requires development of a site-specific detailed work activity sequence based upon the plant inventory. The activity sequence is used to define the labor, material, equipment, energy resources, and duration required for each activity. In the case of major components, individual work sequence activity analyses are performed based on the physical and radiological characteristics of the component, and the packaging, transportation, and disposal options available.

In the case of structures and small components and equipment such as piping, pumps, and tanks, the work durations and costs are calculated based on UCFs. UCFs are economic parameters developed to express costs per unit of work output, piece of equipment, or time. They are developed using decommissioning experience, information on the latest technology applicable to decommissioning, and engineering judgment. The total cost of a specific decommissioning activity can be determined by multiplying the total number of units associated with that activity by the UCF, expressed as $/unit, for that activity. For example, the estimated demolition cost of a non-contaminated concrete structure can be obtained by multiplying the volume of concrete in the structure by the UCF for non-contaminated reinforced concrete demolition, expressed in $/unit volume. Each UCF has associated with it a man-hours/unit and schedule-hours/unit. From these values, total man-hours and total schedule-hours can be estimated for a particular activity.

3.2 Schedule Analysis

After the work activity durations are calculated for all distributed activities, a critical path schedule analysis is performed using MS Project. The schedule accounts for constraints such as spent fuel cooling periods and regulatory reviews. The schedule is typically delineated into phases or time periods (hereinafter referred to as period or periods) that differentiate manpower requirements and undistributed costs.

In order to differentiate between License Termination, Spent Fuel, and Site Restoration elements of the entire decommissioning scope of work, Energy*Solutions* has established a Work Breakdown Structure (WBS) and cost accounting system to treat each element as a subproject.

Accordingly, the overall project schedule is divided into interrelated periods with major milestones defining the beginning and ending of each period. The major milestones also serve as the basis for integrating the periods of the three subprojects.

3.3 Decommissioning Staff

Energy*Solutions* has assumed that the SONGS Units 2 and 3 decommissioning project will be performed in an efficiently planned and executed manner using project personnel experienced in decommissioning. This DCE assumes that the decommissioning will be performed by a highly experienced and qualified DGC, with oversight and management of the decommissioning operations performed by the Licensee staff. It is also assumed that the Utility (Licensee) staff will be supplemented by a professional consulting engineering firm, particularly in the planning and preparation phase.

Energy*Solutions* analyzed the SONGS licensee staff and developed a site-specific staffing plan. The SCE existing salary structure was then used as the basis for calculating Utility (Licensee) staff labor costs. Energy*Solutions* used industry data to develop DGC salary costs.

Staffing levels, for both staffing plans and for each project period, are based on the Atomic Industrial Forum (AIF) guidelines and industry experience. The sizes of the staffs are varied in each period in accordance with the requirements of the work activities. Staffing has been organized into the following departments or functional groups:

- Decommissioning
- Engineering
- Maintenance and Work Control
- Operations
- Oversight and Nuclear Safety
- Radiation Protection and Chemistry
- Regulatory and Emergency Planning
- Safety and Human Performance
- Security Administration
- Security Guard Force
- Site Management and Administration
- Additional Staff for Spent Fuel Shipping
- DGC Staff

3.4 Waste Disposal

Waste management costs comprise a significant portion of the decommissioning cost estimate. Additionally, limited future access to disposal sites licensed for receipt of Class B and C wastes introduces a significant level of uncertainty with respect to the appropriateness of using existing rate structures to estimate disposal costs of these wastes. Energy*Solutions*' approach to estimating waste disposal costs is discussed in the following paragraphs.

Waste Classification

Regulations governing disposal of radioactive waste are stringent in order to ensure control of the waste and preclude adverse impact on public health and safety. At present, LLRW disposal

is controlled by 10 CFR 61, which went into effect in December 1983. This regulation stipulates the criteria for the establishment and operation of shallow-land LLRW burial facilities. Embodied within this new regulation are criteria and classifications for packaging LLRW such that it is acceptable for burial at licensed LLRW disposal sites.

For each waste classification, 10 CFR 61 stipulates specific criteria for physical and chemical properties that the LLRW must meet in order to be accepted at a licensed disposal site. The LLRW disposal criteria of 10 CFR 61 require that LLRW generators determine the proportional amount of a number of specific radioactive isotopes present in each container of disposable LLRW. This requirement for isotopic analysis of each container of disposable LLRW is met by employing a combination of analytical techniques such as computerized analyses based upon scaling factors, sample laboratory analyses, and direct assay methods. Having performed an isotopic analysis of each container of disposable LLRW, the waste must then be classified according to one of the classifications (Class A, B, C, or Greater Than Class C (GTCC)) as defined in 10 CFR 61.

Energy*Solutions*' classification of LLRW resulting from decommissioning activities is based on AIF/NESP-036 (Ref. No. 2), NUREG/CR-0130 (Ref. No. 5), NUREG/CR-0672 (Ref. No. 6), and recent industry experience. The estimated curie content of the reactor vessel and internals at shutdown is derived from NUREG/CR-0130 for Pressurized Water Reactors (PWRs) and NUREG/CR-0672 for Boiling Water Reactors (BWRs), and adjusted for the different mass of components and period of decay.

Packaging

Selection of the type and quantity of containers required for Class B and C wastes is based on the most restrictive of either curie content, dose-rate, container weight limit, or container volume limit. GTCC wastes from segmentation of the reactor vessel internals is packaged in spent fuel canisters. The selection of container type for Class A waste is based on the transportation mode (rail, truck, barge, etc.) and waste form. The quantity of Class A waste containers is determined by the most restrictive of either container weight limit or container volume limit. Large components, such as steam generators, pressurizers, and reactor recirculation pumps, are shipped as their own containers with additional shielding as required.

Container costs are obtained from manufacturers specializing in the design and fabrication of storage containers for nuclear materials. Shielded transport cask and liner costs are obtained from the cask owners and operators.

Transportation

Transportation routes to processing and disposal facilities are determined based on available transportation modes (truck, rail, barge, or combinations). Transportation costs for the selected routes and modes are obtained from vendor quotes or published tariffs whenever possible.

Class A Disposal Options and Rates

In accordance with the existing Life-of-Plant Disposal Agreement (Ref. No. 7), all Class A waste that meets the waste acceptance criteria are to be disposed of at Energy*Solutions'* LLRW

disposal facility in Clive, Utah. All reported waste disposal costs include packaging, transportation, and any applicable surcharges.

Class B and C Disposal Options and Rates

Currently, within the United States, there are only three operational commercial near-surface disposal facilities licensed to accept Class B and C LLRW: the Barnwell facility, operated by Energy*Solutions* in Barnwell, South Carolina; the U.S. Ecology facility in Richland, Washington; and the recently licensed facility in Andrews County, Texas operated by Waste Control Specialists. Barnwell only accepts waste from states within the Atlantic Compact and U.S. Ecology only accepts waste from states within the Northwest and Rocky Mountain Compacts. However, the WCS facility will accept waste from the Texas Compact (comprised of Texas and Vermont) and from non-Compact generators. The Texas Compact Commission on March 23, 2012 approved amendments to rules allowing the import of non-compact generator LLRW for disposal at the WCS Andrews County facility.

Greater Than Class C (GTCC)

Wastes identified as 10 CFR 61 Class A, B, and C may be disposed of at near-surface disposal facilities. Certain components are highly activated and may exceed the radionuclide concentration limitations for 10 CFR 61 Class C waste. In accordance with 10 CFR 61, these components, which are referred to as Greater Than Class C (GTCC) wastes, cannot be disposed of in a near-surface LLRW disposal facility and must be transferred to a geologic repository or a similar site approved by the NRC.

Highly activated sections of the reactor vessel internals will result in GTCC waste. Presently, a facility does not exist for the disposal of wastes exceeding 10 CFR 61 Class C limitations. Energy*Solutions* assumes that the DOE will accept this waste along with spent fuel. Although courts have held that DOE is obligated to accept and dispose of GTCC, issues regarding potential costs remain potentially unsettled. Therefore, Energy*Solutions* conservatively estimates a GTCC waste disposal cost. Energy*Solutions* assumes that the GTCC waste will be packaged in spent fuel canisters and will be shipped to a storage or disposal facility operated by DOE along with the spent fuel. Additionally, Energy*Solutions* assumes shipping costs for GTCC waste to be equivalent to the commercial cost of shipping a Type B licensed, shielded cask such as the CNS 8-120B cask, which is owned and operated by Energy*Solutions*.

LLRW Volume Reduction

Becasue current Class A LLRW disposal rates are significantly lower than LLRW volume reduction rates, Energy*Solutions* does not assume on-site volume reduction techniques such as waste compaction or an aggressive decontamination, survey and release effort.

Non-Radioactive Non-Hazardous Waste Disposal

Energy*Solutions* assumes that recyclable, non-radioactive scrap metal resulting from the decommissioning program will be sold to a scrap metal dealer. However, no cost credit is assumed in the estimate for the value of the scrap metal. Clean (non-contaminated) concrete and demolition debris is assumed to be removed off site to an out of state Class III landfill consistent

with the Governor of the State of California Executive Order D-62-02 (Ref. No. 16). This study includes the costs of installation and operation of Energy*Solutions*' GAmma Radiation Detection and In-container ANalysis or GARDIAN System. The GARDIAN System performs radiological assays of bulk shipping containers. The GARDIAN System is a cost effective and efficient means to ensure all non-radiological waste and recyclable materials arising from the decommissioning and demolition of the SONGS' site comply with all applicable regulatory requirements.

Hazardous and Industrial Waste Disposal

Uncontaminated lead shielding remaining after shutdown was assumed to be removed from its installed locations and shipped offsite by entities having a need for the material. The entities will receive the lead at no charge in return for providing the removal and shipping services. Non-Radioactive contaminated surfaces coated with tightly adhering and undamaged lead based paint will be removed as non-hazardous building demolition debris. All other chemicals and hazardous materials present at shutdown will be removed and properly disposed of during decommissioning.

3.5 Final Status Survey

The cost of performing a final status survey (FSS) is based on NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," (Ref. No. 8). Estimates of MARSSIM Class I, II, and III survey designations are based on radiological assumptions regarding contamination resulting from small and large component removal activities. The FSS activity cost calculation includes the in-place remote survey of underground metal and concrete pipe, soil, and groundwater sampling and analysis. Estimated costs for NRC and Oak Ridge Institute for Science and Education (ORISE) verification are also included, and the NRC review period is incorporated into the project schedule.

3.6 Contingency

Contingencies are applied to cost estimates primarily to allow for unknown or unplanned occurrences during the actual program, e.g., increased radioactive waste materials volumes over that expected; equipment breakdowns, weather delays, and labor strikes. This is consistent with the definition provided in the DOE Cost Estimating Guide, DOE G 430.1-1, 3-28-97 (DOE G) (Ref. No. 9). Contingency "covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of contingency will depend on the status of design, procurement, and construction; and the complexity and uncertainties of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected costs." Energy*Solutions* determines site-specific contingency factors to be applied to each estimate based on industry practices.

The DOE has established a recommended range of contingencies as a function of completeness of program design, DOE G. The ranges are:

Type of Estimate	Contingency Range as a % of Total Estimate
Planning Phase Estimate	20-30
Budget Estimate	15-25
Title I (Preliminary Design Estimate)	10-20
Title II (Definitive Design Estimate)	5-15

Also, the Pacific Gas & Electric Company (PG&E) Technical Position Paper "Establishing an Appropriate Contingency Factor for Inclusion in the Decommissioning Revenue Requirements" (Ref. No. 13) was developed to review and determine a "conservative contingency factor" to be applied to decommissioning cost estimates. In that study it was determined that "based on an understanding of the level of project definition, and the extent and maturity of estimate input information used to develop decommissioning cost estimates, the 25 percent contingency factor is within the range of industry recognized cost engineering practices."

The contingencies presented in this study are consistent with the values presented in DOE G 430.1-1 for a Planning Phase estimate (Ref. No. 9) and the PG&E study (Ref. No. 13). As directed by SCE, Energy*Solutions* has applied a 25% contingency to all costs in this study, with the exception of following:

2013 and 2014 Actual Expenditures	0%
Department of Navy Easement Payments	15%
Hazardous and Asbestos Wastes	50%
Site Characterization Surveys	15%
Temporary Facilities	15%
Backfill and Compaction	15%

A reactor decommissioning program will be conducted under an NRC-approved Quality Assurance Program which meets the requirements of 10 CFR 50, Appendix B. However, the development of the quality assurance program, the performance of work under that program, and the effort required to ensure compliance with the program, is already included in the detailed cost estimate. Therefore, Energy*Solutions* does not include quality assurance as an element of the contingency allowance. The same is true for contamination. Where radioactive contamination or activated materials are dealt with, the Energy*Solutions* UCFs and associated calculations fully reflect the cost impact of that material, and a separate contingency is not required specifically due to working with contamination.

3.7 Cost Reporting

Total project costs are aggregated from the distributed activity and undistributed costs into the following categories – Labor, Materials and Equipment, Waste Disposal, and Other costs. Other costs include property taxes, insurance, license fees, permits, and energy. Waste Disposal costs are the summation of packaging, transportation, base disposal rate, and any applicable surcharges. Health physics (HP) supplies and small tool costs are calculated as a component of each distributed activity cost and included in the category of Material and Equipment, with the exception that HP supplies for the Utility HP staff are calculated and reported as an undistributed line item. A line item specific contingency is then calculated for each activity cost element.

4.0 SITE SPECIFIC TECHNICAL APPROACH

4.1 Facility Description

The San Onofre Nuclear Generating Station Units 2 & 3 site is located in southern California on the shore of the Pacific Ocean, about 62 miles Southeast of Los Angeles and approximately 51 miles Northwest of San Diego. The station is located entirely within the Camp Pendleton Marine Corps Base. The current Grant of Easement for the site from the United States Department of the Navy is currently scheduled to expire May 12, 2023 (Ref. No. 14). Units 2 & 3 occupy 52.8 acres of the 84 acre site. Approximately 16 acres are occupied by the North Industrial Area (formerly Unit 1), which is where the existing ISFSI is located.

The Nuclear Steam Supply System (NSSS) for both units are identical, with two independent loops, and utilizing pressurized light water cooled reactors (PWRs) supplied by Combustion Engineering, Inc. The construction permit was issued for an initial reactor power of 3,390 MWt with licensed Rated Thermal Power of 3,438 MWt.

The facility currently has an existing ISFSI containing spent fuel that was transferred into MPCs to maintain full core offload capability during operations and to facilitate decommissioning of Unit 1. This study also assumes that the MPCs will be licensed under a 10 CFR Part 72 general license, using the manufacturer's Certificate of Compliance. The 10 CFR Part 50 license will be maintained until decommissioning is complete and all spent fuel has been transferred to DOE.

Appendix A provides a list of the SONGS Unit 2 & 3 systems and structures included in the material inventory for this study.

4.2 Decommissioning Periods

The project periods consist of six License Termination periods, seven Spent Fuel Management periods (two of which are ISFSI decontamination and demolition periods), and six Site Restoration periods. As shown in Figure 1-1 above, the periods for each of these project areas are independent from (do not compete with) the periods for the other project areas. The project periods defined for this site-specific study and the major activities performed during each period are as follows:

License Termination Periods

Decon Pd 1 –Transition to Decommissioning

- Defuel Reactors
- Notification of Permanent Fuel Removal
- Disposition of LLRW Resins

Decon Pd 2 –Decommissioning Planning and Site Modifications

- Preparation of Decommissioning License Documents
- Preparation of NRC Deliverables
- Submit PSDAR to NRC
- Perform Historical Site Assessment and Site Characterization
- Planning, Design, and Implementation of Cold & Dark (Site Repowering)

- Design and Implement Spent Fuel Pool Support System Modifications, Control Room Relocation, and Spent Fuel Security System Modifications

- Select Decommissioning General Contractor (DGC)

Decon Pd 3 – Decommissioning Preparations and Reactor Internal Segmentation

- DGC Mobilization and Planning
- System Decontamination
- Reactor Internals Removal Preparations
- Reactor Internals Segmentation Planning and Implementation
- Purchase Dry Storage Modules for GTCC Waste
- Segment and Package Reactor Internals for Storage in the ISFSI

Decon Pd 4 – Plant Systems and Large Component Removal

- Upgrade Rail Spur on 'Owner Controlled Area' (does not affect spur connecting to CALTRANS).
- Install Large Array Radiation Detection System
- Remove, Package, and Dispose of Non-Essential Systems
- Asbestos and Lead Abatement
- Fuel Pool Closure
- Remove Spent Fuel Racks, Spent Fuel Pool Island Equipment, and Bridge Cranes
- Remove and Dispose of Legacy Class B & C Wastes
- Remove, Package, and Dispose of Essential Systems
- Removal and Disposal of Spent Resins, Filter Media, and Tank Sludge
- Large Component Removal
- Prepare License Termination Plan

Decon Pd 5 – Building Decontamination

- Decon Containment Buildings – Units 2 & 3
- Decon Turbine Buildings – Units 2 & 3
- Decon Fuel Handling Buildings – Units 2 & 3
- Decon Auxiliary Radwaste Building
- Decon Auxiliary Control Building
- Decon Penetration Buildings – Units 2 & 3
- Decon Safety Equipment and Main Steam Isolation Valve Buildings – Units 2 & 3
- Radiological Survey of Structures During Decon

Decon Pd 6 – License Termination During Decommissioning

- Final Status Survey
- ORISE Verification and NRC Approval

Spent Fuel Management Periods

SNF Pd 1 – Spent Fuel Transfer Management Transition

- Implementation of Security Enhancements Required for Reductions in Staff
- Cyber Security Modifications
- Post Fukushima Modifications – Unit 2
- Design and Fabricate Spent Fuel Canisters

SNF Pd 2 – Spent Fuel Transfer to Dry Storage
- Prepare Irradiated Fuel Management Plan
- Select Dry Storage System Canister Design and Vendor
- Design and Construct ISFSI Expansion
- Purchase, Deliver and Load Spent Fuel Canisters and Transfer to ISFSI

SNF Pd 3 – Dry Storage During Decommissioning Units 1, 2, & 3

SNF Pd 4 – Dry Storage Only – Units 1, 2, & 3

SNF Pd 5 – Dry Storage Only – Units 2, & 3

SNF D&D Pd 1 – ISFSI License Termination
- Preparation and NRC Review of License Termination Plan

SNF D&D Pd 2 – ISFSI Demolition
- Verification Survey of Horizontal Storage Modules
- Clean Demolition of ISFSI AHSMs and Pads
- Clean Demolition of ISFSI Support Structures
- Restore ISFSI Site
- Preparation of Final Report on Decommissioning and NRC Review

Site Restoration Periods

SR Pd 1 –Transition to Site Restoration
- Severance Costs from Post-Shutdown Reduction in Staffing
- Phase I and II Environmental Assessment of the Mesa Site
- Disposition of Hazardous Waste at the Mesa Site
- Site Characterization of the Mesa Site

SR Pd 2 –Building Demolition During Decommissioning
- Demolish South Access for Decommissioning, South Yard Facility, and Mesa Structures
- Finish Grade and Re-vegetate Mesa Site
- Mesa Lease Termination

SR Pd 3 – Subsurface Demolition Engineering & Permitting
- Hydrogeologic Investigation and Outfall Conduit Survey
- Subsurface Structure Removal Analyses for Lease Termination Activities
- Final Site Grading and Shoreline Protection Engineering Planning and Design
- Obtain Permits and Approvals

SR Pd 4 – Building Demolition to 3 Feet Below Grade
- Demolition Preparations
- De-Tension and Remove Containment Building Tendons – Units 2 & 3
- Demolish Diesel Generator Buildings – Units 2 & 3
- Demolish Condensate Buildings and Transformer Pads – Units 2 & 3

- Demolish Full Flow Areas and Turbine Buildings – Units 2 & 3
- Demolish Auxiliary Radwaste Building
- Demolish Auxiliary Control Building
- Remove Systems and Demolish Make-up Demineralizer Structures
- Demolish Penetration Buildings – Units 2 & 3
- Demolish Safety Equipment and Main Steam Isolation Valve Buildings – Units 2 & 3
- Demolish Fuel Handling Buildings to 3 Feet Below Grade – Units 2 & 3
- Demolish Containment Buildings to 3 Feet Below Grade – Units 2 & 3
- Demolish Intake and Discharge Structures to 3 Feet Below Grade

SR Pd 5 – Subgrade Structure Removal Below – 3 Feet

- Install Sheet Piling and Excavation Shoring, Dewatering System, and Effluent Treatment and Discharge Controls
- Demolish and Backfill Unit 3 Subsurface Structures
- Demolish and Backfill Unit 2 Subsurface Structures
- Demolish and Backfill Common Subsurface Structures
- Demolish and Backfill Intake Structure Inside Seawall Below -3 Feet
- Remove Off Shore Intake and Outfall Conduits
- Remove Sheet Piling, Excavation Shoring, and Dewatering and Effluent Treatment
- Finish Grading and Re-vegetate Site

SR Pd 6 – Final Site Restoration and Easement Termination

- Obtain Required Permits and Approvals
- Install Dewatering System and Effluent Treatment and Discharge Controls
- Remove and Stockpile Existing Seawall Erosion Protection
- Remove Unit 2 & 3 Seawall and Pedestrian Walkway
- Remove Remaining Intake Structure Beneath Seawall
- Backfill and Compaction of Excavation
- Remove Dewatering System & Effluent Treatment
- Remove Railroad Tracks, Gunite Slope Protection, Access Road, and North Parking Lot
- Finish Grading and Re-vegetate Site

4.3 Decommissioning Staff

Energy*Solutions* developed staffing based on the assumption that decommissioning will be performed by an experienced and qualified DGC, with oversight and management of the decommissioning operations performed by the Utility (Licensee) staff. It is also assumed that the Utility staff will be supplemented by a professional consulting engineering firm, particularly in the planning and preparation phase. The sizes of the Utility (Licensee) and DGC staffs are varied in each period in accordance with the requirements of the work activities. Details on the staff levels, by functional group, during each period are provided in Section 6.0.

4.4 Spent Fuel Management Staff

The largest spent fuel staff is in place while the fuel pool is operational during the spent fuel cooling period and the fuel assemblies are being transferred to dry storage. After all spent fuel

has been removed from the spent fuel pool, the staff is reduced. During spent fuel pool operations and the dry storage period, the full-time spent fuel management staff is supplemented with part-time staff to support fuel movements. Details on the staff levels, by functional group, during each period are provided in Section 6.0.

4.5 Spent Fuel Shipments

The spent fuel shipping schedules are based in part on the DOE's "Acceptance Priority Ranking & Annual Capacity Report," dated July 2004. (Ref. No. 12). The information regarding existing fuel inventory, planned transfers to dry storage and DOE's projected date of 2024 for acceptance of spent fuel is based on information provided by SCE. The spent fuel shipping schedule is provided in Appendix B. The spent fuel shipment schedule is based upon best current information and assumptions, as qualified and described elsewhere in this study, including in Section 2.2 above.

5.0 BASES OF ESTIMATE AND KEY ASSUMPTIONS

The bases of, and key assumptions for, this site-specific decommissioning estimate are presented below:

1. SCE's actual decommissioning expenses incurred from the time of permanent cessation of operations on June 7, 2013 until December 31, 2013 are included in the estimate. All other decommissioning cost data used in this study is current as of 2014. Totals and subtotals have been rounded to significant figures.

2. Energy*Solutions* developed a prompt dismantlement (DECON) project schedule based on a permanent shutdown date of June 7, 2013.

3. The decommissioning will be performed using currently available technologies.

4. DOE currently has no plans, program, or schedule in place for acceptance of utility spent fuel. However, for purposes of this decommissioning cost estimate, certain simplifying assumptions must be made regarding the schedule and rate of DOE performance. Therefore, while DOE's Standard Contract governing the acceptance of SCE's spent fuel allows for alternative removal schedules, including priority for shutdown reactors and exchanges of allocations, for purposes of this estimate DOE acceptance from the industry is assumed to commence in 2024 in accordance with SCE testimony to the Public Utilities Commission of the State of California (Ref. No. 17). The spent fuel shipment schedules are based upon the assumption that the DOE will accept spent fuel at the rate published in DOE's July 2004 Acceptance Priority Ranking & Annual Capacity Report (DOE/RW-0567) (Ref. No. 12). Additionally, SCE is reviewing available information from DOE to determine if the DOE start date assumption requires updating. The DCE will be revised accordingly as new information becomes available.

5. This estimate is based on site-specific building inventories and plant systems, as provided by Energy*Solutions*.

6. All transformers on site following shutdown are assumed to be polychlorinated biphenyl (PCB)-free, therefore, this study does not include costs for disposition of PCB contaminated transformers.

7. Cost for transportation of clean scrap metal to a recycler is included in the estimate; however, no credit is taken for the value of the scrap metal. Concrete debris and all other demolition debris is assumed to be removed from the site and disposed of at an out of state Class III landfill, consistent with the Governor of the State of California Executive Order D-62-02 (Ref. No. 16). The cost of installation and operation of Energy*Solutions*' GARDIAN system for bulk radiological assay of all wastes and recyclable materials leaving the SONGS site is included in the estimate. The purpose of the GARDIAN system is to ensure all materials not intended for disposal at a licensed facility meet all applicable requirements.

8. The estimate is based on final site restoration, in which all existing and proposed structures, with the exception of the switchyard, will be removed. Clean demolition costs are based on the assumption that all site improvements will be removed in their entirety. Clean backfill will be imported and placed to re-establish grade. The entire disturbed area of the site is to be graded, to restore the natural grade to the extent possible, and seeded.

9. Uncontaminated lead shielding remaining is assumed to be removed from its installed locations and shipped offsite by entities having a need for the material. The entities receive the lead at no charge in return for providing the removal and shipping services.

10. Site-specific information regarding contaminated soil was used as a basis for calculation of current costs for their remediation. While no known radiological or chemical remediation is required at the switchyard or the Mesa, those areas will be addressed as part of the Baseline Characterization Survey and Historical Site Assessment. If the studies conclude that radiological or chemical remediation is required at the switchyard or the Mesa, the DCE will be amended. For radiological contamination found at either the switchyard or the Mesa, the DCE will be amended to include all subsequent cost estimates for the remediation, which will be paid for by the SONGS participants in accordance with their cost allocations for the 'Common Facilities'. Chemical remediation of the switchyards will be paid by either SCE or SDG&E owners of the respective switchyards.

11. Costs for hazardous waste disposal, as well as asbestos and lead abatement, are included in this study.

12. All Class A waste is assumed to be disposed of at Energy*Solutions*' facility in Clive, Utah, in accordance with the existing Life-of-Plant Disposal Agreement between Energy*Solutions* and Southern California Edison, dated January 18, 2014 (Ref. No. 7). The following 2014 disposal rates will be applied:

    Demolition Debris and Soil - $57.97/Cubic Foot plus 5% Utah taxes
    Oversized Debris - $111.31/Cubic Foot plus 5% Utah taxes
    Containerized Waste Facility - $214.50/Cubic Foot plus 12% Utah taxes
    Large Components - $289.87/Cubic Foot plus 5% Utah taxes
    Cask Shipments - $44,059/Cask plus 12% Utah taxes

    Class A waste includes Dry Active Waste (DAW) arising from the disposal of contaminated protective clothing and health physics supplies.

13. Class B, C, and GTCC waste disposal costs are based on recent quotes for disposal of activated hardware and resins at the WCS facility. All resins and filter waste is assumed to be Class B.

14. Shipping costs for the Class B and C waste are based on a distance of 1,079 miles one way from SONGS to the WCS site.

15. GTCC is not subject to the same storage and security requirements as spent fuel and therefore is not required to be stored on the ISFSI pad. But for purposes of this estimate and to facilitate decommissioning, GTCC waste generated from the segmentation of the reactor internals is assumed to be packaged in Dry Shielded Canisters (DSCs) and placed in Advanced Horizontal Storage Modules (AHSMs) in the ISFSI to await final disposition at a DOE repository.

16. It is assumed that a total of six DSCs per unit will be required for GTCC waste.

17. Reactor vessel and internals curie estimates were derived from the values for the Reference PWR vessel and internals in NUREG/CR-0130 (Ref. No. 5). These values were adjusted for decay period.

18. The Energy*Solutions* site-specific classification of radioactive wastes for the SONGS Plant identified that the spent fuel assemblies and two components within the reactor vessel (the Core Shroud Assembly and the Lower Core Grid Plate) will exceed Class C limitations.

19. The spent fuel shipments are based upon best current information and assumptions, as qualified and described elsewhere in this study, including in Section 2.2. above.

20. Spent fuel will remain in the spent fuel pool for six years before being transferred to the ISFSI.

21. The costs for ISFSI construction and transfer of spent fuel from Units 2 & 3 to dry storage were developed by SCE and furnished to Energy*Solutions*. Following completion of spent fuel transfers to dry storage the cost of maintenance and operation of the ISFSI is distributed between Units 1, 2 and 3 based on the relative percentages of spent fuel assemblies in storage. The percentages are 10, 45, and 45 for Units 1, 2, and 3, respectively. The exception is that all property taxes are solely the liability of Units 2 & 3. Following completion of SNF Pd 4 – Dry Storage Only Units 1, 2, and 3, all ISFSI maintenance and operating costs are assigned to Units 2 & 3 until the ISFSI D&D. During ISFSI D&D costs are distributed to all three units in the same percentages of 10, 45, and 45.

22. DOE has not committed to accept SCE's canistered spent fuel. But for purposes of this estimate, it is assumed that an SCE-funded dry storage facility will not be necessary.

23. Costs for ISFSI demolition are included in this estimate. SCE assumes that portions of the AHSM concrete will be activated.

24. Energy*Solutions* has assumed that the 10 CFR Part 50 license will be maintained until DOE has taken possession of the spent fuel.

25. SCE's annual ISFSI insurance premiums of $302,000 are assumed to be incurred until all fuel shipments have been completed and the structure is no longer in use.

26. SCE's Emergency Preparedness (FEMA) fees of $500,000 per year and California Office of Emergency Services fees of $2,800,000 per year are applied until the spent fuel pool is empty. These fees were supplied by SCE.

27. SCE's current annual property taxes are assumed to be reduced to a constant $1,500,000 per year. The property taxes are a license termination expense until the completion of decommissioning, and then a spent fuel management expense until completion of the ISFSI D&D.

28. Energy*Solutions* has included the annual NRC 10 CFR 171.15(c)(2) fees, for reactors in decommissioning of $231,000/yr per unit until decommissioning is completed as a license termination expense. Following completion of decommissioning, this expense is continued as a spent fuel management cost for maintenance of the 10 CFR Part 50 license.

29. Energy*Solutions* has included Environmental Permits and Fees of $1,900,000 per year as supplied by SCE.

30. Energy*Solutions* has included NRC inspection fees during each decommissioning period based on the type and level of activities being performed.

31. SONGS annual insurance premiums, in 2014 dollars as supplied by SCE, are as follows:

    Nuclear Property Primary - $4,878,099
    Nuclear Liability - $1,151,075
    Additional Liability, Non-Nuclear - $3,576,519
    Workers' Compensation - $180,335
    Property Insurance - $353,286

    The premium amounts have been adjusted by Energy*Solutions* in accordance with information furnished by SCE to meet the requirements of each period.

32. Site operating expenses expected to be incurred during decommissioning and spent fuel management are included in the estimate. These costs include materials and services, utilities (water, gas, phone), telecommunications equipment, non-process computers, personal computers and tools and equipment. These costs were calculated based on information provided by SCE and adjusted by Energy*Solutions* to match the requirements of each period, based on staffing levels.

33. Site Lease and Easement expenses of $2,300,000 per year until the Mesa lease is terminated are included in the estimate. Following termination of the Mesa lease the site lease and easement expenses are reduced to $299,920 per year. These costs are based on information provided by SCE.

34. Utility (Licensee) staff positions and average direct burdened salary (i.e. total compensation) data in 2014 dollars were supplied by SCE.

35. Severance costs for those employees terminated as a result of SONGS decommissioning, including those costs required under California law are included in the estimate. Severance costs for Reductions-in-Force (RIFs) that occurred immediately after shutdown, and during the course of spent fuel management and decommissioning are assumed to be a site restoration expense and are included in the estimate.

36. Severance costs per employee were provided by SCE.

37. DGC staff salaries, including overhead and profit, were determined by Energy*Solutions* and represent Energy*Solutions*' standard assumptions for these rates.

38. The professional personnel used for the planning and preparation activities, and DGC personnel, are assumed to be paid per diem at the rate of $204/day, based on per diem rates from U.S. General Services Administration (GSA) for Orange County, California.

39. Craft labor rates were taken from the CA Union Craft Rate Sheet, dated January 9, 2014. Craft labor rates for disciplines not provided in the rate sheet have been taken from the 2014 RS Means Labor Rates for the Construction Industry (Ref. No. 10), for Anaheim, CA. Since the skilled laborers are assumed to be supplied by the local union hall, they will not be paid per diem.

40. The security guard force included in this estimate has been sized in accordance with the current Design Basis Threat assessment.

41. This study follows the occupational exposure principles of As Low As Reasonably Achievable (ALARA) through the use of productivity loss factors that incorporate such items as the use of respiratory protection and personnel protective clothing. These factors increase the work duration and cost.

42. The costs of all required safety analyses and safety measures for the protection of the general public, the environment, and decommissioning workers are included in the cost estimates. This reflects the requirements of:

10 CFR 20	Standards for Protection Against Radiation
10 CFR 50	Domestic Licensing of Production and Utilization Facilities
10 CFR 61	Licensing Requirements for Land Disposal of Radioactive Waste
10 CFR 71	Packaging of Radioactive Material for Transport
10 CFR 72	Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste
29 CFR 1910	Occupational Safety and Health Standards

49 CFR 170-189	Department of Transportation Regulations Governing the Transport of Hazardous Materials
Reg. Guide 1.159	Assuring the Availability of Funds for Decommissioning Nuclear Reactors

43. Activity labor costs do not include any allowance for delays between activities, nor is there any cost allowance for craft labor retained on site while waiting for work to become available.

6.0 STUDY RESULTS

This study analyzes the following technical approach to decommissioning as defined by SCE:

- Prompt DECON methodology.
- Permanent cessation of operations and commencement of decommissioning planning on June 7, 2013.
- Termination of spent fuel pool operation six years after permanent shutdown.
- Spent fuel will be stored in MPCs at an on-site ISFSI.
- A dry transfer facility will not be necessary for transfer of SNF for transport.
- Decommissioning will be performed by a DGC with oversight by the SONGS participants.
- LOP Disposal Rates are used for Class A LLRW.
- WCS Texas Disposal Rates are used for Class B and C LLRW.
- DOE begins accepting spent fuel from the industry in 2024.

Spent Fuel Shipping Schedule

The spent fuel shipping schedule is provided in Appendix B. Spent fuel shipments from the industry to DOE will begin in 2024. The spent fuel shipment schedules are based upon best current information and assumptions, as qualified and described elsewhere in this study, including in Section 2.2 above.

Cost and Schedule

Figure 6-1 is a summary project schedule. A detailed schedule is provided in Appendix C. Table 6-1 summarizes the period durations and total costs, including contingency, for License Termination, Spent Fuel, and Site Restoration activities. A detailed cost table is provided in Appendix D, and a table of annual expenditures is provided in Appendix E.

Project Staffing

This scenario is based on the assumption that decommissioning will be performed by an experienced and qualified DGC, with oversight and management of the decommissioning operations performed by the Licensee staff. Utility (Licensee) staffing levels, by organizational department and function, for each period are provided in Table 6-2. The DGC staffing levels, by organizational department and function, for each period are provided in Table 6-3.

LLRW Disposal Volumes

LLRW disposal is a significant element of the decommissioning project. The estimated cubic feet of waste are summarized as follows:

Waste Class	Unit 2	Unit 3	Total
Class A	1,832,961	1,819,680	3,652,641
Class B	7,600	7,600	15,200
Class C	4,095	4,095	8,190
GTCC	941	941	1,882

Waste disposal volumes and costs, itemized by packaging, transportation, surcharges and disposal costs by waste class and facility, are provided in Table 6-4. The waste disposal costs provided in Table 6-4 do not include contingency.

Figure 6-1
Summary Schedule

DECON with Dry Storage, 2013 Shutdown and DOE Acceptance in 2024

Task Name	Start	Finish
Post-Shutdown Spent Fuel Management	06/07/2013	09/08/2051
Spent Fuel Shipping Complete - Unit 1	12/31/2035	12/31/2035
Spent Fuel Shipping Complete - Units 2 & 3	12/31/2049	12/31/2049
SNF Pd 1 - Spent Fuel Management Transition	06/07/2013	12/31/2013
SNF Pd 2 - Spent Fuel Transfer to Dry Storage	1/1/2014	06/01/2019
SNF Pd 3 - Dry Storage During Decommissioning - Units 1, 2 and 3	06/01/2019	12/05/2031
SNF Pd 4 - Dry Storage Only - Units 1, 2 and 3	12/05/2031	12/31/2035
SNF Pd 5 - Dry Storage Only - Units 2 and 3	12/31/2035	12/31/2049
SNF D&D Pd 1 - ISFSI D&D Planning	12/31/2049	05/06/2050
SNF D&D Pd 2 - ISFSI D&D	05/06/2050	09/08/2051
Part 50 License Termination	06/07/2013	12/24/2032
Announcement of Cessation of Operations (June 7, 2013)	06/07/2013	06/07/2013
Decon Pd 1 - Transition to Decommissioning	06/07/2013	12/31/2013
Decon Pd 2 - Decommissioning Planning and Site Modifications	1/1/2014	06/30/2015
Decon Pd 3 - Decommissioning Preparations and Reactor Internals Segmentation	06/30/2015	06/01/2019
Decon Pd 4 - Plant Systems and Large Component Removal	06/01/2019	09/24/2022
Decon Pd 5 - Building Decontamination	09/24/2022	07/13/2024
Decon Pd 6 - License Termination During Demolition	07/13/2024	12/24/2032
Site Restoration	06/07/2013	12/15/2051
SR Pd 1 - Transition to Site Restoration	06/07/2013	06/30/2015
SR Pd 2 - Building Demolition During Decommissioning	06/30/2015	07/11/2017
SR Pd 3 - Subsurface Demolition Engineering and Permitting	10/01/2019	07/13/2024
SR Pd 4 - Building Demolition to 3 Feet Below Grade	07/13/2024	10/14/2028
SR Pd 5 - Subgrade Structure Removal Below -3 Feet	10/14/2028	12/05/2031
SR Pd 6 - Final Site Restoration and Lease Termination	05/06/2050	12/15/2051
Final Easement Termination	12/15/2051	12/15/2051

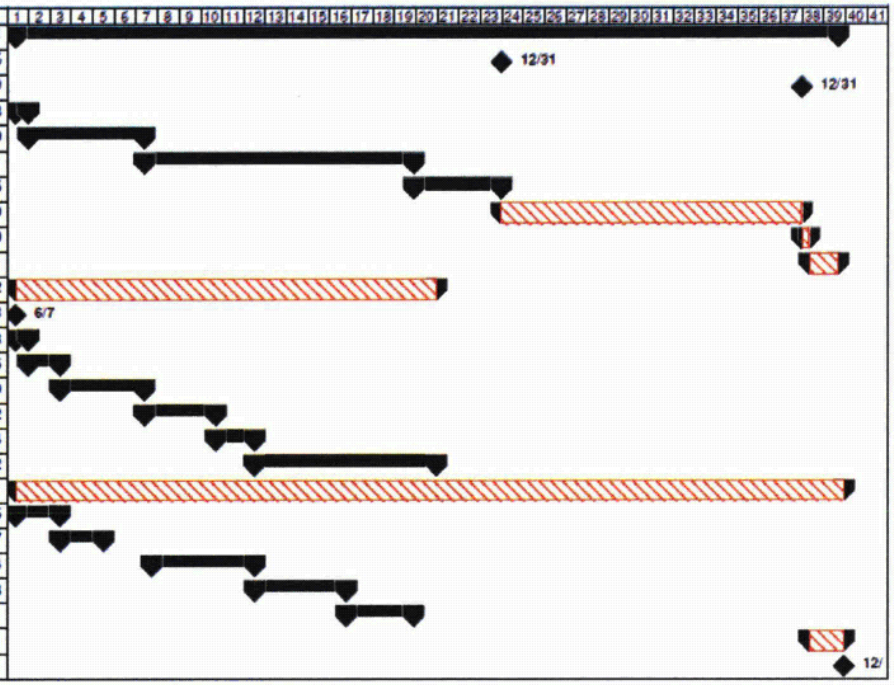


Table 6-1[3]
Cost and Schedule Summary
(2014 Dollars in Thousands)

Period No.	Period Description	Start	End	Years	Unit 2 Cost	Unit 3 Cost	Total Cost
License Termination (50.75(c))							
Decon Pd 1	Transition to Decommissioning	6/7/2013	12/31/2013	0.56	$25,749	$26,566	$52,315
Decon Pd 2	Decommissioning Planning and Site Modifications	1/1/2014	6/30/2015	1.49	$118,709	$122,430	$241,140
Decon Pd 3	Decommissioning Preparations and Reactor Internals Segmentation	6/30/2015	6/1/2019	3.92	$262,210	$276,799	$539,009
Decon Pd 4	Plant Systems and Large Component Removal	6/1/2019	9/24/2022	3.31	$392,029	$412,475	$804,504
Decon Pd 5	Building Decontamination	9/24/2022	7/13/2024	1.80	$212,447	$216,659	$429,106
Decon Pd 6	License Termination During Demolition	7/13/2024	12/24/2032	8.44	$23,085	$23,085	$46,171
Account Total				**19.52**	**$1,034,230**	**$1,078,016**	**$2,112,246**
Spent Fuel (50.54(bb)) and (72.30)							
SNF Pd 1	Spent Fuel Management Transition	6/7/2013	12/31/2013	0.56	$63,891	$66,105	$129,997
SNF Pd 2	Spent Fuel Transfer to Dry Storage	1/1/2014	6/1/2019	5.41	$344,629	$372,193	$716,822
SNF Pd 3	Dry Storage During Decommissioning - Units 1, 2 and 3	6/1/2019	12/5/2031	12.51	$61,425	$61,425	$122,849
SNF Pd 4	Dry Storage Only - Units 1, 2 and 3	12/5/2031	12/31/2035	4.07	$29,383	$29,383	$58,765
SNF Pd 5	Dry Storage Only - Units 2 and 3	12/31/2035	12/31/2049	14.00	$107,326	$107,326	$214,653
SNF D&D Pd 1	ISFSI License Termination	12/31/2049	5/6/2050	0.34	$1,260	$1,260	$2,520
SNF D&D Pd 2	ISFSI Demolition	5/6/2050	9/8/2051	1.34	$15,295	$15,295	$30,590
Account Total				**38.23**	**$623,209**	**$652,987**	**$1,276,196**
Site Restoration							
SR Pd 1	Transition to Site Restoration	6/7/2013	6/30/2015	2.06	$64,280	$66,210	$130,489
SR Pd 2	Building Demolition During Decommissioning	6/30/2015	7/11/2017	2.03	$13,003	$37,242	$50,245
SR Pd 3	Subsurface Demolition Engineering and Permitting	10/1/2019	7/13/2024	4.78	$15,593	$22,319	$37,912
SR Pd 4	Building Demolition to 3 Feet Below Grade	7/13/2024	10/14/2028	4.25	$124,953	$134,113	$259,066
SR Pd 5	Subgrade Structure Removal Below - 3 Feet	10/14/2028	12/5/2031	3.14	$171,987	$269,560	$441,547
SR Pd 6	Final Site Restoration and Lease Termination	5/6/2050	12/15/2051	1.60	$33,482	$70,064	$103,545
Account Total				**17.86**	**$423,297**	**$599,507**	**$1,022,804**
Grand Total					**$2,080,735**	**$2,330,511**	**$4,411,246**

[3] Rows and columns may not add correctly due to rounding.

Table 6-2
Utility Staff Levels

License Termination – 50.75(c) Utility Staff

Department	Decon Pd 1	Decon Pd 2	Decon Pd 3	Decon Pd 4	Decon Pd 5	Decon Pd 6
Decommissioning	0	21	21	25	18	0
Engineering	0	49	14	14	12	0
Maintenance and Work Control	0	38	10	10	3	0
Operations	0	15	7	7	0	0
Oversight and Nuclear Safety	0	7	2	2	1	0
Radiation Protection and Chemistry	0	27	26	31	26	0
Regulatory and Emergency Planning	0	10	4	4	4	0.5
Safety and Human Performance	0	13	7	7	7	0
Security Admin	0	6	6	6	6	0
Security Guard Force	0	12	12	12	12	0
Site Management and Administration	0	13	13	13	9	1
Period Totals	**0**	**211**	**122**	**131**	**98**	**1.5**

Spent Fuel - 50.54(bb) Utility Staff

Department	SNF Pd 1	SNF Pd 2	SNF Pd 3	SNF Pd 4	SNF Pd 5	SNF D&D Pd 1	SNF D&D Pd 2
Spent Fuel Shipping	0	0	0	2	2	0	0
Decommissioning	0	0	0	0	0	1	1
Engineering	0	1	1	1	1	0	1
Maintenance and Work Control	0	31	0	0	0	0	0
Operations	0	45	1	1	1	0	0
Oversight and Nuclear Safety	0	1	0.25	0.25	0.25	0	0
Radiation Protection and Chemistry	0	6	4	4	4	1	2
Regulatory and Emergency Planning	0	0	0	0	0	1	1
Security Admin	0	14	10	8	8	1	1
Security Guard Force	0	178	35	35	35	5	5
Site Management and Administration	0	0	0	0	0	1	1
Period Total	**0**	**276**	**51.25**	**54.25**	**54.25**	**10**	**12**

Site Restoration - Utility Staff

Department	SR Pd 1	SR Pd 2	SR Pd 3	SR Pd 4	SR Pd 5	SR Pd 6
Decommissioning	0	2	0	5	4	2
Engineering	0	1	0	2	1	0
Maintenance and Work Control	0	1	0	2	2	2
Regulatory and Emergency Planning	0	1	0	0	0	0
Safety and Human Performance	0	1	0	2	1	1
Security Admin	0	0	0	1	1	0
Security Guard Force	0	0	0	5	5	0
Site Management and Administration	0	0	0	4	3	3
Period Totals	**0**	**6**	**0**	**21**	**17**	**8**

Table 6-3
DGC Staff Levels

License Termination – 50.75(c) DGC Staff

Department	Decon Pd 3	Decon Pd 4	Decon Pd 5	Decon Pd 6
Administration	9	17	17	0
Engineering	15	29	14	0
Health Physics	16	73	73	2
Management	3	3	3	0
Quality Assurance	2	5	4	0
Waste Operations	7	16	16	0
Period Totals	**52**	**143**	**127**	**2**

Spent Fuel - 50.54(bb) - DGC Staff

Department	SNF D&D Pd 2
Administration	1
Engineering	2
Health Physics	3
Management	1
Quality Assurance	1
Waste Operations	4
Period Totals	**12**

Site Restoration DGC Staff

Department	SR Pd 1	SR Pd 2	SR Pd 3	SR Pd 4	SR Pd 5	SR Pd 6
Administration	0	0	0	10	5	4
Engineering	0	0	0	13	11	5
Health Physics	0	0	0	3	0	0
Management	0	0	0	2	2	1
Quality Assurance	0	0	0	2	1	0
Waste Operations	0	0	0	11	7	7
Period Totals	**0**	**0**	**0**	**41**	**26**	**17**

Table 6-4
Waste Disposal Volumes
(Cost Excludes Contingency - 2014 Dollars)

Facility and Waste Class	Waste Weight (LBs)	Waste Volume (CF)	Burial Volume (CF)	Packaging Cost	Transportation Cost	Base Burial Cost	Total Disposal Cost
Class B and C Facility							
Class B	1,132,323	6,696	15,199	$1,199,186	$6,433,599	$72,635,570	$80,268,355
Class C	407,380	1,546	8,191	$2,064,309	$26,706,007	$39,142,870	$67,913,186
GTCC	92,861	190	1,882	$196,288	$1,680,000	$38,775,980	$40,652,268
	1,632,564	**8,431**	**25,272**	**$3,459,782**	**$34,819,606**	**$150,554,420**	**$188,833,808**
Energy*Solutions*							
Class A – Debris	200,560,122	3,229,506	3,308,050	$3,804,262	$13,779,286	$211,423,909	$229,007,458
Class A – Oversize	9,967,521	146,943	184,730	$187,314	$784,285	$22,669,947	$23,641,545
Class A – Containerized Waste	1,053,914	12,287	16,303	$397,152	$364,322	$4,112,378	$4,873,851
Class A – Large Component	11,480,200	108,866	136,373	$6,313,568	$69,622,664	$43,582,464	$119,518,696
Class A – Mixed Waste	62,643	3,012	3,012	$67,887	$12,448	$801,226	$881,561
	223,124,400	**3,500,614**	**3,648,469**	**$10,770,182**	**$84,563,005**	**$282,589,924**	**$377,923,111**
Other							
Out of State Class III Landfill	1,909,207,440	25,212,269	29,372,422	$0	$146,326,469	$43,929,750	$190,256,219
Scrap Metal Recycler	184,787,372	377,117	7,391,495	$0	$911,926	$0	$911,926
	2,093,994,812	**25,589,386**	**36,763,917**	**$0**	**$147,238,394**	**$43,929,750**	**$191,168,144**
Grand Total	**2,318,751,776**	**29,098,431**	**40,437,658**	**$14,229,964**	**$266,621,006**	**$477,074,094**	**$757,925,064**

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5. U.S. Nuclear Regulatory Commission, "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130, June 1978.

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7. Life-of-Plant Disposal Agreement, between Energy*Solutions*, LLC and SCE effective January 1st, 2014.

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Appendix A

List of Systems and Structures

SONGS Plant System and Structure List

Common

Type	System Name or Description
Non	Not Used
Struct	Administration Building (K-40/50)
Struct	AWS Building
Struct	Building L-50
Struct	Gunite Slope Protection
Struct	High Flow Make-Up Demineralizer Area
Struct	ISFSI Support Structures
Struct	Maintenance Building 1 (B-43/B-44)
Struct	Maintenance Building 2 (B-49/B-50)
Struct	Maintenance Building 4 (B-64/B-65)
Struct	Maintenance Building 5 (B-62/B-63)
Struct	Mesa Buildings
Struct	Not Used
Struct	Outage Control Center Building
Struct	REMS Staging Pad
Struct	Seawall - Units 2 & 3
Struct	Security Access Building (A-80, 81, 82)
Struct	Service Building (K-10, 20, 30)
Struct	South Security Processing Facility (K-70)
Struct	South Yard Facility Buildings (T-10, 20, 60 and Haz Mat.)
Struct	Staging Warehouse Building
Ess	Auxilary Control Systems - Unit 2
Ess	Fuel Handling Building Systems - Unit 2
Ess	Radwaste Systems - Unit 2
Non	Condenstate Storage Systems - Unit 2
Non	Containment Building Systems - Unit 2
Non	Diesel Generator Systems - Unit 2
Non	Full Flow Areas Systems - Unit 2
Non	Intake Systems - Unit 2
Non	Penetration Building Systems - Unit 2
Non	Safety Equipment Building Systems - Unit 2
Non	Turbine Bldg Equip to 9 ft - Unit 2
Struct	Condensate Storage Area - Unit 2
Struct	Containment Building - Unit 2
Struct	Control Building - Unit 2
Struct	Diesel Generator Building - Unit 2
Struct	Fuel Handling Building - Unit 2
Struct	Full Flow Building - Unit 2
Struct	Intake Structure - Unit 2
Struct	Penetration Building - Unit 2
Struct	Radwaste Building - Unit 2
Struct	Safety Equipment Building - Unit 2
Struct	Tunnels - Unit 2
Struct	Turbine Building - Unit 2
Ess	Auxilary Control Systems - Unit 3
Ess	Fuel Handling Building Systems - Unit 3

SONGS Plant System and Structure List

Unit 3

Type	System Name or Description
Ess	Radwaste Systems - Unit 3
Non	Condenstate Storage Systems - Unit 3
Non	Containment Building Systems - Unit 3
Non	Diesel Generator Systems - Unit 3
Non	Full Flow Areas Systems - Unit 3
Non	Intake Systems - Unit 3
Non	Penetration Building Systems - Unit 3
Non	Safety Equipment Building Systems - Unit 3
Non	Turbine Bldg Equip to 9 ft - Unit 3
Non	Turbine Generator to 63 ft - Unit 3
Struct	Condensate Storage Tank Area - Unit 3
Struct	Containment Building - Unit 3
Struct	Control Building - Unit 3
Struct	Diesel Generator Building - Unit 3
Struct	Fuel Handling Building - Unit 3
Struct	Full Flow Building - Unit 3
Struct	Intake Structure - Unit 3
Struct	Penetration Building - Unit 3
Struct	Radwaste Building - Unit 3
Struct	Safety Equipment Building - Unit 3
Struct	Tunnels - Unit 3
Struct	Turbine Building - Unit 3

Appendix B

Spent Fuel Shipping Schedule

SONGS Unit 2 & Unit 3
Spent Fuel Shipping Schedule
2024 DOE Acceptance

	On-Site Inventory (Beginning of Year)				On-Site Transfers (During Year)		Off-Site Transfers (During Year)			
Year	Units 2 & 3 Fuel Assemblies in Wet Storage	Units 2 & 3 Fuel Assemblies in Dry Storage	Units 2 & 3 Fuel Assemblies in On-Site Storage	Units 2 & 3 Canisters in ISFSI	Unit 2 & 3 Fuel Assemblies Transferred to ISFSI	Unit 2 & 3 Fuel Canisters Transferred to ISFSI	Unit 2 Assemblies Transferred to DOE	Unit 3 Assemblies Transferred to DOE	Units 2 & 3 Assemblies Transferred to DOE	Units 2 & 3 Canisters Transferred to DOE
2014	2668	792	3460	33	0	0	0	0	0	0
2015	2668	792	3460	33	0	0	0	0	0	0
2016	2668	792	3460	33	0	0	0	0	0	0
2017	2668	792	3460	33	768	24	0	0	0	0
2018	1900	1560	3460	57	1,536	48	0	0	0	0
2019	364	3096	3460	105	364	13	0	0	0	0
2020	0	3460	3460	118	0	0	0	0	0	0
2021	0	3460	3460	118	0	0	0	0	0	0
2022	0	3460	3460	118	0	0	0	0	0	0
2023	0	3460	3460	118	0	0	0	0	0	0
2024	0	3460	3460	118	0	0	0	0	0	0
2025	0	3460	3460	118	0	0	0	0	0	0
2026	0	3460	3460	118	0	0	0	0	0	0
2027	0	3460	3460	118	0	0	0	0	0	0
2028	0	3460	3460	118	0	0	0	0	0	0
2029	0	3460	3460	118	0	0	0	0	0	0
2030	0	3460	3460	118	0	0	48	48	96	4
2031	0	3364	3364	114	0	0	192	96	288	12
2032	0	3076	3076	102	0	0	120	120	240	10
2033	0	2836	2836	92	0	0	0	96	96	4
2034	0	2740	2740	88	0	0	112	120	232	8
2035	0	2508	2508	80	0	0	96	96	192	6
2036	0	2316	2316	74	0	0	128	96	224	7
2037	0	2092	2092	67	0	0	0	0	0	0
2038	0	2092	2092	67	0	0	96	128	224	7
2039	0	1868	1868	60	0	0	96	96	192	6
2040	0	1676	1676	54	0	0	96	96	192	6
2041	0	1484	1484	48	0	0	0	0	0	0
2042	0	1484	1484	48	0	0	96	96	192	6
2043	0	1292	1292	42	0	0	96	96	192	6
2044	0	1100	1100	36	0	0	96	96	192	6
2045	0	908	908	30	0	0	128	96	224	7
2046	0	684	684	23	0	0	96	128	224	7
2047	0	460	460	16	0	0	96	230	326	11
2048	0	134	134	5	0	0	0	0	0	0
2049	0	134	134	5	0	0	134	0	134	5
2050	0	0	0	0	0	0	0	0	0	0

Appendix C

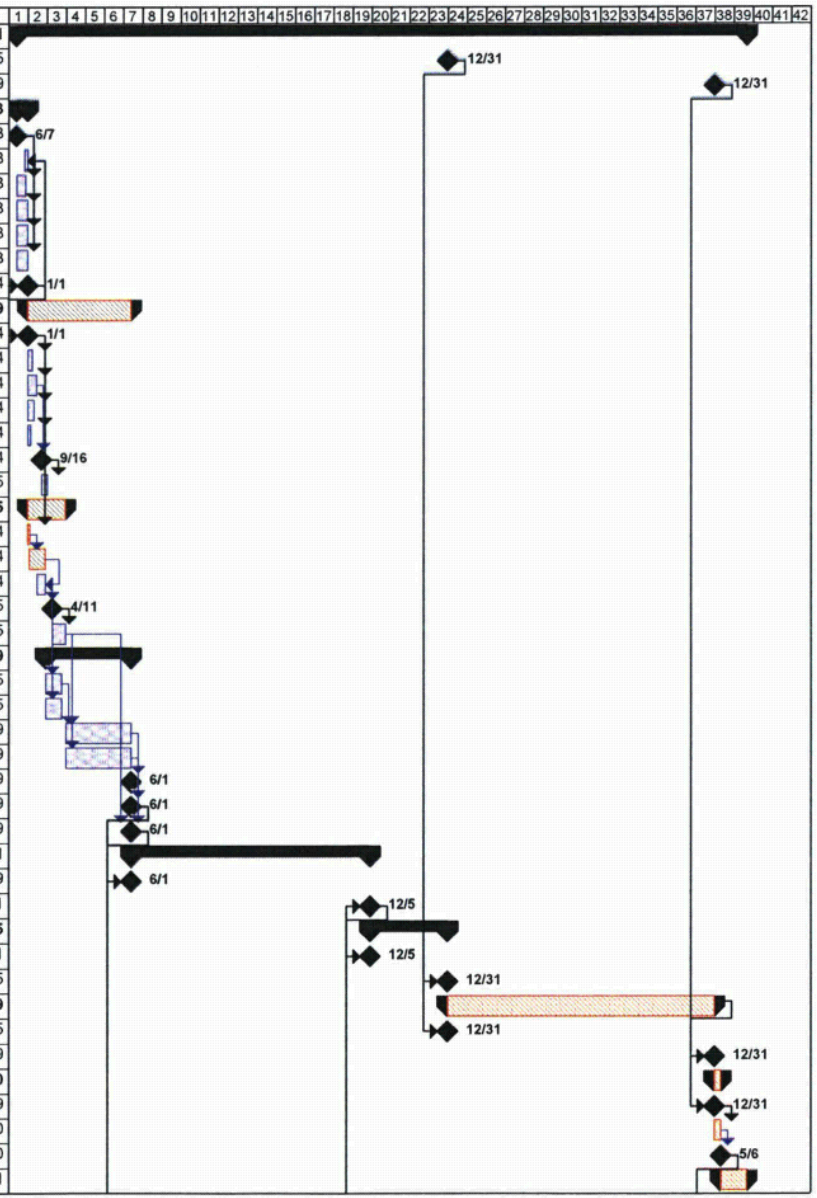
Detailed Project Schedule

SONGS 2 & 3

Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
1	**Post-Shutdown Spent Fuel Management**	**9982 days**	**06/07/2013**	**09/08/2051**
2	Spent Fuel Shipping Complete - Unit 1	0 days	12/31/2035	12/31/2035
3	Spent Fuel Shipping Complete - Units 2 & 3	0 days	12/31/2049	12/31/2049
4	**SNF Pd 1 - Spent Fuel Management Transition**	**149 days**	**06/07/2013**	**12/31/2013**
5	SNF Pd 1 Begins	0 days	06/07/2013	06/07/2013
6	Security Enhancements	45 days	10/31/2013	12/31/2013
7	Design and Fabricate Spent Fuel Canisters	120 days	06/07/2013	11/21/2013
8	Post Fukushima Modifications - Unit 2	148 days	06/07/2013	12/31/2013
9	Post Fukushima Modifications - Unit 3	148 days	06/07/2013	12/31/2013
10	Cyber Security Modifications	148 days	06/07/2013	12/31/2013
11	SNF Pd 1 Ends	0 days	01/01/2014	01/01/2014
12	**SNF Pd 2 - Spent Fuel Transfer to Dry Storage**	**1413 days**	**1/1/2014**	**06/01/2019**
13	SNF Pd 2 Begins	0 days	01/01/2014	01/01/2014
14	Security Enhancements	60 days	01/02/2014	03/26/2014
15	Prepare Irradiated Fuel Management Plan	118 days	01/02/2014	06/14/2014
16	Decay Heat Analysis	85 days	01/02/2014	04/30/2014
17	Zirconium Fire and Shine Analysis	42 days	01/02/2014	02/28/2014
18	Issue Irradiated Fuel Management Plan	0 days	09/16/2014	09/16/2014
19	NRC Review of Irradiated Fuel Management Plan	82 days	09/17/2014	01/08/2015
20	**ISFSI Expansion**	**513 days**	**01/02/2014**	**12/19/2015**
21	Select Dry Storage System Canister Design and Vendor	30 days	01/02/2014	02/12/2014
22	ISFSI Pad Study	220 days	02/03/2014	12/06/2014
23	Design ISFSI Expansion	120 days	06/24/2014	12/06/2014
24	ISFSI Permit Approved By California Coastal Commission	0 days	04/11/2015	04/11/2015
25	Construct ISFSI Expansion	180 days	04/14/2015	12/19/2015
26	**Canister Purchase, Fabrication and Fuel Tranfer**	**1170 days**	**12/09/2014**	**06/01/2019**
27	Purchase Spent Fuel Canisters and AHSMs - Unit 2	220 days	12/09/2014	10/10/2015
28	Purchase Spent Fuel Canisters and AHSMs - Unit 3	220 days	12/09/2014	10/10/2015
29	Load Spent Fuel Canisters and Transfer to ISFSI - Unit 2	900 days	12/22/2015	06/01/2019
30	Load Spent Fuel Canisters and Transfer to ISFSI - Unit 3	900 days	12/22/2015	06/01/2019
31	Unit 2 Spent Fuel Pool Empty	0 days	06/01/2019	06/01/2019
32	Unit 3 Spent Fuel Pool Empty	0 days	06/01/2019	06/01/2019
33	SNF Pd 2 Ends	0 days	06/01/2019	06/01/2019
34	**SNF Pd 3 - Dry Storage During Decommissioning - Units 1, 2 and 3**	**3265 days**	**06/01/2019**	**12/05/2031**
35	SNF Pd 3 Begins	0 days	06/01/2019	06/01/2019
36	SNF Pd 3 Ends	0 days	12/05/2031	12/05/2031
37	**SNF Pd 4 - Dry Storage Only - Units 1, 2 and 3**	**1061 days**	**12/05/2031**	**12/31/2035**
38	SNF Pd 4 Begins	0 days	12/05/2031	12/05/2031
39	SNF Pd 4 Ends	0 days	12/31/2035	12/31/2035
40	**SNF Pd 5 - Dry Storage Only - Units 2 and 3**	**3654 days**	**12/31/2035**	**12/31/2049**
41	SNF Pd 5 Begins	0 days	12/31/2035	12/31/2035
42	SNF Pd 5 Ends	0 days	12/31/2049	12/31/2049
43	**SNF D&D Pd 1 - ISFSI D&D Planning**	**90 days**	**12/31/2049**	**05/06/2050**
44	SNF D&D Pd 1 Begins	0 days	12/31/2049	12/31/2049
45	Preparation and NRC Review of License Termination Plan	90 days	01/01/2050	05/06/2050
46	SNF D&D Pd 1 Ends	0 days	05/06/2050	05/06/2050
47	**SNF D&D Pd 2 - ISFSI D&D**	**350 days**	**05/06/2050**	**09/08/2051**

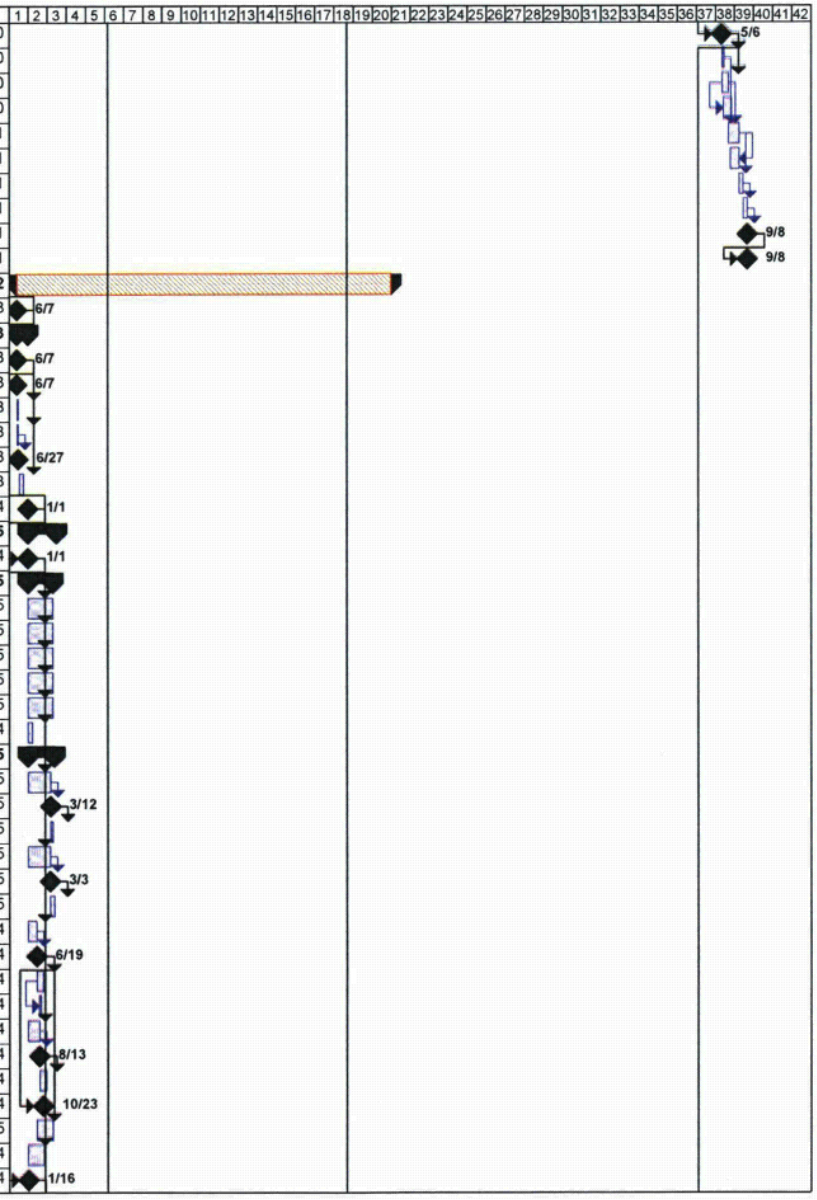


SONGS 2 & 3

Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
48	SNF D&D Pd 2 Begins	0 days	05/06/2050	05/06/2050
49	Install GARDIAN Bulk Assay System	30 days	05/07/2050	06/17/2050
50	Decon AHSMs	90 days	05/07/2050	09/09/2050
51	Final Status Survey of ISFSI	120 days	05/28/2050	11/11/2050
52	Clean Demolition of ISFSI AHSMs and Pad	145 days	09/10/2050	03/31/2051
53	Clean Demolition of ISFSI Support Structures	120 days	10/15/2050	03/31/2051
54	Restore ISFSI Site	55 days	04/01/2051	06/16/2051
55	Preparation of Final Report on Decommissioning and NRC Review	60 days	06/17/2051	09/08/2051
56	SNF D&D Pd 2 Ends - License Termination Complete	0 days	09/08/2051	09/08/2051
57	Post-Shutdown Spent Fuel Management Complete	0 days	09/08/2051	09/08/2051
58	**Part 50 License Termination**	**5102 days**	**06/07/2013**	**12/24/2032**
59	Announcement of Cessation of Operations (June 7, 2013)	0 days	06/07/2013	06/07/2013
60	**Decon Pd 1 - Transition to Decommissioning**	**149 days**	**06/07/2013**	**12/31/2013**
61	Decon Pd 1 Begins	0 days	06/07/2013	06/07/2013
62	Certification of Permanent Cessation Submitted to NRC (June 12, 2013)	0 days	06/07/2013	06/07/2013
63	Defuel Unit 3 Reactor	15 days	06/07/2013	06/27/2013
64	Defuel Unit 2 Reactor	15 days	06/07/2013	06/27/2013
65	Notification of Permanent Fuel Removal (July 23, 2013)	0 days	06/27/2013	06/27/2013
66	Disposition of Legacy Wastes	60 days	07/19/2013	10/10/2013
67	Decon Pd 1 Ends	0 days	01/01/2014	01/01/2014
68	**Decon Pd 2 - Decommissioning Planning and Site Modifications**	**389 days**	**1/1/2014**	**06/30/2015**
69	Decon Pd 2 Begins	0 wks	01/01/2014	01/01/2014
70	**Preparation of Decommissioning License Documents**	**340 days**	**01/02/2014**	**04/22/2015**
71	Develop Certified Fuel Handler Program	340 days	01/02/2014	04/22/2015
72	Prepare Post-Shutdown QA Plan	340 days	01/02/2014	04/22/2015
73	Prepare Post-Shutdown Security Plan	340 days	01/02/2014	04/22/2015
74	Prepare Post-Shutdown Fire Protection Plan	340 days	01/02/2014	04/22/2015
75	Prepare Defueled Radiation Protection Manual	340 days	01/02/2014	04/22/2015
76	Prepare Preliminary Defueled Technical Specifications	63 days	01/02/2014	03/29/2014
77	**NRC Deliverables**	**364 days**	**01/02/2014**	**05/26/2015**
78	Prepare Defueled Safety Analysis Report (DSAR)	311 days	01/02/2014	03/12/2015
79	Submit DSAR to NRC	0 days	03/12/2015	03/12/2015
80	Implement Technical Specification Modifications	30 days	03/13/2015	04/23/2015
81	Prepare Post-Shutdown Emergency Preparedness Plan	304 days	01/02/2014	03/03/2015
82	Submit Emergency Plan to NRC	0 days	03/03/2015	03/03/2015
83	NRC Review of Emergency Plan	60 days	03/04/2015	05/26/2015
84	Prepare Post-Shutdown Decommissioning Activities Report (PSDAR)	121 days	01/02/2014	06/19/2014
85	Submit PSDAR to NRC	0 days	06/19/2014	06/19/2014
86	NRC Review of PSDAR	90 days	06/20/2014	10/23/2014
87	Public Meeting on PSDAR	30 days	08/01/2014	09/11/2014
88	Prepare Decommissioning Cost Estimate (DCE)	160 days	01/02/2014	08/13/2014
89	Submit DCE to NRC	0 days	08/13/2014	08/13/2014
90	NRC Review of Decommissioning Cost Estimate	90 days	08/14/2014	12/17/2014
91	Commencement of Major Decommisisoning Activities Allowable	0 days	10/23/2014	10/23/2014
92	Respond to NRC quesitons on PSDAR	220 days	06/20/2014	04/23/2015
93	Disposition of Legacy Wastes	220 days	01/02/2014	11/05/2014
94	Contract Award for Historic Site Assessment and Site Characterization	0 wks	01/16/2014	01/16/2014

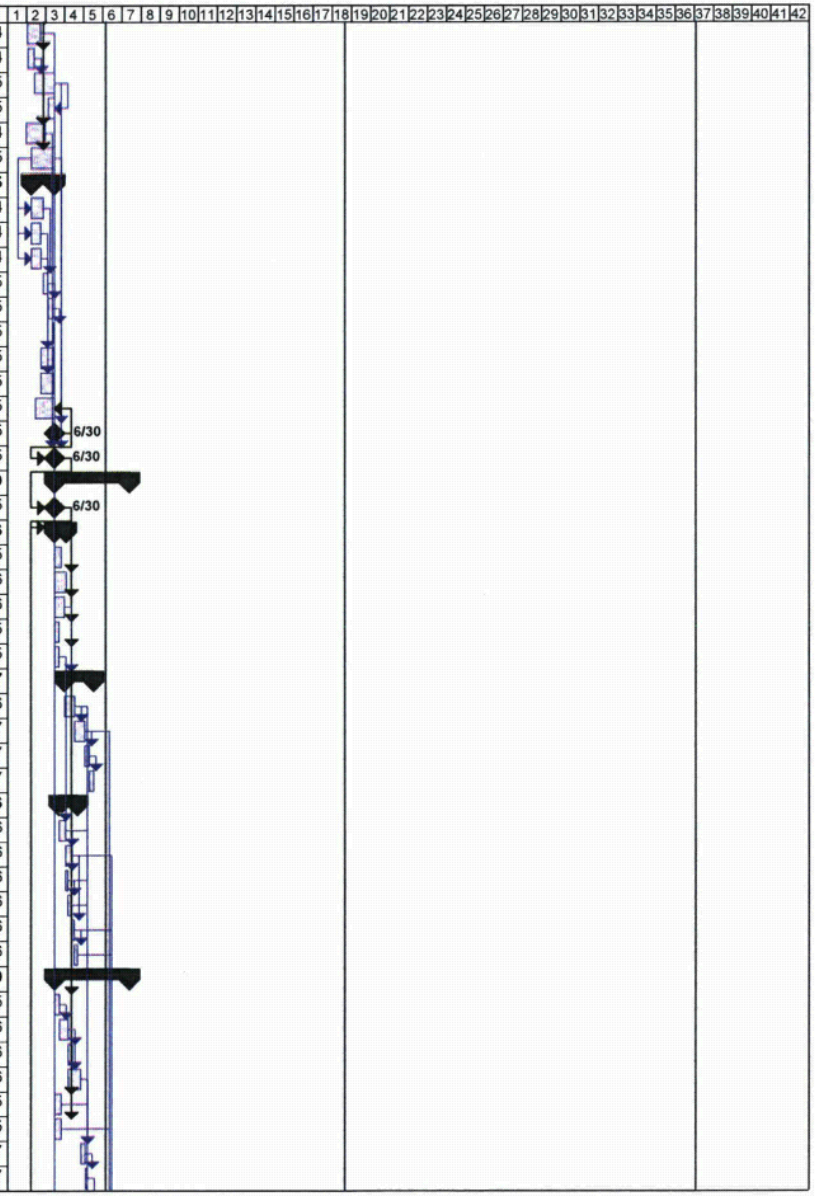


SONGS 2 & 3

Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
95	Perform Historic Site Assessment and Site Characterization	180 days	01/17/2014	09/25/2014
96	Planning and Design For Cold and Dark	90 days	02/01/2014	06/06/2014
97	Implement Cold and Dark (Repower Site)	275 days	06/07/2014	06/26/2015
98	Install 12kV Service Line to Power Temporary Power Ring	90 days	02/21/2015	06/26/2015
99	Drain and De-Energize Non-Essential Systems (DEC Process)	260 days	01/02/2014	12/31/2014
100	Select Decommissioning General Contractor (DGC)	318 days	04/11/2014	06/30/2015
101	**Spent Fuel Pool Isolation**	**318 days**	**04/11/2014**	**06/30/2015**
102	Design Spent Fuel Pool Support System Modifications	160 days	04/11/2014	11/20/2014
103	Design Control Room Relocation	125 days	04/11/2014	10/02/2014
104	Design Spent Fuel Security System Modifications	130 days	04/11/2014	10/09/2014
105	Install Spent Fuel Pool System Modifications - Unit 2	66 days	11/21/2014	02/20/2015
106	Install Spent Fuel Pool System Modifications - Unit 3	66 days	02/21/2015	05/23/2015
107	Spent Fuel Pool Island System Training	10 days	05/26/2015	06/06/2015
108	Implement Control Room Modifications	185 days	10/03/2014	06/18/2015
109	Implement Spent Fuel Pool Security Modifications	180 days	10/10/2014	06/18/2015
110	Transition Project Modifictations	262 days	06/28/2014	06/30/2015
111	DGC Contract Award	0 days	06/30/2015	06/30/2015
112	Decon Pd 2 Ends	0 wks	06/30/2015	06/30/2015
113	**Decon Pd 3 - Decommissioning Preparations and Reactor Internals Segmenta**	**1024 days**	**06/30/2015**	**06/01/2019**
114	Decon Pd 3 Begins	0 days	06/30/2015	06/30/2015
115	**DGC Mobilization and Planning**	**160 days**	**07/01/2015**	**02/09/2016**
116	Prepare Integrated Work Sequence and Schedule for Decommissioning	90 days	07/01/2015	11/03/2015
117	Prepare Detailed Work Procedures for Decommissioning	160 days	07/01/2015	02/09/2016
118	Planning and Design of Primary System Decontamination	135 days	07/01/2015	01/05/2016
119	Planning and Design of Infrastructure Improvements	60 days	07/01/2015	09/22/2015
120	Design Containment Access Modifications	60 days	07/01/2015	09/22/2015
121	**System Decon**	**400 days**	**01/06/2016**	**07/18/2017**
122	Perform Primary System Decon- Unit 2	140 days	01/06/2016	07/19/2016
123	Perform Primary System Decon- Unit 3	140 days	07/20/2016	01/31/2017
124	Hot Spot Decontamination - Unit 2	60 days	02/01/2017	04/25/2017
125	Hot Spot Decontamination - Unit 3	60 days	04/26/2017	07/18/2017
126	**Rx Internals Removal Preparations**	**255 days**	**09/23/2015**	**09/13/2016**
127	Modify Containment Access- Unit 2	90 days	09/23/2015	01/26/2016
128	Modify Containment Access- Unit 3	90 days	01/27/2016	05/31/2016
129	Remove and Dispose of Missle Shields - Unit 2	30 days	01/27/2016	03/08/2016
130	Remove and Dispose of Reactor Head - Unit 2	45 days	03/09/2016	05/10/2016
131	Remove and Dispose of Missle Shields - Unit 3	30 days	06/01/2016	07/12/2016
132	Remove and Dispose of Reactor Head - Unit 3	45 days	07/13/2016	09/13/2016
133	**Reactor Internals Segmentation Planning and Implementation**	**1020 days**	**07/01/2015**	**05/28/2019**
134	Finalize Residual Radiation Inventory (Rx Vessel & Internals)	65 days	07/01/2015	09/29/2015
135	Prepare Activity Specification for Rx Vessel and Internals Segmentation	120 days	09/30/2015	03/15/2016
136	Select Shipping Casks and Obtain Shipping Permits	60 days	03/16/2016	06/07/2016
137	Design, Specify, and Procure Special Items and Materials	175 days	03/16/2016	11/15/2016
138	Purchase Dry Storage Modules for GTCC Waste - Unit 2	90 days	07/01/2015	11/03/2015
139	Purchase Dry Storage Modules for GTCC Waste - Unit 3	90 days	07/01/2015	11/03/2015
140	Test Special Cutting and Handling Equipment and Train Operators	60 days	11/16/2016	02/07/2017
141	Finalize Internals and Vessel Segmenting Details - Unit 2	30 days	02/08/2017	03/21/2017

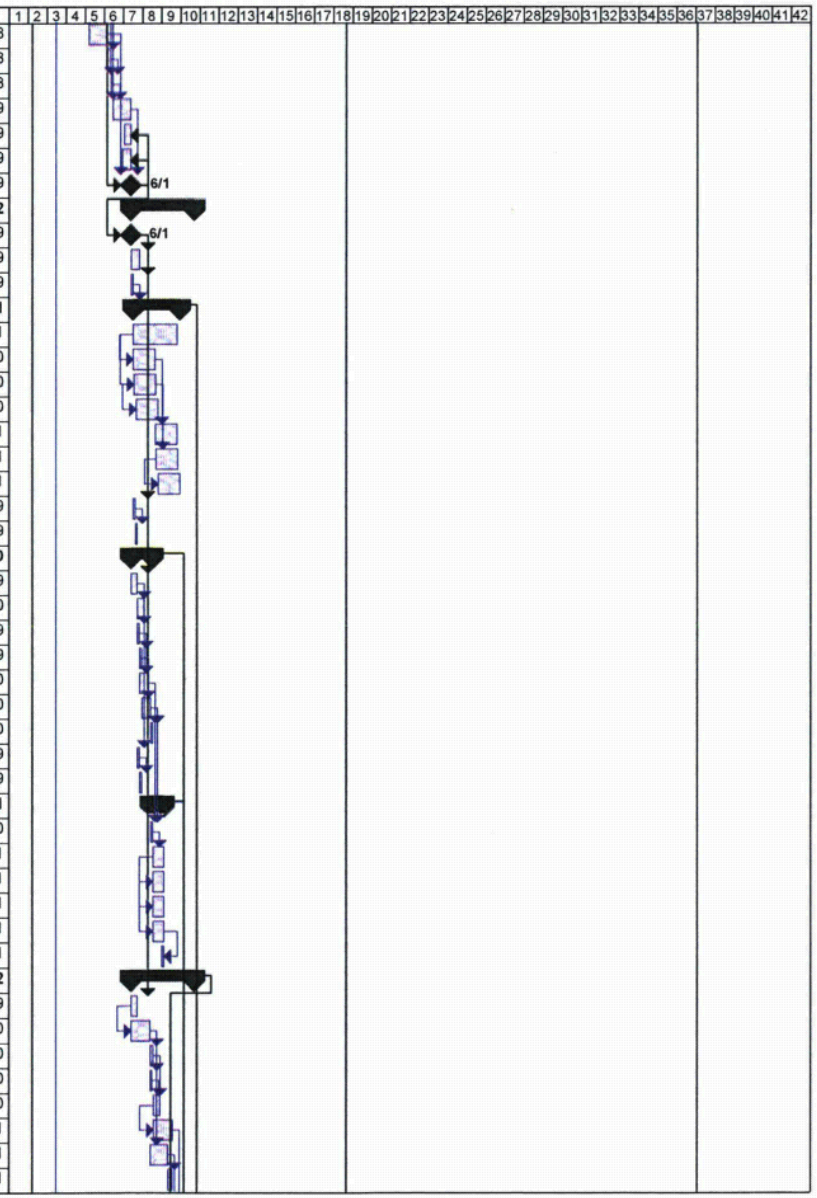


SONGS 2 & 3

Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
142	Segment, Package and Dispose of Reactor Internals - Unit 2	240 days	03/22/2017	02/20/2018
143	Transfer Internals Segmentation Equipment to Unit 3	60 days	02/21/2018	05/15/2018
144	Finalize Internals and Vessel Segmenting Details - Unit 3	30 days	05/16/2018	06/26/2018
145	Segment, Package and Dispose of Reactor Internals - Unit 3	240 days	06/27/2018	05/28/2019
146	Construct new change rooms, hot laundry, in-plant laydown areas	90 days	01/29/2019	06/01/2019
147	Procure Non-Engineered Standard Equipment	120 days	12/18/2018	06/01/2019
148	Decon Pd 3 Ends	0 wks	06/01/2019	06/01/2019
149	**Decon Pd 4 - Plant Systems and Large Component Removal**	**865 days**	**06/01/2019**	**09/24/2022**
150	Decon Pd 4 Begins	0 days	06/01/2019	06/01/2019
151	Upgrade Rail Spur	120 days	06/04/2019	11/16/2019
152	Install GARDIAN Bulk Assay System	30 days	06/04/2019	07/13/2019
153	**Non Essential System Removal**	**640 days**	**07/16/2019**	**12/25/2021**
154	Scaffolding for Non-Essential System Removal	120 wks	07/16/2019	10/30/2021
155	Asbestos Abatement for Non-Essential Systems Removal - Unit 2	60 wks	07/16/2019	09/05/2020
156	Lead Abatement for Non-Essential Systems Removal - Unit 2	60 wks	07/30/2019	09/19/2020
157	Remove, Package and Dispose of Non-Essential Systems - Unit 2	60 wks	09/10/2019	10/31/2020
158	Asbestos Abatement for Non-Essential Systems - Unit 3	60 wks	09/08/2020	10/30/2021
159	Lead Abatement for Non-Essential Systems - Unit 3	60 wks	09/22/2020	11/13/2021
160	Remove, Package and Dispose of Non-Essential Systems - Unit 3	60 wks	11/03/2020	12/25/2021
161	Remove Underground Diesel Tank - Unit 2	30 days	07/16/2019	08/24/2019
162	Remove Underground Diesel Tank - Unit 3	30 days	08/27/2019	10/05/2019
163	**Fuel Pool Closure**	**300 days**	**06/04/2019**	**07/25/2020**
164	Remove and Dispose of Spent Fuel Storage Racks - Unit 2	90 days	06/04/2019	10/05/2019
165	Remove and Dispose of Spent Fuel Storage Racks - Unit 3	90 days	10/08/2019	02/08/2020
166	Remove and Dispose of Legacy Class B and C Waste - Unit 2	30 days	10/08/2019	11/16/2019
167	Remove and Dispose of Legacy Class B and C Waste - Unit 3	30 days	11/19/2019	12/28/2019
168	Drain Spent Fuel Pool and Process Liquid Waste - Unit 2	24 wks	11/19/2019	05/02/2020
169	Drain Spent Fuel Pool and Process Liquid Waste - Unit 3	24 wks	12/31/2019	06/13/2020
170	Segment, Package and Dispose of Spent Fuel Pool Island Equipment	30 days	06/16/2020	07/25/2020
171	Segment and Dispose of Fuel Pool Bridge Crane - Unit 2	30 days	10/08/2019	11/16/2019
172	Segment and Dispose of Fuel Pool Bridge Crane - Unit 3	30 days	11/19/2019	12/28/2019
173	**Essential Systems Removal**	**180 days**	**06/16/2020**	**02/20/2021**
174	Flush and Drain Essential Systems Following Fuel Pool Closure	30 days	06/16/2020	07/25/2020
175	Scaffolding for Essential System Removal	30 wks	07/28/2020	02/20/2021
176	Asbestos Abatement for Essential Systems	30 wks	07/28/2020	02/20/2021
177	Lead Abatement for Essential Systems Removal	30 wks	07/28/2020	02/20/2021
178	Remove, Package and Dispose of Essential Systems	30 wks	07/28/2020	02/20/2021
179	Removal and Disposal of Spent Resins, Filter Media and Tank Sludge	30 days	01/12/2021	02/20/2021
180	**Large Component Removal**	**865 days**	**06/04/2019**	**09/24/2022**
181	Reactor Vessel Insulation Removal and Disposal - Unit 2	90 days	06/04/2019	10/05/2019
182	Segment, Package and Dispose of Reactor Pressure Vessel - Unit 2	260 days	06/04/2019	05/30/2020
183	Transfer Rx Vessel Segmentation Equipment to Unit 3	45 days	06/02/2020	08/01/2020
184	Procure Replacement Non-Engineered Standard Equipment	30 days	06/02/2020	07/11/2020
185	Reactor Vessel Insulation Removal and Disposal - Unit 3	90 days	08/04/2020	12/05/2020
186	Segment, Package and Dispose of Reactor Pressure Vessel - Unit 3	260 days	08/04/2020	07/31/2021
187	Remove and Dispose of Steam Generators - Unit 2	240 days	06/02/2020	05/01/2021
188	Remove and Dispose of Pressurizer - Unit 2	60 days	05/04/2021	07/24/2021



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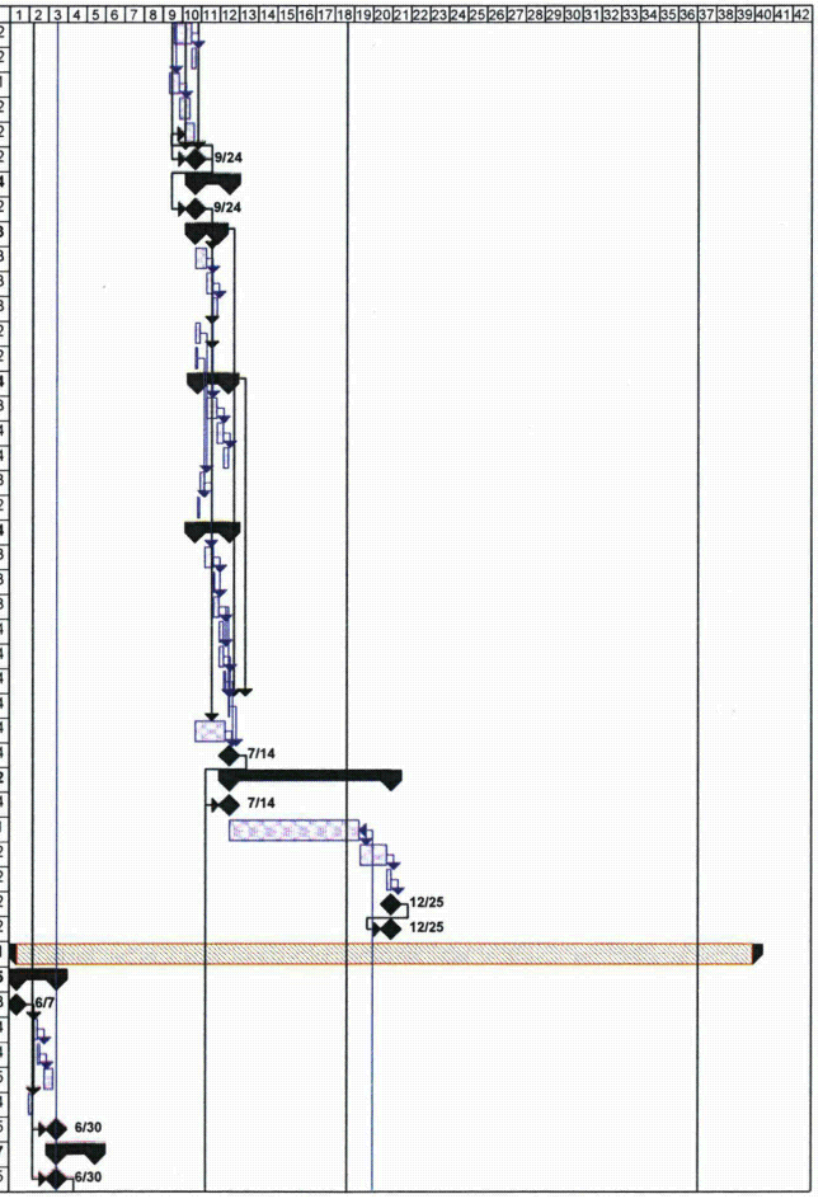
Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
189	Remove and Dispose of Steam Generators - Unit 3	240 days	08/03/2021	07/02/2022
190	Remove and Dispose of Pressurizer - Unit 3	60 days	07/05/2022	09/24/2022
191	Remove and Dispose of Turbine Gantry Crane - Unit 2	140 days	05/04/2021	11/13/2021
192	Remove and Dispose of Turbine Gantry Crane - Unit 3	140 days	11/16/2021	05/28/2022
193	Prepare License Termination Plan	26 wks	03/01/2022	08/27/2022
194	Decon Pd 4 Ends	0 days	09/24/2022	09/24/2022
195	**Decon Pd 5 - Building Decontamination**	**470 days**	**09/24/2022**	**07/13/2024**
196	Decon Pd 5 Begins	0 days	09/24/2022	09/24/2022
197	**Unit 3**	**305 days**	**09/27/2022**	**11/25/2023**
198	Decon Containment Building - Unit 3	150 days	09/27/2022	04/22/2023
199	Decon Penetration Building - Unit 3	85 days	04/25/2023	08/19/2023
200	Decon Safety Equipment and MSIV Building - Unit 3	70 days	08/22/2023	11/25/2023
201	Decon Fuel Handling Building - Unit 3	65 days	09/27/2022	12/24/2022
202	Decon Turbine Building - Unit 3	30 days	09/27/2022	11/05/2022
203	**Unit 2**	**425 days**	**11/08/2022**	**06/22/2024**
204	Decon Containment Building - Unit 2	150 days	04/25/2023	11/18/2023
205	Decon Penetration Building - Unit 2	85 days	11/21/2023	03/16/2024
206	Decon Safety Equipment and MSIV Building - Unit 2	70 days	03/19/2024	06/22/2024
207	Decon Fuel Handling Building - Unit 2	65 days	12/27/2022	03/25/2023
208	Decon Turbine Building - Unit 2	30 days	11/08/2022	12/17/2022
209	**Common**	**470 days**	**09/27/2022**	**07/13/2024**
210	Decon Auxiliary Radwaste Building - Common	120 days	03/28/2023	09/09/2023
211	Decon Auxiliary Control Building - Common	20 days	09/12/2023	10/07/2023
212	Decon Condensate Area and Tunnels - Units 2 and 3	80 days	09/12/2023	12/30/2023
213	Excavate, Remove and Dispose of Yard Area Drains	60 days	01/02/2024	03/23/2024
214	Remove and Dispose of Contaminated Sumps, Trenches and Pavement	60 days	01/02/2024	03/23/2024
215	Remove and Dispose of Radiologically Contaminated Soil	30 days	03/26/2024	05/04/2024
216	Dispose of Contaminated Decon Equipment and Tooling	15 days	06/25/2024	07/13/2024
217	Radiological Survey of Structures During Decon	410 days	09/27/2022	04/20/2024
218	Decon Pd 5 Ends	0 days	07/13/2024	07/13/2024
219	**Decon Pd 6 - License Termination During Demolition**	**2206 days**	**07/13/2024**	**12/24/2032**
220	Decon Pd 6 Begins	0 days	07/13/2024	07/13/2024
221	Final Status Survey	1771 days	07/13/2024	04/25/2031
222	ORISE Verification and NRC Approval	18 mons	05/17/2031	10/01/2032
223	Prepare Final Report of Dismantling Program	60 days	10/02/2032	12/24/2032
224	Decon Complete - Partial License Termination	0 days	12/24/2032	12/24/2032
225	Decon Pd 6 Ends	0 days	12/24/2032	12/24/2032
226	**Site Restoration**	**10052 days**	**06/07/2013**	**12/15/2051**
227	**SR Pd 1 - Transition to Site Restoration**	**538 days**	**06/07/2013**	**06/30/2015**
228	SR Pd 1 Begins	0 days	06/07/2013	06/07/2013
229	Mesa Site Phase I and II Site Assessment	60 days	04/11/2014	07/03/2014
230	Disposition Hazardous Waste from Mesa Site	30 days	07/04/2014	08/14/2014
231	Mesa Site Characterization Survey	120 days	11/07/2014	04/23/2015
232	Fuel Cancellation Expense	60 days	01/21/2014	04/12/2014
233	SR Pd 1 Ends	0 days	06/30/2015	06/30/2015
234	**SR Pd 2 - Building Demolition During Decommissioning**	**530 days**	**06/30/2015**	**07/11/2017**
235	SR Pd 2 Begins	0 days	06/30/2015	06/30/2015



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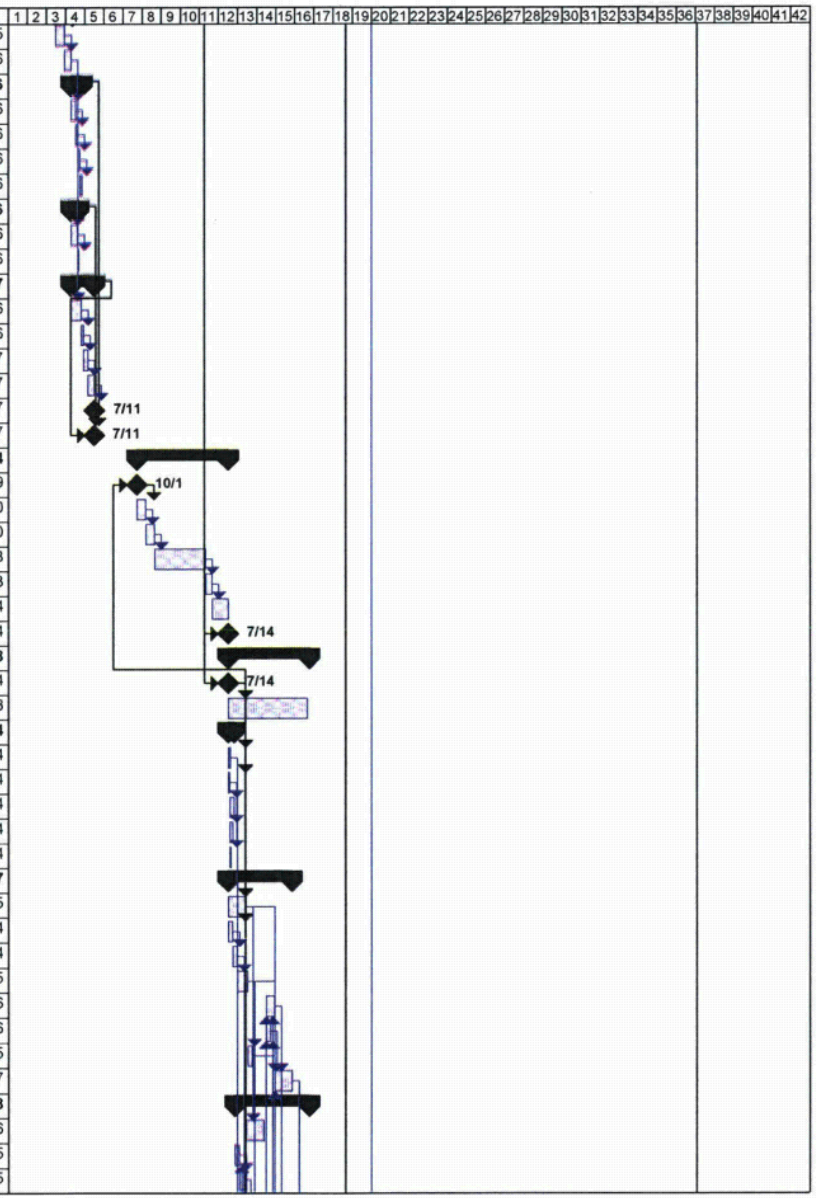
Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
236	Prepare Site Restoration Demolition Plan and Schedule	120 days	07/01/2015	12/15/2015
237	Obtain Required Permits For Mesa, South Access and South Yard	90 days	12/16/2015	04/19/2016
238	**South Access for Decommissioning**	**150 days**	**04/20/2016**	**11/15/2016**
239	Demolish Service Building (K-10, 20, 30)	60 days	04/20/2016	07/12/2016
240	Demolish South Security Processing Facility (K-70)	30 days	07/13/2016	08/23/2016
241	Demolish Staging Warehouse	30 days	08/24/2016	10/04/2016
242	Demolish Administration Building (K-40/50)	30 days	10/05/2016	11/15/2016
243	**South Yard Facility**	**105 days**	**04/20/2016**	**09/13/2016**
244	Demolish South Yard Area Buildings T-10, 20, 60 and Haz Mat.	90 days	04/20/2016	08/23/2016
245	Demolish REMS Staging Pad	15 days	08/24/2016	09/13/2016
246	**Mesa**	**320 days**	**04/20/2016**	**07/11/2017**
247	Demolish Mesa Buildings	140 days	04/20/2016	11/01/2016
248	Remove Underground Fuel Storage Tanks	30 days	11/02/2016	12/13/2016
249	Demolish Mesa Roads and Parking Lots	60 days	12/14/2016	03/07/2017
250	Finish Grading and Re-vegetate Mesa Site	90 days	03/08/2017	07/11/2017
251	Mesa Area Cleared for Easement Termination	0 days	07/11/2017	07/11/2017
252	SR Pd 2 Ends	0 days	07/11/2017	07/11/2017
253	**SR Pd 3 - Subsurface Demolition Engineering and Permitting**	**1250 days**	**10/01/2019**	**07/13/2024**
254	SR Pd 3 Begins	0 days	10/01/2019	10/01/2019
255	Hydrogeologic Investigation and Outfall Conduit Survey	120 days	10/01/2019	03/14/2020
256	Subsurface Structure Removal Engineering Planning and Design	120 days	03/17/2020	08/29/2020
257	Environmental Impacts Analyses for Lease Termination Activities	700 days	09/01/2020	05/06/2023
258	Final Site Grading and Shoreline Protection Engineering Planning and Design	90 days	05/09/2023	09/09/2023
259	Obtain Required Permits and Approvals	220 days	09/12/2023	07/13/2024
260	SR Pd 3 Ends	0 days	07/13/2024	07/13/2024
261	**SR Pd 4 - Building Demolition to 3 Feet Below Grade**	**1110 days**	**07/13/2024**	**10/14/2028**
262	SR Pd 4 Begins	0 days	07/13/2024	07/13/2024
263	Procure Building Demolition Equipment	1080 days	07/16/2024	09/02/2028
264	**Demolition Preparations**	**80 days**	**07/16/2024**	**11/02/2024**
265	Install Temporary Structures	30 days	07/16/2024	08/24/2024
266	Install Erosion and Sediment Controls	20 days	07/16/2024	08/10/2024
267	Remove Cathodic Protection Trench	60 days	08/13/2024	11/02/2024
268	Remove Protected Area Security Fencing	45 days	08/13/2024	10/12/2024
269	Remove Protected Area Pavement	20 days	08/13/2024	09/07/2024
270	**Unit 3**	**870 days**	**07/16/2024**	**11/13/2027**
271	Detension and Remove Unit 3 Containment Builidng Tendons	240 days	07/16/2024	06/14/2025
272	Demolish Diesel Generator Building - Unit 3	60 days	07/16/2024	10/05/2024
273	Demolish Condensate Building and Transformer Pads - Unit 3	60 days	10/08/2024	12/28/2024
274	Demolish Full Flow Area and Turbine Building - Unit 3	140 days	12/31/2024	07/12/2025
275	Demolish Unit 3 Fuel Handling Building to 3-Feet Below Grade	120 days	06/30/2026	12/12/2026
276	Demolish Penetration Building - Unit 3	60 days	06/30/2026	09/19/2026
277	Demolish Safety Equipmentand MSIV Building - Unit 3	60 days	07/15/2025	10/04/2025
278	Demolish Unit 3 Containment Building to 3-Feet Below Grade	240 days	12/15/2026	11/13/2027
279	**Unit 2**	**1020 days**	**11/19/2024**	**10/14/2028**
280	Detension and Remove Unit 2 Containment Builidng Tendons	240 days	06/17/2025	05/16/2026
281	Demolish Diesel Generator Building - Unit 2	60 days	11/19/2024	02/08/2025
282	Demolish Condensate Building and Transformer Pads - Unit 2	60 days	02/11/2025	05/03/2025



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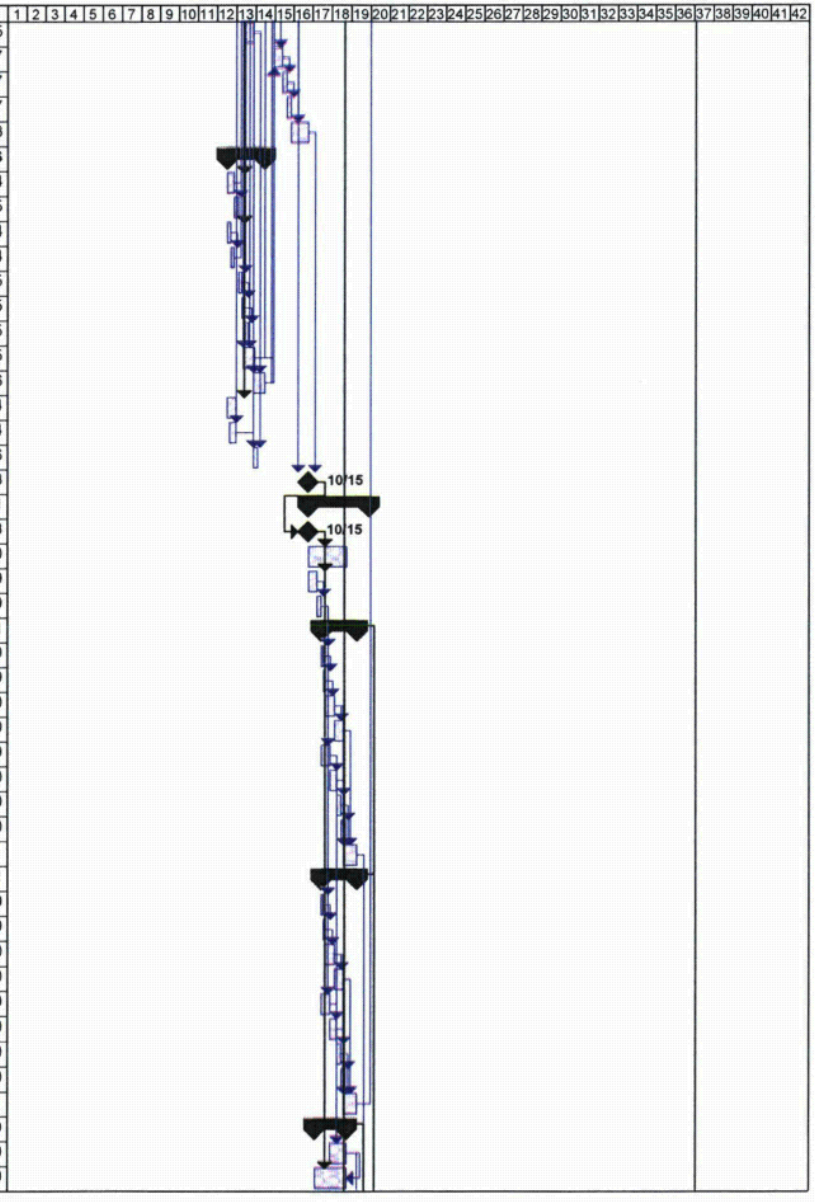
Detailed Project Schedule

Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
283	Demolish Full Flow Area and Turbine Building - Unit 2	140 days	05/06/2025	11/15/2025
284	Demolish Unit 2 Fuel Handling Building to 3-Feet Below Grade	120 days	12/15/2026	05/29/2027
285	Demolish Penetration Building - Unit 2	60 days	06/01/2027	08/21/2027
286	Demolish Safety Equipment and MSIV Building - Unit 2	60 days	08/24/2027	11/13/2027
287	Demolish Unit 2 Containment Building to 3-Feet Below Grade	240 days	11/16/2027	10/14/2028
288	**Common**	**510 days**	**07/16/2024**	**06/27/2026**
289	Demolish AWS Building	90 days	07/16/2024	11/16/2024
290	Demolish Building L-50	60 days	11/19/2024	02/08/2025
291	Demolish Building B-64/B-65	45 days	07/16/2024	09/14/2024
292	Demolish Building B-62/B-63	45 days	09/17/2024	11/16/2024
293	Demolish Outage Control Center	45 days	02/11/2025	04/12/2025
294	Demolish Building B-49/B-50	45 days	04/15/2025	06/14/2025
295	Demolish Building B-43/B-44	45 days	06/17/2025	08/16/2025
296	Demolish Auxiliary Radwaste Building - Common	160 days	05/06/2025	12/13/2025
297	Demolish Auxiliary Control Building - Common	160 days	11/18/2025	06/27/2026
298	Remove Systems and Demolish Make-Up Demineralizer Structures	120 days	07/16/2024	12/28/2024
299	Install Concrete Plugs in Intake and Discharge Structures	90 days	08/27/2024	12/28/2024
300	Demolish Intake and Discharge Structures to 3-Feet Below Grade	60 days	11/18/2025	02/07/2026
301	SR Pd 4 Ends	0 days	10/14/2028	10/14/2028
302	**SR Pd 5 - Subgrade Structure Removal Below -3 Feet**	**820 days**	**10/14/2028**	**12/05/2031**
303	SR Pd 5 Begins	0 days	10/14/2028	10/14/2028
304	Procure Subsurface Structure Demolition Equipment	520 days	10/17/2028	10/11/2030
305	Install Sheet Piling and Excavation Shoring	120 days	10/17/2028	03/31/2029
306	Install Dewatering System and Effluent Treatment and Discharge Controls	60 days	04/01/2029	06/22/2029
307	**Unit 3 Subsurface Structures**	**480 days**	**06/23/2029**	**04/25/2031**
308	Demolish and Backfill Unit 3 Condensate Storage Area Below -3 Feet	30 days	06/23/2029	08/03/2029
309	Demolish and Backfill Unit 3 Diesel Generator Builidng Below -3 Feet	30 days	08/04/2029	09/14/2029
310	Demolish and Backfill Unit 3 Fuel Handling Building Below -3 Feet	120 days	09/15/2029	03/01/2030
311	Demolish and Backfill Unit 3 Radwaste Building Below -3 Feet	120 days	03/02/2030	08/16/2030
312	Demolish and Backfill Unit 3 Turbine Building Structure Below 9 Ft Elevatior	120 days	06/23/2029	12/07/2029
313	Demolish and Backfill Unit 3 Safety Equipment Building Below -3 Feet	90 days	12/08/2029	04/12/2030
314	Demolish and Backfill Unit 3 Penetration Area Below -3 Feet	60 days	04/13/2030	07/05/2030
315	Demolish and Backfill Unit 3 Full Flow Building Below -3 Feet	60 days	07/06/2030	09/27/2030
316	Demolish and Backfill Unit 3 Containment Building Below -3 Feet	180 days	08/17/2030	04/25/2031
317	**Unit 2 Subsurface Structures**	**480 days**	**06/23/2029**	**04/25/2031**
318	Demolish and Backfill Unit 2 Condensate Storage Area Below -3 Feet	30 days	06/23/2029	08/03/2029
319	Demolish and Backfill Unit 2 Diesel Generator Builidng Below -3 Feet	30 days	08/04/2029	09/14/2029
320	Demolish and Backfill Unit 2 Fuel Handling Building Below -3 Feet	120 days	09/15/2029	03/01/2030
321	Demolish and Backfill Unit 2 Radwaste Building Below -3 Feet	120 days	03/02/2030	08/16/2030
322	Demolish and Backfill Unit 2 Turbine Building Structure Below 9 Ft Elevatior	120 days	06/23/2029	12/07/2029
323	Demolish and Backfill Unit 2 Safety Equipment Building Below -3 Feet	90 days	12/08/2029	04/12/2030
324	Demolish and Backfill Unit 2 Penetration Area Below -3 Feet	60 days	04/13/2030	07/05/2030
325	Demolish and Backfill Unit 2 Full Flow Building Below -3 Feet	60 days	07/06/2030	09/27/2030
326	Demolish and Backfill Unit 2 Containment Building Below -3 Feet	180 days	08/17/2030	04/25/2031
327	**Common Subgrade Structures**	**432 days**	**02/16/2029**	**10/11/2030**
328	Demolish and Backfill Intake Structure Inside Seawall Below -3 Feet	220 days	12/08/2029	10/11/2030
329	Remove Off Shore Intake and Outfall Conduits	432 days	02/16/2029	10/11/2030



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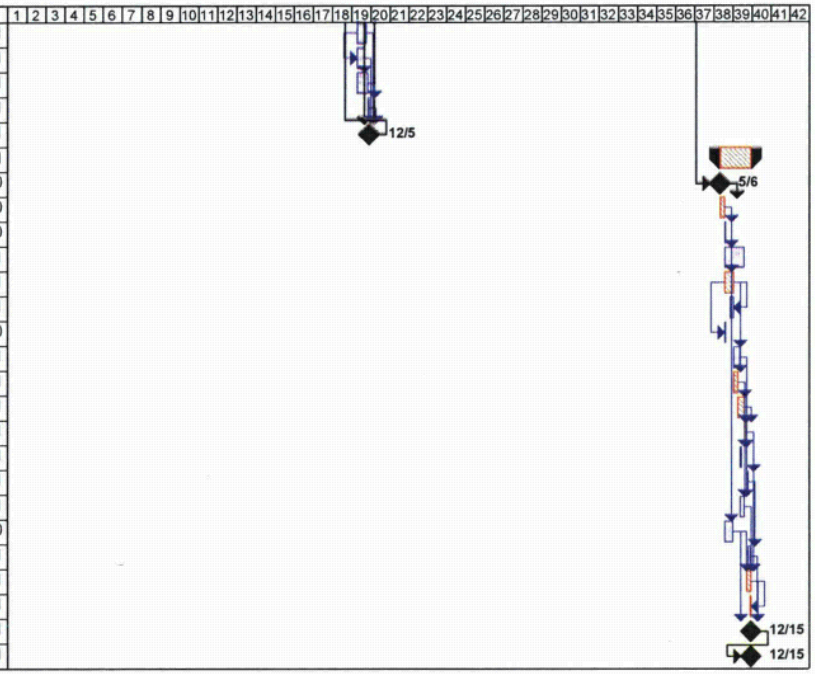
Detailed Project Schedule
Prompt DECON, DOE Repository Opens 2024

ID	Task Name	Duration	Start	Finish
330	Remove Sheet Piling and Excavation Shoring	120 days	04/26/2031	10/10/2031
331	Remove Dewatering System and Effluent Treatment	90 days	04/26/2031	08/29/2031
332	Finish Grading and Re-Vegetate Site	140 days	04/26/2031	11/07/2031
333	Remove Temporary Structures	20 days	11/08/2031	12/05/2031
334	SR Pd 5 Ends	0 days	12/05/2031	12/05/2031
335	**SR Pd 6 - Final Site Restoration and Lease Termination**	**420 days**	**05/06/2050**	**12/15/2051**
336	SR Pd 6 Begins	0 days	05/06/2050	05/06/2050
337	Obtain Required Permits and Approvals	60 days	05/07/2050	07/29/2050
338	Install Temporary Structures	10 days	07/30/2050	08/12/2050
339	Procure Site Restoration Equipment	265 days	07/30/2050	08/04/2051
340	Install Temporary Seawall or Coffer Dam	120 days	07/30/2050	01/13/2051
341	Install Dewatering System and Effluent Treatment and Discharge Controls	45 days	11/12/2050	01/13/2051
342	Remove and Stockpile Existing Seawall Erosion Protection	10 days	07/30/2050	08/12/2050
343	Remove Unit 2 and 3 Seawall and Pedestrian Walkway	90 days	01/14/2051	05/19/2051
344	Remove Remaining Intake and Outfall Box Culvert	60 days	01/14/2051	04/07/2051
345	Remove Temporary Seawall or Coffer Dam	90 days	04/08/2051	08/11/2051
346	Backfill and Compaction of Excavation	30 days	08/12/2051	09/22/2051
347	Remove Dewatering System and Effluent Treatment	20 days	05/20/2051	06/16/2051
348	Install Shoreline Erosion Control and Restoration Features	20 days	09/23/2051	10/20/2051
349	Remove Railroad Tracks, Rails and Ballast	60 days	05/20/2051	08/11/2051
350	Remove Gunite Slope Protection	110 days	07/30/2050	12/30/2050
351	Remove Access Roads and Parking Lots	30 days	10/21/2051	12/01/2051
352	Finish Grading and Re-Vegetate Site	60 days	09/23/2051	12/15/2051
353	Remove Temporary Structures	10 days	12/02/2051	12/15/2051
354	SR Pd 6 Ends	0 days	12/15/2051	12/15/2051
355	Final Easement Termination	0 days	12/15/2051	12/15/2051



Appendix D

Detailed Cost Table

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
A. License Termination							
Decon Pd 1	**Transition to Decommissioning**						
Distributed							
1.05	Disposition of Legacy Wastes	$0	$0	$9,153	$735	$0	$9,888
Distributed	**Subtotal**	**$0**	**$0**	**$9,153**	**$735**	**$0**	**$9,888**
Undistributed							
1.01	Utility Staff	$30,049	$0	$0	$0	$0	$30,049
1.05	Insurance	$0	$0	$0	$5,352	$0	$5,352
1.07	NRC Decommissioning Fees	$0	$0	$0	$1,349	$0	$1,349
1.08	Materials and Services	$0	$0	$0	$1,007	$0	$1,007
1.10	Energy	$0	$0	$0	$2,422	$0	$2,422
1.17	Association Fees and Expenses	$0	$0	$0	$315	$0	$315
1.18	Utilities (Water, gas, phone)	$0	$0	$0	$840	$0	$840
1.20	Non-Process Computers	$0	$0	$0	$224	$0	$224
1.21	Telecommunications	$0	$0	$0	$41	$0	$41
1.22	Personal Computers	$0	$0	$0	$9	$0	$9
1.24	Environmental Permits and Fees	$0	$0	$0	$818	$0	$818
Undistributed	**Subtotal**	**$30,049**	**$0**	**$0**	**$12,378**	**$0**	**$42,426**
Decon Pd 1	**Subtotal**	**$30,049**	**$0**	**$9,153**	**$13,113**	**$0**	**$52,315**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Decon Pd 2	**Decommissioning Planning and Site Modifications**						
Distributed							
2.01	Develop Certified Fuel Handler Program	$143	$1	$0	$0	$36	$180
2.02	Prepare Post-Shutdown QA Plan	$427	$1	$0	$0	$107	$535
2.03	Prepare Post-Shutdown Security Plan	$427	$1	$0	$0	$107	$535
2.04	Prepare Post-Shutdown Fire Protection Plan	$427	$1	$0	$0	$107	$535
2.05	Prepare Defueled Radiation Protection Manual	$427	$1	$0	$0	$107	$535
2.06	Prepare Preliminary Defueled Technical Specifications	$0	$0	$0	$135	$34	$169
2.07	Prepare Defueled Safety Analysis Report (DSAR)	$1,279	$5	$0	$0	$321	$1,605
2.08	Implement Technical Specification Modifications	$1,332	$5	$0	$0	$334	$1,671
2.09	Prepare Post-Shutdown Emergency Preparedness Plan	$634	$1	$0	$0	$159	$793
2.10	NRC Review of Emergency Preparedness Plan	$0	$0	$0	$105	$26	$131
2.11	Prepare Post-Shutdown Decommissioning Activities Report (PSDAR)	$550	$1	$0	$0	$138	$688
2.12	NRC Review of Post-Shutdown Decommissioning Activities Report (PSDAR)	$0	$0	$0	$105	$26	$131
2.13	Respond to NRC quesitons on PSDAR	$34	$1	$0	$0	$9	$43
2.14	Prepare Decommissioning Cost Estimate (DCE)	$1,429	$4	$0	$0	$358	$1,791
2.15	NRC Review of Decommissioning Cost Estimate	$0	$0	$0	$105	$26	$131
2.16	Disposition of Legacy Wastes	$0	$0	$16,457	$0	$4,114	$20,571
2.17	Perform Historic Site Assessment and Site Characterization	$6,784	$838	$0	$0	$1,143	$8,765
2.18	Planning and Design For Cold and Dark	$9,716	$90	$0	$0	$2,451	$12,257
2.19	Implement Cold and Dark (Repower Site)	$16,141	$17,860	$0	$0	$8,500	$42,501
2.20	Install 12kV Service Line to Power Temporary Power Ring	$0	$0	$0	$5,250	$1,313	$6,563
2.21	Drain and De-Energize Non-Essential Systems (DEC Process)	$822	$183	$1,485	$0	$623	$3,114
2.22	Select Decommissioning General Contractor	$645	$8	$0	$0	$163	$817
2.23	Design Spent Fuel Pool Support System Modifications	$622	$8	$0	$0	$157	$787
2.24	Design Control Room Relocation	$601	$7	$0	$0	$152	$760
2.25	Design Spent Fuel Security System Modifications	$459	$5	$0	$0	$116	$580
2.26	Install Spent Fuel Pool System Modifications - Unit 2	$1,863	$4,101	$0	$0	$1,491	$7,456
2.27	Install Spent Fuel Pool System Modifications - Unit 3	$1,863	$4,101	$0	$0	$1,491	$7,456
2.28	Spent Fuel Pool System Modification Training	$0	$0	$0	$273	$68	$341
2.29	Implement Control Room Modifications	$1,004	$1,519	$0	$0	$631	$3,153
2.30	Implement Spent Fuel Pool Security Modifications	$525	$795	$0	$0	$330	$1,650
2.31	Transition Project Modifications	$0	$0	$0	$105	$26	$131

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Distributed	**Subtotal**	**$48,154**	**$29,538**	**$17,942**	**$6,077**	**$24,665**	**$126,376**
Undistributed							
1.01	Utility Staff	$56,478	$0	$0	$0	$14,119	$70,597
1.02	Utility Staff HP Supplies	$0	$1,781	$0	$0	$445	$2,226
1.03	Security Guard Force	$2,087	$0	$0	$0	$522	$2,609
1.04	Security Related Expenses	$77	$0	$0	$0	$19	$96
1.05	Insurance	$0	$0	$0	$4,446	$1,111	$5,557
1.06	Site Lease and Easement Expenses	$0	$0	$0	$470	$70	$540
1.07	NRC Decommissioning Fees	$0	$0	$0	$2,390	$598	$2,988
1.08	Materials and Services	$0	$3,208	$0	$0	$802	$4,010
1.09	DAW Disposal	$0	$0	$295	$0	$74	$369
1.10	Energy	$0	$0	$0	$6,338	$1,584	$7,922
1.13	Craft Worker Training	$234	$0	$0	$0	$58	$292
1.14	Workers Compensation Insurance	$0	$0	$0	$283	$71	$353
1.15	Community Outreach	$1,638	$0	$0	$1,830	$867	$4,335
1.16	Property Tax	$0	$0	$0	$2,350	$588	$2,938
1.17	Association Fees and Expenses	$0	$2,350	$0	$0	$588	$2,938
1.18	Utilities (Water, gas, phone)	$0	$738	$0	$0	$185	$923
1.20	Non-Process Computers	$0	$157	$0	$0	$39	$196
1.21	Telecommunications	$0	$157	$0	$0	$39	$196
1.24	Environmental Permits and Fees	$0	$0	$0	$2,977	$744	$3,721
1.25	Decommissioning Advisor	$0	$0	$0	$1,567	$392	$1,958
Undistributed	**Subtotal**	**$60,513**	**$8,391**	**$295**	**$22,650**	**$22,915**	**$114,764**
Decon Pd 2	**Subtotal**	**$108,667**	**$37,928**	**$18,237**	**$28,727**	**$47,581**	**$241,140**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Decon Pd 3	**Decommissioning Preparations and Reactor Internals Segmentation**						
Distributed							
3.01	Prepare Integrated Work Sequence and Schedule for Decommissioning	$952	$0	$0	$0	$238	$1,190
3.02	Prepare Detailed Work Procedures and Activity Specifications for Decommissioning	$14,920	$70	$0	$0	$3,748	$18,738
3.03	Planning and Design of Primary System Decontamination	$516	$4	$0	$0	$130	$649
3.04	Planning and Design Site Infrastructure Improvements	$341	$4	$0	$0	$86	$431
3.05	Design Containment Access Modifications	$557	$6	$0	$0	$141	$705
3.06	Primary System Decontamination - Unit 2	$1,447	$1,857	$2,228	$0	$1,383	$6,914
3.07	Primary System Decontamination - Unit 3	$1,447	$1,857	$2,228	$0	$1,383	$6,914
3.08	Hot Spot Decontamination - Unit 2	$580	$887	$743	$0	$552	$2,761
3.09	Hot Spot Decontamination - Unit 3	$580	$913	$743	$0	$559	$2,794
3.10	Modify Containment Access- Unit 2	$315	$611	$0	$0	$231	$1,157
3.11	Modify Containment Access- Unit 3	$315	$611	$0	$0	$231	$1,157
3.12	Remove and Dispose of Missle Shields - Unit 2	$206	$30	$81	$0	$79	$395
3.13	Remove and Dispose of Reactor Head - Unit 2	$879	$453	$2,463	$0	$949	$4,744
3.14	Remove and Dispose of Missile Shields - Unit 3	$437	$178	$3,375	$0	$997	$4,987
3.15	Remove and Dispose of Reactor Head - Unit 3	$879	$453	$2,463	$0	$949	$4,744
3.16	Finalize Residual Radiation Inventory	$125	$0	$0	$287	$103	$516
3.17	Prepare Activity Specifications	$7,328	$696	$0	$0	$2,006	$10,031
3.18	Select Shipping Casks and Obtain Shipping Permits	$49	$0	$0	$0	$12	$62
3.19	Design, Specify, and Procure Special Items and Materials	$972	$5,379	$0	$0	$1,588	$7,938
3.22	Test Special Cutting and Handling Equipment and Train Operators	$1,157	$148	$0	$0	$326	$1,631
3.23	Finalize Internals and Vessel Segmenting Details - Unit 2	$212	$16	$0	$0	$57	$284
3.24	Segment, Package and Dispose of Reactor Internals - Unit 2	$5,669	$2,036	$62,661	$0	$17,591	$87,957
3.25	Transfer Internals Segmentation Equipment to Unit 3	$131	$19	$0	$0	$37	$187
3.26	Finalize Internals and Vessel Segmenting Details - Unit 3	$212	$16	$0	$0	$57	$284
3.27	Segment, Package and Dispose of Reactor Internals - Unit 3	$5,669	$2,036	$62,661	$0	$17,591	$87,957
3.28	Construct New Change Rooms, Hot Laundry, In-Plant Laydown Areas	$0	$1,290	$0	$0	$194	$1,484
3.29	Procure Non-Engineered Standard Equipment	$0	$5,454	$0	$0	$1,364	$6,818
Distributed	**Subtotal**	**$45,893**	**$25,024**	**$139,643**	**$287**	**$52,583**	**$263,431**
Undistributed							
1.01	Utility Staff	$79,350	$0	$0	$0	$19,837	$99,187

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

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Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
1.02	Utility Staff HP Supplies	$0	$2,693	$0	$0	$673	$3,366
1.03	Security Guard Force	$5,484	$0	$0	$0	$1,371	$6,855
1.04	Security Related Expenses	$326	$0	$0	$0	$82	$408
1.05	Insurance	$0	$0	$0	$8,000	$2,000	$10,000
1.06	Site Lease and Easement Expenses	$0	$0	$0	$1,235	$185	$1,420
1.07	NRC Decommissioning Fees	$0	$0	$0	$6,281	$1,570	$7,851
1.08	Materials and Services	$0	$4,582	$0	$0	$1,145	$5,727
1.09	DAW Disposal	$0	$0	$424	$0	$106	$529
1.10	Energy	$0	$0	$0	$10,226	$2,556	$12,782
1.11	Decommissioning General Contractor Staff	$62,219	$0	$0	$0	$15,555	$77,773
1.12	DGC HP Supplies	$0	$1,558	$0	$0	$389	$1,947
1.13	Craft Worker Training	$1,842	$0	$0	$0	$460	$2,302
1.14	Workers Compensation Insurance	$0	$0	$0	$742	$186	$928
1.15	Community Outreach	$4,303	$0	$0	$4,808	$2,278	$11,390
1.16	Property Tax	$0	$0	$0	$6,175	$1,544	$7,719
1.17	Association Fees and Expenses	$0	$6,175	$0	$0	$1,544	$7,719
1.18	Utilities (Water, gas, phone)	$0	$1,106	$0	$0	$277	$1,383
1.19	Tools and Equipment	$0	$182	$0	$0	$45	$227
1.20	Non-Process Computers	$0	$412	$0	$0	$103	$515
1.21	Telecommunications	$0	$412	$0	$0	$103	$515
1.22	Personal Computers	$0	$0	$0	$89	$22	$111
1.24	Environmental Permits and Fees	$0	$0	$0	$7,822	$1,955	$9,777
1.25	Decommissioning Advisor	$0	$0	$0	$4,117	$1,029	$5,146
Undistributed	**Subtotal**	**$153,524**	**$17,119**	**$424**	**$49,495**	**$55,017**	**$275,579**
Decon Pd 3	**Subtotal**	**$199,417**	**$42,144**	**$140,067**	**$49,782**	**$107,600**	**$539,009**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Decon Pd 4	**Plant Systems and Large Component Removal**						
Distributed							
4.01	Upgrade Rail Spur	$0	$0	$0	$3,277	$819	$4,096
4.02	Install GARDIAN System	$0	$0	$0	$525	$131	$656
4.03	Scaffolding for Non-Essential System Removal	$3,516	$1,144	$200	$0	$1,215	$6,075
4.04	Asbestos Abatement and Hazardous Waste Disposal for Non-Essential Systems - Unit	$0	$0	$0	$1,050	$525	$1,575
4.05	Lead Abatement for Non-Essential Systems Removal - Unit 2	$2,287	$23	$411	$0	$1,361	$4,082
4.06	Remove, Package and Dispose of Non-Essential Systems - Unit 2	$33,512	$5,597	$31,969	$0	$17,769	$88,847
4.07	Asbestos Abatement and Hazardous Waste Disposal for Non-Essential Systems - Unit	$0	$0	$0	$1,050	$525	$1,575
4.08	Lead Abatement for Non-Essential Systems - Unit 3	$2,287	$399	$411	$0	$1,549	$4,647
4.09	Remove, Package and Dispose of Non-Essential Systems - Unit 3	$36,851	$6,313	$36,610	$0	$19,944	$99,718
4.10	Remove Underground Diesel Tank - Unit 2	$111	$45	$0	$41	$49	$247
4.11	Remove Underground Diesel Tank - Unit 3	$111	$45	$0	$41	$49	$247
4.12	Remove and Dispose of Spent Fuel Storage Racks - Unit 2	$42	$36	$4,922	$0	$1,250	$6,250
4.13	Remove and Dispose of Spent Fuel Storage Racks - Unit 3	$42	$36	$4,922	$0	$1,250	$6,250
4.14	Remove and Dispose of Legacy Class B and C Waste - Unit 2	$0	$0	$500	$0	$125	$625
4.15	Remove and Dispose of Legacy Class B and C Waste - Unit 3	$0	$0	$500	$0	$125	$625
4.16	Drain Spent Fuel Pool and Process Liquid Waste - Unit 2	$557	$703	$0	$0	$315	$1,575
4.17	Drain Spent Fuel Pool and Process Liquid Waste - Unit 3	$557	$703	$0	$0	$315	$1,575
4.18	Segment, Package and Dispose of Spent Fuel Pool Island Equipment	$11	$2	$107	$0	$30	$150
4.19	Segment and Dispose of Fuel Pool Bridge Crane - Unit 2	$85	$12	$168	$0	$66	$332
4.20	Segment and Dispose of Fuel Pool Bridge Crane - Unit 3	$85	$12	$168	$0	$66	$332
4.21	Flush and Drain Essential Systems Following Fuel Pool Closure	$226	$181	$2,970	$0	$844	$4,221
4.22	Scaffolding for Essential System Removal	$989	$322	$56	$0	$342	$1,708
4.23	Asbestos Abatement and Hazardous Waste Disposal for Essential Systems	$0	$0	$0	$788	$394	$1,181
4.24	Lead Abatement for Essential Systems Removal	$332	$58	$59	$0	$225	$674
4.25	Remove, Package and Dispose of Essential Systems	$33,774	$5,869	$17,264	$0	$14,227	$71,134
4.26	Removal and Disposal of Spent Resins, Filter Media and Tank Sludge	$90	$40	$7,425	$0	$1,889	$9,445
4.27	Reactor Vessel Insulation Removal and Disposal - Unit 2	$105	$12	$147	$0	$66	$331
4.28	Segment, Package and Dispose of Reactor Pressure Vessel - Unit 2	$1,044	$2,834	$29,313	$0	$8,298	$41,489
4.29	Transfer Rx Vessel Segmentation Equipment to Unit 3	$122	$18	$0	$0	$35	$175
4.30	Procure Replacement Non-Engineered Standard Equipment	$0	$454	$0	$0	$114	$568
4.31	Reactor Vessel Insulation Removal and Disposal - Unit 3	$105	$12	$147	$0	$66	$331

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

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Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
4.32	Segment, Package and Dispose of Reactor Pressure Vessel - Unit 3	$1,044	$2,834	$29,313	$0	$8,298	$41,489
4.33	Remove and Dispose of Steam Generators - Unit 2	$2,789	$1,288	$18,154	$0	$5,558	$27,788
4.34	Remove and Dispose of Pressurizer - Unit 2	$462	$70	$2,620	$0	$788	$3,940
4.35	Remove and Dispose of Steam Generators - Unit 3	$2,789	$1,288	$18,154	$0	$5,558	$27,788
4.36	Remove and Dispose of Pressurizer - Unit 3	$462	$70	$2,620	$0	$788	$3,940
4.37	Remove and Dispose of Turbine Gantry Crane - Unit 2	$445	$229	$0	$4	$170	$848
4.38	Remove and Dispose of Turbine Gantry Crane - Unit 3	$445	$229	$0	$4	$170	$848
4.39	Prepare License Termination Plan	$1,646	$149	$0	$0	$449	$2,244
Distributed	**Subtotal**	**$126,926**	**$31,029**	**$209,131**	**$6,779**	**$95,755**	**$469,620**
Undistributed							
1.01	Utility Staff	$71,956	$0	$0	$0	$17,989	$89,945
1.02	Utility Staff HP Supplies	$0	$2,715	$0	$0	$679	$3,394
1.03	Security Guard Force	$4,638	$0	$0	$0	$1,159	$5,797
1.04	Security Related Expenses	$1,007	$0	$0	$0	$252	$1,259
1.05	Insurance	$0	$0	$0	$3,653	$913	$4,566
1.06	Site Lease and Easement Expenses	$0	$0	$0	$1,044	$157	$1,201
1.07	NRC Decommissioning Fees	$0	$0	$0	$5,312	$1,328	$6,639
1.08	Materials and Services	$0	$4,204	$0	$0	$1,051	$5,255
1.09	DAW Disposal	$0	$0	$1,568	$0	$392	$1,960
1.10	Energy	$0	$0	$0	$7,568	$1,892	$9,460
1.11	Decommissioning General Contractor Staff	$125,798	$0	$0	$0	$31,449	$157,247
1.12	DGC HP Supplies	$0	$5,834	$0	$0	$1,458	$7,292
1.13	Craft Worker Training	$7,788	$0	$0	$0	$1,947	$9,735
1.14	Workers Compensation Insurance	$0	$0	$0	$628	$157	$785
1.15	Community Outreach	$3,639	$0	$0	$4,066	$1,926	$9,632
1.16	Property Tax	$0	$0	$0	$5,222	$1,306	$6,528
1.18	Utilities (Water, gas, phone)	$0	$1,007	$0	$0	$252	$1,258
1.19	Tools and Equipment	$0	$423	$0	$0	$106	$529
1.20	Non-Process Computers	$0	$348	$0	$0	$87	$435
1.21	Telecommunications	$0	$348	$0	$0	$87	$435
1.24	Environmental Permits and Fees	$0	$0	$0	$6,615	$1,654	$8,268
1.25	Decommissioning Advisor	$0	$0	$0	$2,611	$653	$3,264

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

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Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Undistributed	**Subtotal**	**$214,826**	**$14,879**	**$1,568**	**$36,718**	**$66,893**	**$334,884**
Decon Pd 4	**Subtotal**	**$341,752**	**$45,908**	**$210,699**	**$43,497**	**$162,649**	**$804,504**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

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2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Decon Pd 5	**Building Decontamination**						
Distributed							
5.01	Decon Containment Building - Unit 3	$6,056	$3,318	$54,825	$0	$16,050	$80,249
5.02	Decon Penetration Building - Unit 3	$1,065	$351	$2,933	$0	$1,087	$5,437
5.03	Decon Safety Equipment and MSIV Building - Unit 3	$905	$390	$5,562	$0	$1,715	$8,573
5.04	Decon Fuel Handling Building - Unit 3	$1,275	$577	$16,101	$0	$4,488	$22,442
5.05	Decon Turbine Building - Unit 3	$100	$95	$3,925	$0	$1,030	$5,150
5.06	Decon Containment Building - Unit 2	$6,056	$3,318	$54,825	$0	$16,050	$80,249
5.07	Decon Penetration Building - Unit 2	$1,065	$351	$2,933	$0	$1,087	$5,437
5.08	Decon Safety Equipment and MSIV Building - Unit 2	$911	$396	$5,777	$0	$1,771	$8,854
5.09	Decon Fuel Handling Building - Unit 2	$1,275	$577	$16,101	$0	$4,488	$22,442
5.10	Decon Turbine Building - Unit 2	$100	$95	$3,925	$0	$1,030	$5,150
5.11	Decon Auxiliary Radwaste Building - Common	$943	$691	$17,999	$0	$4,908	$24,541
5.12	Decon Auxiliary Control Building - Common	$198	$163	$38	$0	$100	$499
5.13	Decon Condensate Area and Tunnels - Units 2 & 3	$375	$316	$403	$0	$274	$1,368
5.14	Excavate, Remove and Dispose of Yard Area Drains	$1,159	$128	$240	$0	$382	$1,908
5.15	Remove and Dispose of Contaminated Sumps, Trenches and Pavement	$185	$21	$746	$0	$238	$1,191
5.16	Remove and Dispose of Radiologically Contaminated Soil	$192	$216	$1,158	$0	$392	$1,958
5.17	Segment, Package and Dispose of Contaminated Decon Equipment and Tooling	$38	$6	$92	$0	$34	$170
5.18	Radiological Survey of Structures During Decon	$4,702	$3,666	$0	$0	$1,255	$9,623
Distributed	**Subtotal**	**$26,600**	**$14,676**	**$187,585**	**$0**	**$56,379**	**$285,240**
Undistributed							
1.01	Utility Staff	$29,516	$0	$0	$0	$7,379	$36,895
1.02	Utility Staff HP Supplies	$0	$997	$0	$0	$249	$1,247
1.03	Security Guard Force	$2,520	$0	$0	$0	$630	$3,150
1.04	Security Related Expenses	$560	$0	$0	$0	$140	$701
1.05	Insurance	$0	$0	$0	$1,985	$496	$2,481
1.06	Site Lease and Easement Expenses	$0	$0	$0	$567	$85	$652
1.07	NRC Decommissioning Fees	$0	$0	$0	$2,886	$722	$3,608
1.08	Materials and Services	$0	$1,668	$0	$0	$417	$2,086
1.09	DAW Disposal	$0	$0	$464	$0	$116	$580
1.10	Energy	$0	$0	$0	$2,336	$584	$2,920

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2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
1.11	Decommissioning General Contractor Staff	$56,286	$0	$0	$0	$14,071	$70,357
1.12	DGC HP Supplies	$0	$3,170	$0	$0	$792	$3,962
1.13	Craft Worker Training	$1,693	$0	$0	$0	$423	$2,116
1.14	Workers Compensation Insurance	$0	$0	$0	$341	$85	$426
1.15	Community Outreach	$862	$0	$0	$964	$457	$2,283
1.16	Property Tax	$0	$0	$0	$2,837	$709	$3,547
1.18	Utilities (Water, gas, phone)	$0	$413	$0	$0	$103	$517
1.19	Tools and Equipment	$0	$204	$0	$0	$51	$255
1.20	Non-Process Computers	$0	$189	$0	$0	$47	$236
1.21	Telecommunications	$0	$189	$0	$0	$47	$236
1.22	Personal Computers	$0	$0	$0	$71	$18	$88
1.24	Environmental Permits and Fees	$0	$0	$0	$3,594	$899	$4,493
1.25	Decommissioning Advisor	$0	$0	$0	$825	$206	$1,031
Undistributed	**Subtotal**	**$91,437**	**$6,832**	**$464**	**$16,406**	**$28,728**	**$143,866**
Decon Pd 5	**Subtotal**	**$118,037**	**$21,508**	**$188,049**	**$16,406**	**$85,106**	**$429,106**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
Decon Pd 6	**License Termination During Demolition**						
Distributed							
6.01	Final Status Survey	$9,613	$3,088	$0	$2,360	$2,259	$17,320
6.02	Prepare Final Report of Dismantling Program	$164	$4	$0	$0	$42	$210
Distributed	**Subtotal**	**$9,777**	**$3,091**	**$0**	**$2,360**	**$2,301**	**$17,530**
Undistributed							
1.01	Utility Staff	$1,378	$0	$0	$0	$345	$1,723
1.04	Security Related Expenses	$4	$0	$0	$0	$1	$5
1.07	NRC Decommissioning Fees	$0	$0	$0	$13,535	$3,384	$16,919
1.08	Materials and Services	$0	$47	$0	$0	$12	$58
1.09	DAW Disposal	$0	$0	$62	$0	$16	$78
1.10	Energy	$0	$0	$0	$1,872	$468	$2,340
1.11	Decommissioning General Contractor Staff	$651	$0	$0	$0	$163	$814
1.12	DGC HP Supplies	$0	$301	$0	$0	$75	$376
1.15	Community Outreach	$2,386	$0	$0	$2,666	$1,263	$6,315
1.18	Utilities (Water, gas, phone)	$0	$10	$0	$0	$3	$13
Undistributed	**Subtotal**	**$4,420**	**$357**	**$62**	**$18,074**	**$5,728**	**$28,641**
Decon Pd 6	**Subtotal**	**$14,197**	**$3,449**	**$62**	**$20,434**	**$8,029**	**$46,171**
A. License Termination	**Subtotal**	**$812,119**	**$150,936**	**$566,266**	**$171,959**	**$410,965**	**$2,112,246**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
B. Spent Fuel							
SNF Pd 1	**Spent Fuel Management Transition**						
Distributed							
7.01	Security Shut Down Strategy	$0	$0	$0	$8,388	$0	$8,388
7.02	Design and Fabricate Spent Fuel Canisters	$0	$0	$0	$8,842	$0	$8,842
7.03	Post Fukushima Modifications - Unit 2	$0	$0	$0	$126	$0	$126
7.05	Cyber Security Modifications	$0	$0	$0	$1,901	$0	$1,901
Distributed	**Subtotal**	**$0**	**$0**	**$0**	**$19,258**	**$0**	**$19,258**
Undistributed							
2.01	Utility Spent Fuel Staff	$38,478	$0	$0	$0	$0	$38,478
2.04	Security Guard Force	$69,889	$0	$0	$0	$0	$69,889
2.09	Emergency Preparedness Fees	$0	$0	$0	$2,340	$0	$2,340
2.10	Spent Fuel Maintenance	$0	$0	$0	$32	$0	$32
Undistributed	**Subtotal**	**$108,367**	**$0**	**$0**	**$2,372**	**$0**	**$110,739**
SNF Pd 1	**Subtotal**	**$108,367**	**$0**	**$0**	**$21,630**	**$0**	**$129,997**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF Pd 2	**Spent Fuel Transfer to Dry Storage**						
Distributed							
8.01	Security Shut Down Strategy	$0	$0	$0	$2,855	$714	$3,569
8.02	Decay Heat Analysis	$0	$0	$0	$105	$26	$131
8.03	Zirconium Fire/ Shine Analysis	$0	$0	$0	$105	$26	$131
8.05	NRC Review of Irradiated Fuel Management Plan	$0	$0	$0	$105	$26	$131
8.07	ISFSI Pad Study	$0	$0	$0	$103	$26	$129
8.08	Design ISFSI Expansion	$0	$0	$0	$3,150	$788	$3,938
8.09	Construct ISFSI Expansion	$0	$0	$0	$33,600	$8,400	$42,000
8.10	Purchase and Fabrication of Spent Fuel Canisters and AHSMs - Unit 2	$0	$49,613	$0	$0	$12,403	$62,016
8.11	Purchase and Fabrication Spent Fuel Canisters and AHSMs - Unit 3	$0	$50,794	$0	$0	$12,698	$63,492
8.12	Deliver and Load Spent Fuel Canisters and Transfer to ISFSI - Unit 2	$71,338	$17,478	$0	$0	$22,204	$111,021
8.13	Deliver and Load Spent Fuel Canisters and Transfer to ISFSI - Unit 3	$73,037	$17,894	$0	$0	$22,733	$113,664
Distributed	**Subtotal**	**$144,375**	**$135,779**	**$0**	**$40,023**	**$80,044**	**$400,221**
Undistributed							
2.01	Utility Spent Fuel Staff	$90,824	$0	$0	$0	$22,706	$113,530
2.02	Utility Staff HP Supplies	$0	$6,590	$0	$0	$1,647	$8,237
2.04	Security Guard Force	$112,313	$0	$0	$0	$28,078	$140,391
2.05	Security Related Expenses	$1,334	$0	$0	$0	$333	$1,667
2.06	Insurance	$0	$0	$0	$4,408	$1,102	$5,510
2.08	NRC Spent Fuel Fees	$0	$0	$0	$1,107	$277	$1,383
2.09	Emergency Preparedness Fees	$0	$0	$0	$18,756	$4,689	$23,445
2.10	Spent Fuel Maintenance	$0	$0	$0	$2,131	$533	$2,664
2.11	Materials and Services	$0	$5,848	$0	$0	$1,462	$7,310
2.12	DAW Disposal	$0	$0	$275	$0	$69	$343
2.13	Energy	$0	$0	$0	$3,991	$998	$4,989
2.15	Craft Worker Training	$2,119	$0	$0	$0	$530	$2,649
2.18	Utilities (Water, gas, phone)	$0	$3,572	$0	$0	$893	$4,465
2.22	Personal Computers	$0	$0	$0	$14	$3	$17
Undistributed	**Subtotal**	**$206,590**	**$16,010**	**$275**	**$30,406**	**$63,320**	**$316,601**
SNF Pd 2	**Subtotal**	**$350,965**	**$151,789**	**$275**	**$70,429**	**$143,364**	**$716,822**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF Pd 3	**Dry Storage During Decommissioning - Units 1, 2 and 3**						
Undistributed							
2.01	Utility Spent Fuel Staff	$39,894	$0	$0	$0	$9,973	$49,867
2.02	Utility Staff HP Supplies	$0	$1,487	$0	$0	$372	$1,859
2.04	Security Guard Force	$45,944	$0	$0	$0	$11,486	$57,430
2.05	Security Related Expenses	$2,556	$0	$0	$0	$639	$3,195
2.08	NRC Spent Fuel Fees	$0	$0	$0	$2,302	$576	$2,878
2.10	Spent Fuel Maintenance	$0	$0	$0	$1,478	$370	$1,848
2.11	Materials and Services	$0	$2,017	$0	$0	$504	$2,522
2.13	Energy	$0	$0	$0	$1,209	$302	$1,511
2.18	Utilities (Water, gas, phone)	$0	$1,380	$0	$0	$345	$1,725
2.22	Personal Computers	$0	$0	$0	$12	$3	$15
Undistributed	**Subtotal**	**$88,393**	**$4,884**	**$0**	**$5,001**	**$24,570**	**$122,849**
SNF Pd 3	**Subtotal**	**$88,393**	**$4,884**	**$0**	**$5,001**	**$24,570**	**$122,849**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF Pd 4	**Dry Storage Only - Units 1, 2 and 3**						
Undistributed							
2.01	Utility Spent Fuel Staff	$12,687	$0	$0	$0	$3,172	$15,859
2.02	Utility Staff HP Supplies	$0	$882	$0	$0	$220	$1,102
2.03	Additional Staff for Spent Fuel Shipping	$1,119	$0	$0	$0	$280	$1,398
2.04	Security Guard Force	$14,949	$0	$0	$0	$3,737	$18,687
2.05	Security Related Expenses	$2,506	$0	$0	$0	$626	$3,132
2.06	Insurance	$0	$0	$0	$2,538	$634	$3,172
2.07	Site Lease and Easement Expenses	$0	$0	$0	$1,154	$173	$1,327
2.08	NRC Spent Fuel Fees	$0	$0	$0	$1,638	$409	$2,047
2.10	Spent Fuel Maintenance	$0	$0	$0	$481	$120	$601
2.11	Materials and Services	$0	$778	$0	$0	$194	$972
2.13	Energy	$0	$0	$0	$393	$98	$492
2.16	Workers Compensation Insurance	$0	$0	$0	$694	$173	$867
2.17	Property Tax	$0	$0	$0	$6,412	$1,603	$8,015
2.18	Utilities (Water, gas, phone)	$0	$475	$0	$0	$119	$594
2.20	Non-Process Computers	$0	$192	$0	$0	$48	$240
2.21	Telecommunications	$0	$192	$0	$0	$48	$240
2.22	Personal Computers	$0	$0	$0	$15	$4	$18
Undistributed	**Subtotal**	**$31,261**	**$2,519**	**$0**	**$13,325**	**$11,661**	**$58,765**
SNF Pd 4	**Subtotal**	**$31,261**	**$2,519**	**$0**	**$13,325**	**$11,661**	**$58,765**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF Pd 5	**Dry Storage Only - Units 2 and 3**						
Undistributed							
2.01	Utility Spent Fuel Staff	$48,480	$0	$0	$0	$12,120	$60,601
2.02	Utility Staff HP Supplies	$0	$3,369	$0	$0	$842	$4,211
2.03	Additional Staff for Spent Fuel Shipping	$4,275	$0	$0	$0	$1,069	$5,344
2.04	Security Guard Force	$57,126	$0	$0	$0	$14,281	$71,407
2.05	Security Related Expenses	$4,124	$0	$0	$0	$1,031	$5,155
2.06	Insurance	$0	$0	$0	$9,698	$2,425	$12,123
2.07	Site Lease and Easement Expenses	$0	$0	$0	$4,409	$661	$5,071
2.08	NRC Spent Fuel Fees	$0	$0	$0	$6,259	$1,565	$7,823
2.10	Spent Fuel Maintenance	$0	$0	$0	$1,838	$459	$2,297
2.11	Materials and Services	$0	$2,972	$0	$0	$743	$3,715
2.13	Energy	$0	$0	$0	$1,503	$376	$1,879
2.16	Workers Compensation Insurance	$0	$0	$0	$2,651	$663	$3,314
2.17	Property Tax	$0	$0	$0	$22,053	$5,513	$27,566
2.18	Utilities (Water, gas, phone)	$0	$1,816	$0	$0	$454	$2,270
2.20	Non-Process Computers	$0	$735	$0	$0	$184	$919
2.21	Telecommunications	$0	$735	$0	$0	$184	$919
2.22	Personal Computers	$0	$0	$0	$32	$8	$40
Undistributed	**Subtotal**	**$114,005**	**$9,627**	**$0**	**$48,443**	**$42,578**	**$214,653**
SNF Pd 5	**Subtotal**	**$114,005**	**$9,627**	**$0**	**$48,443**	**$42,578**	**$214,653**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF D&D Pd 1	**ISFSI License Termination**						
Distributed							
12.01	Preparation and NRC Review of License Termination Plan	$116	$0	$0	$163	$70	$349
Distributed	**Subtotal**	**$116**	**$0**	**$0**	**$163**	**$70**	**$349**
Undistributed							
2.01	Utility Spent Fuel Staff	$366	$0	$0	$0	$91	$457
2.02	Utility Staff HP Supplies	$0	$11	$0	$0	$3	$14
2.04	Security Guard Force	$181	$0	$0	$0	$45	$226
2.05	Security Related Expenses	$70	$0	$0	$0	$18	$88
2.06	Insurance	$0	$0	$0	$215	$54	$269
2.07	Site Lease and Easement Expenses	$0	$0	$0	$98	$15	$112
2.08	NRC Spent Fuel Fees	$0	$0	$0	$75	$19	$94
2.11	Materials and Services	$0	$17	$0	$0	$4	$21
2.13	Energy	$0	$0	$0	$102	$26	$128
2.16	Workers Compensation Insurance	$0	$0	$0	$59	$15	$73
2.17	Property Tax	$0	$0	$0	$543	$136	$679
2.18	Utilities (Water, gas, phone)	$0	$7	$0	$0	$2	$9
Undistributed	**Subtotal**	**$617**	**$36**	**$0**	**$1,092**	**$426**	**$2,172**
SNF D&D Pd 1	**Subtotal**	**$733**	**$36**	**$0**	**$1,255**	**$496**	**$2,520**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SNF D&D Pd 2	**ISFSI Demolition**						
Distributed							
13.01	Install GARDIAN Bulk Assay System	$0	$0	$0	$525	$131	$656
13.02	Decon AHSMs	$339	$147	$443	$0	$232	$1,161
13.03	Final Status Survey of ISFSI	$1,589	$256	$0	$0	$277	$2,122
13.04	Clean Demolition of ISFSI AHSMs and Pad	$4,094	$2,590	$3,333	$0	$2,504	$12,521
13.05	Clean Demolition of ISFSI Support Structures	$1,126	$458	$1,372	$0	$739	$3,696
13.06	Restore ISFSI Site	$246	$161	$0	$0	$102	$509
13.07	Preparation of Final Report on Decommissioning and NRC Review	$52	$0	$0	$0	$13	$65
Distributed	**Subtotal**	**$7,446**	**$3,612**	**$5,148**	**$525**	**$3,998**	**$20,729**
Undistributed							
2.01	Utility Spent Fuel Staff	$1,801	$0	$0	$0	$450	$2,251
2.02	Utility Staff HP Supplies	$0	$72	$0	$0	$18	$90
2.04	Security Guard Force	$704	$0	$0	$0	$176	$880
2.05	Security Related Expenses	$37	$0	$0	$0	$9	$46
2.11	Materials and Services	$0	$93	$0	$0	$23	$116
2.12	DAW Disposal	$0	$0	$7	$0	$2	$8
2.13	Energy	$0	$0	$0	$268	$67	$334
2.14	Decommissioning General Contractor Staff	$4,525	$0	$0	$0	$1,131	$5,656
2.15	Craft Worker Training	$189	$0	$0	$0	$47	$236
2.18	Utilities (Water, gas, phone)	$0	$35	$0	$0	$9	$43
2.24	DGC HP Supplies	$0	$159	$0	$0	$40	$199
Undistributed	**Subtotal**	**$7,255**	**$359**	**$7**	**$268**	**$1,972**	**$9,861**
SNF D&D Pd 2	**Subtotal**	**$14,701**	**$3,972**	**$5,154**	**$793**	**$5,970**	**$30,590**
B. Spent Fuel	**Subtotal**	**$708,425**	**$172,826**	**$5,429**	**$160,876**	**$228,639**	**$1,276,196**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
C. Site Restoration							
SR Pd 1	**Transition to Site Restoration**						
Distributed							
14.01	Mesa Site Phase I and II Site Assessment	$0	$0	$0	$42	$11	$53
14.02	Disposition Hazardous Waste from Mesa Site	$0	$0	$0	$211	$106	$317
14.03	Mesa Site Characterization Survey	$988	$261	$0	$0	$312	$1,561
14.04	Fuel Cancellation Expense	$0	$0	$0	$17,679	$0	$17,679
Distributed	**Subtotal**	**$988**	**$261**	**$0**	**$17,932**	**$428**	**$19,610**
Undistributed							
3.05	Site Lease and Easement Expenses	$0	$0	$0	$1,030	$0	$1,030
3.11	Severance	$0	$0	$0	$109,850	$0	$109,850
Undistributed	**Subtotal**	**$0**	**$0**	**$0**	**$110,880**	**$0**	**$110,880**
SR Pd 1	**Subtotal**	**$988**	**$261**	**$0**	**$128,812**	**$428**	**$130,489**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

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Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SR Pd 2	**Building Demolition During Decommissioning**						
Distributed							
15.01	Prepare Site Restoration Demolition Plan and Schedule	$684	$10	$0	$0	$173	$866
15.02	Obtain Required Permits For Mesa, South Access and South Yard	$209	$4	$0	$0	$53	$266
15.03	Demolish Service Building (K-10, 20, 30)	$250	$189	$481	$0	$230	$1,150
15.04	Demolish South Security Processing Facility (K-70)	$46	$44	$122	$0	$53	$264
15.05	Demolish Staging Warehouse	$67	$55	$126	$0	$62	$311
15.06	Demolish Administration Building (K-40/50)	$367	$258	$565	$0	$297	$1,487
15.07	Demolish South Yard Area Buildings T-10, 20, 60 and Haz Mat.	$670	$590	$1,370	$0	$658	$3,288
15.08	Demolish REMS Staging Pad	$98	$184	$549	$0	$208	$1,038
15.09	Demolish Mesa Buildings	$2,788	$1,879	$6,006	$0	$2,668	$13,341
15.10	Remove Underground Fuel Storage Tanks	$56	$22	$0	$21	$25	$123
15.11	Demolish Mesa Roads and Parking Lots	$582	$400	$0	$0	$245	$1,227
15.12	Finish Grading and Re-vegetate Mesa Site	$299	$404	$0	$0	$176	$878
Distributed	**Subtotal**	**$6,114**	**$4,038**	**$9,219**	**$21**	**$4,848**	**$24,239**
Undistributed							
3.01	Utility Staff	$2,563	$0	$0	$0	$641	$3,204
3.03	Security Related Expenses	$898	$0	$0	$0	$224	$1,122
3.05	Site Lease and Easement Expenses	$0	$0	$0	$4,266	$640	$4,906
3.06	Materials and Services	$0	$134	$0	$0	$34	$168
3.08	Decommissioning General Contractor Staff	$4,248	$0	$0	$0	$1,062	$5,310
3.09	Craft Worker Training	$318	$0	$0	$0	$80	$398
3.11	Severance	$0	$0	$0	$8,688	$2,172	$10,860
3.13	Utilities (Water, gas, phone)	$0	$29	$0	$0	$7	$36
Undistributed	**Subtotal**	**$8,027**	**$164**	**$0**	**$12,955**	**$4,860**	**$26,005**
SR Pd 2	**Subtotal**	**$14,141**	**$4,201**	**$9,219**	**$12,975**	**$9,708**	**$50,245**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SR Pd 3	**Subsurface Demolition Engineering and Permitting**						
Distributed							
16.01	Hydrogeologic Investigation and Outfall Conduit Survey	$297	$131	$0	$105	$133	$667
16.02	Subsurface Structure Removal Engineering Planning and Design	$1,264	$33	$0	$0	$324	$1,621
16.03	Environmental Impacts Analyses for Lease Termination Activities	$581	$50	$0	$525	$289	$1,445
16.04	Final Site Grading and Shoreline Protection Engineering Planning and Design	$242	$13	$0	$0	$64	$319
16.05	Obtain Required Permits and Approvals	$1,856	$20	$0	$263	$535	$2,673
Distributed	**Subtotal**	**$4,240**	**$248**	**$0**	**$893**	**$1,345**	**$6,726**
Undistributed							
3.03	Security Related Expenses	$275	$0	$0	$0	$69	$344
3.11	Severance	$0	$0	$0	$24,674	$6,168	$30,842
Undistributed	**Subtotal**	**$275**	**$0**	**$0**	**$24,674**	**$6,237**	**$31,186**
SR Pd 3	**Subtotal**	**$4,516**	**$248**	**$0**	**$25,566**	**$7,582**	**$37,912**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SR Pd 4	**Building Demolition to 3 Feet Below Grade**						
Distributed							
17.01	Procure Clean Building Demolition Equipment	$0	$10,691	$0	$0	$2,673	$13,363
17.02	Install Temporary Structures	$11	$190	$0	$0	$30	$230
17.03	Install Erosion and Sediment Controls	$123	$14	$0	$0	$34	$172
17.04	Remove Cathodic Protection Trench	$1,813	$1,527	$22	$0	$840	$4,201
17.05	Remove Protected Area Security Fencing	$57	$18	$0	$0	$19	$95
17.06	Remove Protected Area Pavement	$139	$97	$755	$0	$248	$1,239
17.07	Detension and Remove Unit 3 Containment Builidng Tendons	$0	$0	$0	$4,200	$1,050	$5,250
17.08	Demolish Diesel Generator Building - Unit 3	$618	$245	$794	$0	$414	$2,072
17.09	Demolish Condensate Building and Transformer Pads - Unit 3	$1,067	$1,755	$3,183	$0	$1,501	$7,505
17.10	Demolish Full Flow Area and Turbine Building - Unit 3	$3,221	$1,149	$3,444	$0	$1,953	$9,767
17.11	Demolish Unit 3 Fuel Handling Building to 3-Feet Below Grade	$306	$354	$1,470	$0	$533	$2,663
17.12	Demolish Penetration Building - Unit 3	$293	$167	$642	$0	$275	$1,377
17.13	Demolish Safety Equipment and MSIV Building - Unit 3	$336	$403	$1,858	$0	$649	$3,246
17.14	Demolish Unit 3 Containment Building to 3-Feet Below Grade	$2,418	$1,351	$6,198	$0	$2,492	$12,459
17.15	Detension and Remove Unit 2 Containment Builidng Tendons	$0	$0	$0	$4,200	$1,050	$5,250
17.16	Demolish Diesel Generator Building - Unit 2	$128	$168	$787	$0	$271	$1,353
17.17	Demolish Condensate Building and Transformer Pads - Unit 2	$1,067	$1,755	$3,183	$0	$1,501	$7,505
17.18	Demolish Full Flow Area and Turbine Building - Unit 2	$3,734	$1,186	$3,447	$0	$2,092	$10,458
17.19	Demolish Unit 2 Fuel Handling Building to 3-Feet Below Grade	$306	$354	$1,470	$0	$533	$2,663
17.20	Demolish Penetration Building - Unit 2	$99	$136	$639	$0	$219	$1,093
17.21	Demolish Safety and MSIV Equipment Building - Unit 2	$336	$403	$1,859	$0	$649	$3,247
17.22	Demolish Unit 2 Containment Building to 3-Feet Below Grade	$2,418	$1,351	$6,198	$0	$2,492	$12,459
17.23	Demolish AWS Building	$1,108	$1,050	$2,925	$0	$1,271	$6,354
17.24	Demolish Building L-50	$59	$33	$67	$0	$40	$198
17.25	Demolish Maintenance Building 4 (B-64/B-65)	$24	$13	$25	$0	$16	$78
17.26	Demolish Maintenance Building 5 (B-62/B-63)	$35	$20	$37	$0	$23	$115
17.27	Demolish Outage Control Center	$98	$57	$148	$0	$76	$378
17.28	Demolish Maintenance Building 2 (B-49/B-50)	$49	$32	$82	$0	$41	$205
17.29	Demolish Maintenance Building 1 (B-43/B-44)	$163	$196	$857	$0	$304	$1,520
17.30	Demolish Auxilary Radwaste Building - Common	$1,521	$1,984	$9,214	$0	$3,180	$15,898
17.31	Demolish Auxilary Control Building - Common	$1,491	$811	$3,219	$0	$1,380	$6,901

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
17.32	Remove Systems and Demolish Make-Up Demineralizer Structures	$737	$122	$471	$0	$332	$1,662
17.33	Install Concrete Plugs in Intake and Discharge Structures	$272	$1,614	$0	$0	$472	$2,358
17.34	Demolish Intake and Discharge Structures to 3-Feet Below Grade	$82	$114	$535	$0	$183	$914
Distributed	**Subtotal**	**$24,128**	**$29,358**	**$53,530**	**$8,400**	**$28,834**	**$144,249**
Undistributed							
3.01	Utility Staff	$12,553	$0	$0	$0	$3,138	$15,691
3.02	Security Guard Force	$2,480	$0	$0	$0	$620	$3,100
3.03	Security Related Expenses	$1,158	$0	$0	$0	$290	$1,448
3.04	Insurance	$0	$0	$0	$3,995	$999	$4,993
3.05	Site Lease and Easement Expenses	$0	$0	$0	$1,340	$201	$1,541
3.06	Materials and Services	$0	$751	$0	$0	$188	$938
3.07	Energy	$0	$0	$0	$1,184	$296	$1,480
3.08	Decommissioning General Contractor Staff	$50,906	$0	$0	$0	$12,727	$63,633
3.09	Craft Worker Training	$1,999	$0	$0	$0	$500	$2,498
3.10	Workers Compensation Insurance	$0	$0	$0	$806	$201	$1,007
3.11	Severance	$0	$0	$0	$7,273	$1,818	$9,091
3.12	Property Tax	$0	$0	$0	$6,701	$1,675	$8,377
3.13	Utilities (Water, gas, phone)	$0	$214	$0	$0	$53	$267
3.14	Tools and Equipment	$0	$156	$0	$0	$39	$195
3.15	Non-Process Computers	$0	$223	$0	$0	$56	$279
3.16	Telecommunications	$0	$223	$0	$0	$56	$279
Undistributed	**Subtotal**	**$69,096**	**$1,567**	**$0**	**$21,298**	**$22,856**	**$114,817**
SR Pd 4	**Subtotal**	**$93,224**	**$30,924**	**$53,530**	**$29,698**	**$51,690**	**$259,066**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SR Pd 5	**Subgrade Structure Removal Below - 3 Feet**						
Distributed							
18.01	Procure Subsurface Structure Demolition Equipment	$0	$6,630	$0	$0	$1,658	$8,288
18.02	Install Sheet Piling and Excavation Shoring	$8,468	$17,219	$0	$0	$6,422	$32,109
18.03	Install Dewatering System and Effluent Treatment and Discharge Controls	$0	$0	$0	$9,651	$2,413	$12,064
18.04	Demolish and Backfill Unit 3 Condensate Storage Area Below -3 Feet	$179	$305	$912	$0	$349	$1,746
18.05	Demolish and Backfill Unit 3 Diesel Generator Builidng Below -3 Feet	$130	$173	$442	$0	$186	$932
18.06	Demolish and Backfill Unit 3 Fuel Handling Building Below -3 Feet	$271	$696	$1,170	$0	$534	$2,671
18.07	Demolish and Backfill Unit 3 Radwaste and Control Building Below -3 Feet	$1,367	$3,268	$5,249	$0	$2,471	$12,355
18.08	Demolish and Backfill Unit 3 Turbine Building Structure Below 9 Ft Elevation	$3,956	$9,277	$12,551	$0	$6,446	$32,231
18.09	Demolish and Backfill Unit 3 Safety Equipment Building Below -3 Feet	$717	$1,883	$2,713	$0	$1,328	$6,641
18.10	Demolish and Backfill Unit 3 Penetration Area Below -3 Feet	$294	$586	$1,285	$0	$541	$2,706
18.11	Demolish and Backfill Unit 3 Full Flow Building Below -3 Feet	$167	$527	$411	$0	$276	$1,382
18.12	Demolish and Backfill Unit 3 Containment Building Below -3 Feet	$1,211	$2,214	$4,636	$0	$2,015	$10,077
18.13	Demolish and Backfill Unit 2 Condensate Storage Area Below -3 Feet	$179	$305	$912	$0	$349	$1,746
18.14	Demolish and Backfill Unit 2 Diesel Generator Builidng Below -3 Feet	$130	$173	$442	$0	$186	$932
18.15	Demolish and Backfill Unit 2 Fuel Handling Building Below -3 Feet	$271	$696	$1,170	$0	$534	$2,671
18.16	Demolish and Backfill Unit 2 Radwaste and Control Building Below -3 Feet	$1,415	$3,308	$5,249	$0	$2,493	$12,466
18.17	Demolish and Backfill Unit 2 Turbine Building Structure Below 9 Ft Elevation	$3,959	$9,277	$12,551	$0	$6,447	$32,234
18.18	Demolish and Backfill Unit 2 Safety Equipment Building Below -3 Feet	$717	$1,883	$2,713	$0	$1,328	$6,641
18.19	Demolish and Backfill Unit 2 Penetration Area Below -3 Feet	$294	$586	$1,285	$0	$541	$2,706
18.20	Demolish and Backfill Unit 2 Full Flow Building Below -3 Feet	$167	$527	$411	$0	$276	$1,382
18.21	Demolish and Backfill Unit 2 Containment Building Below -3 Feet	$1,211	$2,214	$4,636	$0	$2,015	$10,077
18.22	Demolish and Backfill Intake Structure Below -3 Feet	$6,664	$12,970	$36,706	$0	$14,085	$70,426
18.23	Remove Off Shore Intake and Outfall Conduits	$12,406	$44,308	$19,580	$0	$19,073	$95,367
18.24	Remove Sheet Piling and Excavation Shoring	$11,776	$0	$0	$0	$2,944	$14,721
18.25	Remove Dewatering System and Effluent Treatment	$0	$0	$0	$2,308	$577	$2,885
18.26	Finish Grading and Re-Vegetate Site	$945	$813	$0	$0	$440	$2,198
18.27	Remove Temporary Structures	$58	$48	$0	$0	$16	$122
Distributed	**Subtotal**	**$56,952**	**$119,889**	**$115,025**	**$11,959**	**$75,946**	**$379,772**
Undistributed							
3.01	Utility Staff	$7,082	$0	$0	$0	$1,771	$8,853

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
3.02	Security Guard Force	$1,830	$0	$0	$0	$458	$2,288
3.03	Security Related Expenses	$139	$0	$0	$0	$35	$173
3.04	Insurance	$0	$0	$0	$2,948	$737	$3,685
3.05	Site Lease and Easement Expenses	$0	$0	$0	$989	$148	$1,137
3.06	Materials and Services	$0	$415	$0	$0	$104	$519
3.07	Energy	$0	$0	$0	$814	$204	$1,018
3.08	Decommissioning General Contractor Staff	$26,176	$0	$0	$0	$6,544	$32,720
3.09	Craft Worker Training	$983	$0	$0	$0	$246	$1,229
3.10	Workers Compensation Insurance	$0	$0	$0	$595	$149	$743
3.11	Severance	$0	$0	$0	$2,050	$513	$2,563
3.12	Property Tax	$0	$0	$0	$4,946	$1,237	$6,183
3.13	Utilities (Water, gas, phone)	$0	$128	$0	$0	$32	$160
3.14	Tools and Equipment	$0	$73	$0	$0	$18	$91
3.15	Non-Process Computers	$0	$165	$0	$0	$41	$206
3.16	Telecommunications	$0	$165	$0	$0	$41	$206
Undistributed	**Subtotal**	**$36,211**	**$946**	**$0**	**$12,343**	**$12,276**	**$61,775**
SR Pd 5	**Subtotal**	**$93,163**	**$120,834**	**$115,025**	**$24,302**	**$88,222**	**$441,547**

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
SR Pd 6	**Final Site Restoration and Lease Termination**						
Distributed							
19.01	Obtain Required Permits and Approvals	$404	$20	$0	$131	$139	$693
19.02	Install Temporary Structures	$6	$35	$0	$0	$6	$48
19.03	Procure Site Restoration Equipment	$0	$404	$0	$0	$101	$505
19.04	Install Temporary Seawall or Coffer Dam	$8,551	$17,624	$0	$0	$6,544	$32,718
19.05	Install Dewatering System and Effluent Treatment and Discharge Controls	$0	$0	$0	$1,427	$357	$1,784
19.06	Remove and Stockpile Existing Seawall Erosion Protection	$6	$11	$0	$0	$4	$21
19.07	Remove Unit 2 and 3 Seawall and Pedestrian Walkway	$3,206	$3,060	$4,558	$0	$2,706	$13,530
19.08	Remove Remaining Intake and Outfall Box Culvert	$336	$468	$2,188	$0	$748	$3,739
19.09	Remove Temporary Seawall or Coffer Dam	$11,791	$143	$0	$0	$2,983	$14,917
19.10	Backfill and Compaction of Excavation	$1,471	$2,238	$0	$0	$556	$4,265
19.11	Remove Dewatering System and Effluent Treatment	$0	$0	$0	$592	$148	$740
19.12	Install Shoreline Erosion Control and Restoration Features	$10	$144	$0	$0	$38	$192
19.13	Remove Railroad Tracks, Rails and Ballast	$63	$35	$0	$0	$24	$122
19.14	Remove Gunite Slope Protection	$262	$366	$1,710	$0	$585	$2,923
19.15	Remove Access Roads and Parking Lots	$240	$181	$0	$0	$105	$527
19.16	Finish Grading and Re-Vegetate Site	$27	$28	$0	$0	$14	$68
19.17	Remove Temporary Structures	$8	$7	$0	$0	$2	$18
Distributed	**Subtotal**	**$26,380**	**$24,763**	**$8,456**	**$2,151**	**$15,061**	**$76,810**
Undistributed							
3.01	Utility Staff	$2,219	$0	$0	$0	$555	$2,773
3.04	Insurance	$0	$0	$0	$605	$151	$756
3.05	Site Lease and Easement Expenses	$0	$0	$0	$507	$76	$583
3.06	Materials and Services	$0	$142	$0	$0	$35	$177
3.07	Energy	$0	$0	$0	$418	$104	$522
3.08	Decommissioning General Contractor Staff	$8,062	$0	$0	$0	$2,016	$10,078
3.09	Craft Worker Training	$504	$0	$0	$0	$126	$630
3.10	Workers Compensation Insurance	$0	$0	$0	$305	$76	$381
3.11	Severance	$0	$0	$0	$6,077	$1,519	$7,596
3.12	Property Tax	$0	$0	$0	$2,536	$634	$3,169
3.13	Utilities (Water, gas, phone)	$0	$31	$0	$0	$8	$38

Table 1
SONGS Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

		License Status	POL	Unit 2 Shut Down:	6/7/2013
Decommissioning Alternative	DECON	Fuel Pool Systems	Modified	Unit 3 Shut Down:	6/7/2013
Spent Fuel Alternative	Dry	Repository Opening Date:	1/1/2024		

2014 Dollars in Thousands

No	Item Description	Labor	Equipment	Disposal	Other	Contingency	Total
3.14	Tools and Equipment	$0	$24	$0	$0	$6	$31
Undistributed	**Subtotal**	**$10,785**	**$197**	**$0**	**$10,446**	**$5,307**	**$26,735**
SR Pd 6	**Subtotal**	**$37,165**	**$24,960**	**$8,456**	**$12,597**	**$20,367**	**$103,545**
C. Site Restoration	**Subtotal**	**$243,198**	**$181,428**	**$186,230**	**$233,951**	**$177,997**	**$1,022,804**
	Total	**$1,763,742**	**$505,191**	**$757,925**	**$566,786**	**$817,601**	**$4,411,246**

Appendix E

Annual Cash Flow Table

SONGS Annual Cost By Account

Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

Unit No: Unit 2

2014 Dollars in Thousands

Year	License Termination	Spent Fuel	Site Restoration	Total
2013	$25,749	$63,891	$49,067	$138,706
2014	$79,799	$35,719	$15,089	$130,607
2015	$69,196	$106,308	$7,439	$182,943
2016	$54,541	$59,308	$3,730	$117,579
2017	$111,903	$59,308	$1,957	$173,168
2018	$47,520	$59,308	$0	$106,828
2019	$108,328	$27,554	$13,539	$149,420
2020	$185,482	$4,908	$36	$190,426
2021	$79,081	$4,908	$36	$84,026
2022	$54,785	$4,908	$1,927	$61,621
2023	$158,207	$4,908	$36	$163,151
2024	$37,930	$4,908	$16,848	$59,687
2025	$2,922	$4,908	$44,621	$52,451
2026	$2,922	$4,908	$19,412	$27,243
2027	$2,922	$4,908	$22,469	$30,299
2028	$2,922	$4,908	$31,688	$39,518
2029	$2,922	$4,908	$66,873	$74,704
2030	$2,922	$4,908	$71,867	$79,697
2031	$2,055	$5,089	$23,181	$30,325
2032	$2,122	$7,214	$0	$9,336
2033	$0	$7,214	$0	$7,214
2034	$0	$7,214	$0	$7,214
2035	$0	$7,228	$0	$7,228
2036	$0	$7,665	$0	$7,665
2037	$0	$7,665	$0	$7,665
2038	$0	$7,665	$0	$7,665
2039	$0	$7,665	$0	$7,665
2040	$0	$7,665	$0	$7,665
2041	$0	$7,665	$0	$7,665
2042	$0	$7,665	$0	$7,665
2043	$0	$7,665	$0	$7,665
2044	$0	$7,665	$0	$7,665
2045	$0	$7,665	$0	$7,665
2046	$0	$7,665	$0	$7,665
2047	$0	$7,665	$0	$7,665
2048	$0	$7,665	$0	$7,665

SONGS Annual Cost By Account

Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

Unit No: Unit 2

2014 Dollars in Thousands

Year	License Termination	Spent Fuel	Site Restoration	Total
2049	$0	$7,667	$0	$7,667
2050	$0	$9,974	$20,177	$30,151
2051	$0	$6,573	$11,928	$18,500
2052	$0	$0	$1,377	$1,377
Total	$1,034,230	$623,209	$423,297	$2,080,735

SONGS Annual Cost By Account

Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

Unit No: Unit 3

2014 Dollars in Thousands

Year	License Termination	Spent Fuel	Site Restoration	Total
2013	$26,566	$66,105	$49,067	$141,739
2014	$78,964	$40,156	$15,969	$135,089
2015	$74,096	$112,024	$9,390	$195,509
2016	$61,451	$64,405	$25,227	$151,083
2017	$40,631	$64,405	$3,799	$108,835
2018	$86,348	$64,405	$0	$150,753
2019	$96,521	$29,675	$13,908	$140,104
2020	$120,873	$4,908	$2,135	$127,916
2021	$194,090	$4,908	$575	$199,574
2022	$135,313	$4,908	$2,467	$142,688
2023	$114,581	$4,908	$1,511	$121,000
2024	$26,874	$4,908	$36,778	$68,560
2025	$2,922	$4,908	$40,655	$48,485
2026	$2,922	$4,908	$21,676	$29,507
2027	$2,922	$4,908	$25,848	$33,678
2028	$2,922	$4,908	$20,945	$28,776
2029	$2,922	$4,908	$117,321	$125,151
2030	$2,922	$4,908	$116,672	$124,503
2031	$2,055	$5,089	$25,501	$32,645
2032	$2,122	$7,214	$0	$9,336
2033	$0	$7,214	$0	$7,214
2034	$0	$7,214	$0	$7,214
2035	$0	$7,228	$0	$7,228
2036	$0	$7,665	$0	$7,665
2037	$0	$7,665	$0	$7,665
2038	$0	$7,665	$0	$7,665
2039	$0	$7,665	$0	$7,665
2040	$0	$7,665	$0	$7,665
2041	$0	$7,665	$0	$7,665
2042	$0	$7,665	$0	$7,665
2043	$0	$7,665	$0	$7,665
2044	$0	$7,665	$0	$7,665
2045	$0	$7,665	$0	$7,665
2046	$0	$7,665	$0	$7,665
2047	$0	$7,665	$0	$7,665
2048	$0	$7,665	$0	$7,665

SONGS Annual Cost By Account

Prompt DECON Base Case, 2024 DOE Acceptance, Dry Storage

Unit No: Unit 3

2014 Dollars in Thousands

Year	License Termination	Spent Fuel	Site Restoration	Total
2049	$0	$7,667	$0	$7,667
2050	$0	$9,974	$23,120	$33,094
2051	$0	$6,573	$45,566	$52,139
2052	$0	$0	$1,377	$1,377
Total	$1,078,016	$652,987	$599,507	$2,330,511

Appendix F

SDG&E SONGS Decommissioning Costs (100%)

Appendix F SDG&E SONGS Decommissioning Costs (100%)

San Diego Gas & Electric Company (SDG&E) provides the following information regarding its internal decommissioning costs, which it expects to incur and to fund on its own behalf (100%) in addition to its 20% share of the Decommissioning Cost Estimate.

I. BACKGROUND

As the 20% minority owner, SDG&E is contractually obligated to pay its 20% ownership share of decommissioning expenses for SONGS. These costs, outlined in the DCE, will be incurred by the decommissioning agent and SDG&E will receive invoicing for its proportional share.

II. SDG&E COSTS

Table F-1

SDG&E SONGS DECOMMISSIONING COSTS (1,000's, $2014)

Total Units 2 & 3	SDG&E Labor	Other/ Non-Labor	Total Costs
License Termination	$3,832	$1,047	$4,879
Spent Fuel Management	$2,729	$417	$3,147
Site Restoration	$1,904	$401	$2,305
Total	$8,465	$1,865	$10,330

In addition to SDG&E's 20% share of the costs outlined in the DCE, SDG&E also incurs internal costs related to its SONGS ownership. SDG&E incurs 100% of these Labor and Non-Labor costs related to SDG&E's oversight activities. These costs are apportioned into SCE's DCE categories of License Termination, Spent Fuel Management, and Site Restoration by determining the percentage of costs SCE allocated to each category and multiplying SDG&E's

costs by that same percentage for each category. SDG&E estimates that its total internal costs over the decommissioning period to be $10.33 million (2014$).

a. SDG&E LABOR

The first category, "SDG&E Labor" includes SDG&E staff who provide oversight of SONGS costs and activities. SDG&E's internal staffing efforts are expected to mirror site staffing where the three (3) full-time equivalents ("FTEs") are reduced after 2016 to two (2) FTEs, then to one (1) FTE after 2025, and eventually to zero (0) FTEs after 2032. After 2032, invoicing and oversight activities are anticipated to be minor during this period. Once ISFSI decommissioning is initiated on or around 2049, SDG&E plans to identify one (1) full-time equivalent through 2052.

These costs are shown in Table F-1 under the column heading of "SDG&E Labor" and are apportioned into SCE's categories of License Termination, Spent Fuel Management, and Site Restoration.

b. OTHER/NON-LABOR

The second type of SDG&E-specific costs are "Other/Non-Labor", which consist of outside decommissioning consultants and direct costs related to oversight activities.

To provide oversight of decommissioning activities, SDG&E has retained an external decommissioning consultant who has the expertise SDG&E requires. The external consultant is utilized to a greater extent through 2016 and then the consultant services are tapered off annually through 2025.

SDG&E also incurs direct costs related specifically to SDG&E's oversight activities at SONGS. These costs, which include travel reimbursement, phone services, training, and wireless

communication from SONGS, will coincide with the number of SDG&E SONGS oversight personnel FTEs.

These costs are shown in Table F-1 under the column heading of Other/Non-labor and are apportioned into SCE's categories of License Termination, Spent Fuel Management, and Site Restoration.

III. CONCLUSION

All of SDG&E's internal decommissioning costs presented in Table F-1 are separate and distinct from the costs incurred by the decommissioning agent and invoiced to SDG&E.

SDG&E will seek authority to access its nuclear decommissioning trust funds to pay for its proportional share of SONGS related decommissioning expenses and for its internal decommissioning costs incurred through a Commission-approved advice letter process consistent with the terms of the SDG&E Master Trust Agreement, and relevant rules and regulations of the Internal Revenue Service and the Nuclear Regulatory Commission.

SDG&E SONGS Detailed Annual Expenditures

Base Case:Prompt DECON, Time Reasonable Schedule, DOE Repository Opening 2024, Utility and DGC, Dry Storage
(2014 Dollars in Thousands)

Account Totals

	Unit 2			Unit 3			Total			
	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Total
License Termination	$1,905	$0	$487	$1,927	$0	$560	$3,832	$0	$1,047	$4,879
Spent Fuel Management	$1,349	$0	$184	$1,380	$0	$233	$2,729	$0	$417	$3,147
Site Restoration	$761	$0	$153	$1,143	$0	$248	$1,904	$0	$401	$2,305
	$4,016	$0	$823	$4,450	$0	$1,041	$8,465	$0	$1,865	$10,330

Unit 2

	License Termination			Spent Fuel Management			Site Restoration			ISFSI D&D		
Year	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other
2013	$25	$0	$0	$91	$0	$0	$0	$0	$1	$0	$0	$0
2014	$240	$0	$41	$122	$0	$22	$0	$0	$28	$0	$0	$0
2015	$225	$0	$20	$123	$0	$66	$6	$0	$5	$0	$0	$0
2016	$133	$0	$41	$203	$0	$22	$10	$0	$3	$0	$0	$0
2017	$88	$0	$77	$138	$0	$23	$4	$0	$2	$0	$0	$0
2018	$74	$0	$34	$144	$0	$24	$0	$0	$0	$0	$0	$0
2019	$162	$0	$47	$78	$0	$7	$0	$0	$21	$0	$0	$0
2020	$244	$0	$89	$11	$0	$1	$0	$0	$0	$0	$0	$0
2021	$146	$0	$35	$13	$0	$1	$0	$0	$0	$0	$0	$0
2022	$184	$0	$25	$20	$0	$1	$0	$0	$5	$0	$0	$0
2023	$206	$0	$57	$21	$0	$1	$0	$0	$0	$0	$0	$0
2024	$139	$0	$14	$29	$0	$1	$45	$0	$21	$0	$0	$0
2025	$6	$0	$1	$23	$0	$0	$89	$0	$9	$0	$0	$0
2026	$7	$0	$1	$30	$0	$0	$74	$0	$7	$0	$0	$0
2027	$7	$0	$1	$28	$0	$0	$73	$0	$7	$0	$0	$0
2028	$7	$0	$1	$27	$0	$0	$88	$0	$10	$0	$0	$0
2029	$5	$0	$0	$20	$0	$0	$71	$0	$6	$0	$0	$0
2030	$5	$0	$0	$21	$0	$0	$71	$0	$7	$0	$0	$0
2031	$3	$0	$1	$25	$0	$1	$82	$0	$7	$0	$0	$0
2032	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2045	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2046	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2047	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2048	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2049	$0	$0	$0	$114	$0	$9	$0	$0	$0	$0	$0	$0
2050	$0	$0	$0	$46	$0	$2	$111	$0	$6	$0	$0	$0
2051	$0	$0	$0	$24	$0	$1	$35	$0	$4	$0	$0	$0
2052	$0	$0	$0	$0	$0	$0	$0	$0	$4	$0	$0	$0
	$1,905	**$0**	**$487**	**$1,349**	**$0**	**$184**	**$761**	**$0**	**$153**	**$0**	**$0**	**$0**

Unit 3

	License Termination			Spent Fuel Management			Site Restoration			ISFSI D&D		
Year	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other
2013	$25	$0	$0	$91	$0	$0	$0	$0	$1	$0	$0	$0
2014	$235	$0	$41	$122	$0	$30	$2	$0	$28	$0	$0	$0
2015	$228	$0	$23	$123	$0	$71	$15	$0	$5	$0	$0	$0
2016	$134	$0	$53	$206	$0	$32	$34	$0	$38	$0	$0	$0
2017	$71	$0	$33	$139	$0	$34	$6	$0	$4	$0	$0	$0
2018	$83	$0	$67	$145	$0	$36	$0	$0	$0	$0	$0	$0
2019	$127	$0	$46	$79	$0	$10	$1	$0	$21	$0	$0	$0
2020	$174	$0	$50	$11	$0	$1	$5	$0	$0	$0	$0	$0
2021	$272	$0	$94	$13	$0	$1	$1	$0	$0	$0	$0	$0
2022	$220	$0	$83	$20	$0	$1	$1	$0	$6	$0	$0	$0
2023	$192	$0	$51	$21	$0	$1	$6	$0	$1	$0	$0	$0
2024	$125	$0	$13	$29	$0	$1	$79	$0	$51	$0	$0	$0
2025	$6	$0	$1	$23	$0	$0	$83	$0	$8	$0	$0	$0
2026	$7	$0	$1	$30	$0	$0	$80	$0	$8	$0	$0	$0
2027	$7	$0	$1	$28	$0	$0	$83	$0	$8	$0	$0	$0
2028	$7	$0	$1	$27	$0	$0	$73	$0	$5	$0	$0	$0
2029	$5	$0	$0	$20	$0	$0	$108	$0	$12	$0	$0	$0
2030	$5	$0	$0	$21	$0	$0	$105	$0	$11	$0	$0	$0
2031	$3	$0	$1	$25	$0	$1	$89	$0	$8	$0	$0	$0
2032	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2045	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2046	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2047	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2048	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2049	$0	$0	$0	$114	$0	$9	$0	$0	$0	$0	$0	$0
2050	$0	$0	$0	$46	$0	$2	$69	$0	$8	$0	$0	$0
2051	$0	$0	$0	$24	$0	$1	$152	$0	$11	$0	$0	$0
2052	$0	$0	$0	$24	$0	$1	$152	$0	$11	$0	$0	$0
	$1,927	**$0**	**$560**	**$1,380**	**$0**	**$233**	**$1,143**	**$0**	**$248**	**$0**	**$0**	**$0**

SDG&E SONGS Detailed Annual Expenditures

Base Ca: Prompt DECON, Time Reasonable Schedule, DOE Repository Opening 2024, Utility and DGC, Dry Storage
(2014 Dollars in Thousands)

Account Totals

	Unit 2			Unit 3			Total			
	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Total
License Termination	$1,905	$0	$487	$1,927	$0	$560	$3,832	$0	$1,047	$4,879
Spent Fuel Management	$1,349	$0	$184	$1,380	$0	$233	$2,729	$0	$417	$3,147
Site Restoration	$761	$0	$153	$1,143	$0	$248	$1,904	$0	$401	$2,305
	$4,016	$0	$823	$4,450	$0	$1,041	$8,465	$0	$1,865	$10,330

Unit 2 and 3 Total / Unit 2 and 3 Project Totals

	License Termination			Spent Fuel Management			Site Restoration			ISFSI D&D			Unit 2 and 3 Project Totals			
Year	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	Labor	LLRW Burial	Other	License Term	Spent Fuel	Site Restoration	Total
2013	$50	$0	$0	$182	$0	$1	$0	$0	$3	$0	$0	$0	$51	$182	$3	$236
2014	$474	$0	$82	$243	$0	$51	$2	$0	$56	$0	$0	$0	$557	$294	$58	$909
2015	$453	$0	$42	$245	$0	$137	$21	$0	$10	$0	$0	$0	$496	$382	$31	$909
2016	$267	$0	$95	$409	$0	$53	$44	$0	$41	$0	$0	$0	$362	$462	$85	$909
2017	$159	$0	$109	$277	$0	$57	$10	$0	$5	$0	$0	$0	$269	$334	$15	$618
2018	$157	$0	$101	$289	$0	$60	$0	$0	$0	$0	$0	$0	$258	$349	$0	$608
2019	$288	$0	$93	$157	$0	$16	$1	$0	$42	$0	$0	$0	$381	$173	$43	$598
2020	$418	$0	$139	$23	$0	$2	$5	$0	$0	$0	$0	$0	$557	$25	$5	$588
2021	$419	$0	$129	$26	$0	$2	$1	$0	$0	$0	$0	$0	$548	$28	$2	$578
2022	$404	$0	$107	$41	$0	$3	$2	$0	$11	$0	$0	$0	$511	$43	$13	$567
2023	$399	$0	$108	$42	$0	$3	$6	$0	$1	$0	$0	$0	$506	$44	$7	$557
2024	$264	$0	$27	$58	$0	$2	$124	$0	$72	$0	$0	$0	$291	$60	$196	$547
2025	$11	$0	$1	$45	$0	$0	$171	$0	$17	$0	$0	$0	$12	$45	$188	$246
2026	$15	$0	$3	$60	$0	$1	$153	$0	$15	$0	$0	$0	$18	$60	$168	$246
2027	$14	$0	$2	$57	$0	$1	$157	$0	$15	$0	$0	$0	$16	$57	$172	$246
2028	$13	$0	$2	$53	$0	$1	$161	$0	$16	$0	$0	$0	$15	$54	$177	$246
2029	$10	$0	$0	$39	$0	$0	$179	$0	$18	$0	$0	$0	$10	$39	$197	$246
2030	$10	$0	$0	$42	$0	$0	$176	$0	$18	$0	$0	$0	$11	$42	$194	$246
2031	$6	$0	$2	$50	$0	$1	$172	$0	$15	$0	$0	$0	$9	$51	$187	$246
2032	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2045	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2046	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2047	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2048	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2049	$0	$0	$0	$228	$0	$18	$0	$0	$0	$0	$0	$0	$0	$246	$0	$246
2050	$0	$0	$0	$93	$0	$4	$180	$0	$14	$0	$0	$0	$0	$97	$195	$291
2051	$0	$0	$0	$48	$0	$3	$187	$0	$16	$0	$0	$0	$0	$51	$203	$253
2052	$0	$0	$0	$24	$0	$1	$152	$0	$16	$0	$0	$0	$0	$25	$168	$193
	$3,832	$0	$1,047	$2,729	$0	$417	$1,904	$0	$401	$0	$0	$0	$4,879	$3,147	$2,306	$10,330

EXHIBIT 4

March 3, 2010

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:
Thomas S. Moore, Chairman
Paul S. Ryerson
Richard E. Wardwell

In the Matter of	)	Docket No. 63-001
U.S. DEPARTMENT OF ENERGY	)	ASLBP No. 09-892-HLW-CAB04
(High-Level Waste Repository)	)	

U.S. DEPARTMENT OF ENERGY'S MOTION TO WITHDRAW

The United States Department of Energy ("DOE") hereby moves, pursuant to 10 C.F.R. § 2.107, to withdraw its pending license application for a permanent geologic repository at Yucca Mountain, Nevada. DOE asks the Board to dismiss its application with prejudice and to impose no additional terms of withdrawal.

While DOE reaffirms its obligation to take possession and dispose of the nation's spent nuclear fuel and high-level nuclear waste, the Secretary of Energy has decided that a geologic repository at Yucca Mountain is not a workable option for long-term disposition of these materials. Additionally, at the direction of the President, the Secretary has established the Blue Ribbon Commission on America's Nuclear Future, which will conduct a comprehensive review

and consider alternatives for such disposition.[1] And Congress has already appropriated $5 million for the Blue Ribbon Commission to evaluate and recommend such "alternatives." Energy and Water Development and Related Agencies Appropriations Act, 2010, Pub. L. No. 111-85, 123 Stat. 2845, 2864-65 (2009). In accord with those decisions, and to avoid further expenditure of funds on a licensing proceeding for a project that is being terminated, DOE has decided to discontinue the pending application in this docket,[2] and hereby moves to withdraw that application with prejudice.

Under the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. §§ 10101 *et seq.* ("NWPA"), this licensing proceeding must be conducted "in accordance with the laws applicable to such applications . . . ." NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws necessarily include the NRC's regulations governing license applications, including, as this Board has already recognized, 10 C.F.R. § 2.107(a). *See* CAB Order (Concerning LSNA Memorandum), ASLBP No. 09-892-HLW-CAB04, at 2 (Dec. 22, 2009) (stating that "the parties are reminded that, pursuant to 10 C.F.R. § 2.107, withdrawal shall be on such terms as the Board may prescribe."). That section provides in relevant part that "[w]ithdrawal of an application after the

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1 *See* Presidential Memorandum -- Blue Ribbon Commission on America's Nuclear Future (Jan. 29, 2010) ("Presidential Memorandum"), *available at* http://www.whitehouse.gov/the-press-office/presidential-memorandum-blue-ribbon-commission-americas-nuclear-future; Department of Energy Press Release, Secretary Chu Announces Blue Ribbon Commission on America's Nuclear Future (January 29, 2010), *available at* http://www.energy.gov/news/8584.htm; Charter, Blue Ribbon Commission on America's Nuclear Future (filed March 1, 2010), *available at* http://www.energy.gov/news/documents/BRC_Charter.pdf. The Commission will conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel and materials derived from nuclear activities. *See id.*

2 This decision was announced in the Administration's Fiscal Year 2011 Budget, which states that "[i]n 2010, the Department will discontinue its application to the Nuclear Regulatory Commission (NRC) for a license to construct a high-level waste geologic repository at Yucca Mountain, Nevada." Budget of the U.S. Government, Fiscal Year 2011: Terminations, Reductions, and Savings, at 62 (Feb. 1, 2010). The Department of Energy's Fiscal Year 2011 Congressional Budget Request similarly states that "in 2010, Department will discontinue its application to the U.S. Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain." Department of Energy, FY 2011 Congressional Budget Request, Vol. 7, at 163 (Feb. 2010).

issuance of a notice of hearing shall be on such terms as the presiding officer may prescribe." 10 C.F.R. § 2.107(a).

Thus, applicable Commission regulations empower this Board to regulate the terms and conditions of withdrawal. *Philadelphia Electric Company* (Fulton Generating Station, Units 1 and 2), ALAB-657, 14 N.R.C. 967, 974 (1981). Any terms imposed for withdrawal must bear a rational relationship to the conduct and legal harm at issue. *Id.* And the record must support any findings concerning the conduct and harm in question to impose a term. *Id.*, citing *LeCompte v. Mr. Chip, Inc.*, 528 F.2d 601, 604-05 (5th Cir. 1976); 5 Moore's Federal Practice ¶ 41.05[1] at 41–58.

A. The Board Should Grant Dismissal With Prejudice

In this instance, the Board should prescribe only one term of withdrawal—that the pending application for a permanent geologic repository at the Yucca Mountain site shall be dismissed with prejudice.[3]

That action will provide finality in ending the Yucca Mountain project for a permanent geologic repository and will enable the Blue Ribbon Commission, as established by the Department and funded by Congress, to focus on alternative methods of meeting the federal government's obligation to take high-level waste and spent nuclear fuel. It is the Secretary of Energy's judgment that scientific and engineering knowledge on issues relevant to disposition of high-level waste and spent nuclear fuel has advanced dramatically over the twenty years since the Yucca Mountain project was initiated. *See also* Presidential Memorandum at 1. Future proposals for the disposition of such materials should thus be based on a comprehensive and

[3] DOE seeks this form of dismissal because it does not intend ever to refile an application to construct a permanent geologic repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

careful evaluation of options supported by that knowledge, as well as other relevant factors, including the ability to secure broad public support, not on an approach that "has not proven effective" over several decades. *Id.*

The Board should defer to the Secretary's judgment that dismissal of the pending application with prejudice is appropriate here. Settled law in this area directs the NRC to defer to the judgment of policymakers within the Executive Branch.[4] And whether the public interest would be served by dismissing this application with prejudice is a matter within the purview of the Secretary.[5] From public statements already made, we of course understand that some will nevertheless argue that dismissing this application is contrary to the NWPA. Although it is impossible to anticipate exactly what parties will argue at this point, at least one litigant seeking to raise these issues in federal court has said the NWPA obligation to file the pending application is inconsistent with the decision to withdraw the application. This is simply wrong.

Nothing in the text of the NWPA strips the Secretary of an applicant's ordinary right to seek dismissal. In fact, the text of the statute cuts sharply in favor of the Secretary's right to seek

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[4] *U.S. Department Of Energy* (Plutonium Export License), CLI-04-17, 59 N.R.C. 357, 374 (2004) (deferring, upon "balanc[ing] our statutory role in export licensing with the conduct of United States foreign relations, which is the responsibility of the Executive Branch," to Executive Branch determination on an export license application). *See also Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-03-30, 58 N.R.C. 454, 472 (2003) (expressing "considerable doubt" about the NRC's authority to "second-guess" the Bureau of Land Management on an issue relating to recommendations as to the wilderness status of land, and declining an invitation to do so); *see also Environmental Radiation Protection Standards for Nuclear Power Operations, 40 CFR 190*, CLI–81–4, 13 N.R.C. 298, 301 (1981) (deferring to EPA standards for radiation protection: "This agency does not sit as a reviewing court for a sister agency's regulations…."). *See generally Pacific Gas & Electric Company* (Stanislaus Nuclear Project, Unit 1), LBP-83-2 , 17 N.R.C. 45, 52 (1983) ("The law on withdrawal does not require a determination of whether [the applicant's] decision [to withdraw] is sound.").

[5] The Atomic Energy Act ("AEA" or "Act") gives the Secretary broad authority to carry out the Act's purposes, including the authority to direct the Government's "control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare." AEA § 3(c), 42 U.S.C. § 2013(c). Indeed, as the D.C. Circuit has recognized, the AEA established "a regulatory scheme which is virtually unique in the degree to which broad responsibility is reposed in the administering agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives." *Siegel v. AEC*, 400 F.2d 778, 783 (D.C. Cir. 1968). While *Siegel* concerned directly the branch of the then-Atomic Energy Commission that later became the NRC, its recognition that broad discretion is to be given to the governmental agencies charged with administering the AEA's objectives applies equally to the Department of Energy, the other lineal descendant of the AEC.

dismissal. The statute simply requires that the Secretary "shall submit . . . an application for a construction authorization." NWPA § 114(b), 42 U.S.C. § 10134(b). It neither directs nor circumscribes the Secretary's actions on the application after that submission.[6]

Indeed, far from imposing special limitations on DOE after the submission, the NWPA expressly requires that the application be considered "in accordance with the laws applicable to such applications." NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws include 10 C.F.R. § 2.107, which, as this Board has recognized, authorizes withdrawals on terms the Board prescribes. Congress, when it enacted the NWPA in 1982, could have dictated that special rules applied to this proceeding to prevent withdrawal motions, or could have prescribed duties by DOE with respect to prosecution of the application after filing, but it chose not to do so.

Nor does the structure of the NWPA somehow override the plain textual indication in the statute that ordinary NRC rules govern here or dictate that the Secretary must continue with an application he has decided is contrary to the public interest. The NWPA does not prescribe a step-by-step process that leads inexorably to the opening of a repository at Yucca Mountain. Indeed, even if the NRC granted the pending application today, the Secretary would not have the authority to create an operational repository. That would require further action by DOE, other agencies, and Congress itself, yet none of those actions is either mandated or even mentioned by the NWPA. The NWPA does not require the Secretary to undertake the actions necessary to obtain the license to receive and possess materials that would be necessary to open a repository. 10 C.F.R. §§ 63.3, 63.32(d). Rather, the NWPA refers only to the need for a "construction

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[6] After filing the application, the only NWPA mandate imposed on the Secretary is a *reporting* requirement to Congress to note the "project decision schedule that portrays the optimum way to attain the operation of the repository, within the time periods specified in this part." NWPA § 114(e)(1), 42 U.S.C. §10134(e)(1).

authorization," NWPA § 114(b), 42 U.S.C. § 10134(b) – and even there, as discussed, it mandates only the submission of an application. To open a facility, moreover, the Department would be required to obtain water rights, rights of way from the Bureau of Land Management for utilities and access roads, and Clean Water Act § 404 permits for repository construction, as well as all the state and federal approvals necessary for an approximately 300-mile rail line, among many other things. None of those actions is mandated by the NWPA. At least as important, as the prior Administration stressed, *Congress* would need to take further action not contained in the NWPA before any such repository could be opened.[7] In short, there are many acts between the filing of the application and the actual use of the repository that the NWPA does not require.

Where, even if the NRC granted the pending application, Congress has not authorized the Secretary to make the Yucca Mountain site operational, or even mandated that he take the many required steps to make it operational, it would be bizarre to read the statute to impose a non-discretionary duty to continue with any particular intermediate step (here, prosecuting the application), absent clear statutory language mandating that result. More generally, it has not been the NRC's practice to require any litigant to maintain a license application that the litigant does not wish to pursue. That deference to an applicant's decisions should apply more strongly where a government official has decided not to pursue a license application because he believes that other courses would better serve the public interest.

Finally, the fact that Congress has approved Yucca Mountain as the site of a repository, *see* Pub. L. No. 107-200, 116 Stat. 735 (2002) ("there hereby is approved the site at Yucca Mountain, Nevada, for a repository, with respect to which a notice of disapproval was submitted

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7 *See* January 2009 Project Decision Schedule at 1 ("This schedule is predicated upon the enactment of legislation ... [regarding] land withdrawal."). *See also, e.g.*, Nuclear Fuel Management and Disposal Act, S.2589, 109th Congress, 2d Sess. § 3 (2006) (proposed legislation authorizing the withdrawal of lands necessary for the Yucca Mountain repository).

by the Governor of the State of Nevada on April 8, 2002"), means, in the D.C. Circuit's words, simply that the Secretary is "permitted" to seek authority to open such a site and that challenges to the prior process to select that site are moot. *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1309-10 (D.C. Cir. 2004). It does *not* require the Secretary to continue with an application proceeding if the Secretary decides that action is contrary to the public interest. *See, e.g.,* S. Rep. No. 107-159, at 13 (2002) ("It bears repeating that enactment of the joint resolution will not authorize construction of the repository or allow DOE to put any radioactive waste or spent nuclear fuel in it or even allow DOE to begin transporting waste to it. Enactment of the joint resolution will only allow DOE to take the next step in the process laid out by the Nuclear Waste Policy Act and apply to the NRC for authorization to construct the repository at Yucca Mountain."); H.R. Rep. No. 107-425, at 7 (2002) ("In accordance with the Nuclear Waste Policy Act (NWPA), such approval would allow the Department of Energy (DOE) to apply for a license with the Nuclear Regulatory Commission to construct a nuclear waste storage facility on the approved site.").[8] That conclusion is even more strongly compelled now, in light of Congress's recent decision to provide funding to a Blue Ribbon Commission, whose explicit purpose is to propose "alternatives" for the disposal of high-level waste and spent nuclear fuel.

Even if there were any ambiguity on these points, the Secretary's interpretation of the NWPA would be entitled to deference. *See Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984); *Gen. Elec. Uranium Mgmt. Corp. v. DOE*, 764 F.2d 896, 907 (D.C. Cir. 1985) (applying *Chevron* deference to uphold DOE's interpretation of the NWPA); *see also Skidmore v Swift Co.*, 323 U.S. 65 (1944); *Auer v. Robbins*, 519 U.S. 452 (1977); *Coeur*

[8] *See also* 148 Cong. Rec. 7155 (2002) (Rep. Dingell) (stating that Yucca Mountain Site Approval Act "is just about a step in a process"); *id.* at 7166 (Rep. Norwood) ("The vote today does not lock us in forever and we are not committed forever to Yucca Mountain."); *id.* at 12340 (Sen. Crapo) ("[T]his debate is not about whether to open the Yucca Mountain facility so much as it is about allowing the process of permitting to begin to take place.").

Alaska, Inc. v. Southeastern Alaska Conservation Council, 129 S. Ct. 2458 (2009). Simply put, the text of the NWPA does not specify actions the Secretary can or must take once the application is filed. Accordingly, while some may disagree with the wisdom of the Secretary's underlying policy decision, the Secretary may fill this statutory "gap." The Secretary's interpretation is a reasonable one that should be given great weight and sustained. *See, e.g., Tennessee v. Herrington*, 806 F.2d 642, 653 (6th Cir. 1986) ("[W]e are mindful of the Supreme Court's statement in *Chevron, supra*, that: 'When a challenge to an agency construction of a statutory provision, fairly conceptualized, really centers on the wisdom of the agency's policy, rather than whether it is a reasonable choice within a gap left open by Congress, the challenge must fail.'").

B. No Conditions Are Necessary As to the Licensing Support Network

Finally, there is no reason to impose conditions relating to the Licensing Support Network ("LSN") as a term of withdrawal. As DOE's prior filings with this Board explain, DOE will, at a minimum, maintain the LSN throughout this proceeding, including any appeals, and then archive the LSN materials in accordance with the Federal Records Act and other relevant law. *See* Department of Energy's Answers to the Board's Questions at the January 27, 2010 Case Management Conference (filed Feb. 4, 2010); Department of Energy's Status Report on Its Archiving Plan (filed Feb. 19, 2010). Thus, DOE will retain the full LSN functionality throughout this proceeding, including appeal, and then follow well established legal requirements that already govern DOE's obligations regarding these documents. DOE is also considering whether sound public and fiscal policy, and the goal of preserving the knowledge gained both inside and outside of this proceeding, suggest going even further than those legal

requirements. There is thus no need for this Board to impose additional conditions concerning the preservation of records.

* * *

DOE counsel has communicated with counsel for the other parties commencing on February 24, 2010, in an effort to resolve any issues raised by them prior to filing this Motion, per 10 C.F.R. § 2.323(b). The State of Nevada and the State of California have stated that they agree with the relief requested here. The Nuclear Regulatory Commission Staff has stated that it takes no position at this time. The Nuclear Energy Institute has stated that it does not consent to the relief requested and will file its position in a response. All other parties that have responded have stated that they reserve their positions until they see the final text of the motion.[9]

[9] These parties include: Clark County, Eureka County, Four Counties (Esmeralda, Lavender, Churchill, Mineral), Inyo County, Lincoln County, Native Community Action Council, Nye County, Timbisha Shoshone Tribal Group, White Pine County.

Respectfully submitted,

U.S. DEPARTMENT OF ENERGY
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March 3, 2010

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:
Thomas S. Moore, Chairman
Paul S. Ryerson
Richard E. Wardwell

In the Matter of	)	Docket No. 63-001
U.S. DEPARTMENT OF ENERGY	)	ASLBP No. 09-892-HLW-CAB04
(High-Level Waste Repository)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the **U.S. DEPARTMENT OF ENERGY'S MOTION TO WITHDRAW** have been served on the following persons on this 3rd day of March 2010 through the Nuclear Regulatory Commission's Electronic Information Exchange.

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EXHIBIT 5

SOUTHERN CALIFORNIA EDISON®
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NEWS

Media Contact: Maureen Brown, (626) 302-2255

SCE Selects Robust Underground System to Store San Onofre Used Nuclear Fuel

ROSEMEAD, Calif., Dec. 11, 2014 — Southern California Edison (SCE) has selected Holtec International to expand the San Onofre nuclear plant's storage of used nuclear fuel in a robust underground facility.

The contract with Holtec represents a major step in the decommissioning of the nuclear plant. It sets the stage to transfer San Onofre's used fuel from steel-lined concrete storage pools to steel-and-concrete-encased canisters, with a goal of completing the work by mid-2019.

"After reviewing leading designs with the San Onofre Community Engagement Panel, we concluded this underground design is best suited to safely and securely store used nuclear fuel at San Onofre until the federal government removes the fuel from site, as required," said Chris Thompson, SCE vice president of Decommissioning. "Our decision to move expeditiously to transfer the fuel also reflects feedback from community leaders who prefer dry storage of used nuclear fuel."

Thompson noted the robust Holtec design exceeds California earthquake requirements and protects against hazards such as water, fire or tsunamis.

"I especially want to thank the Community Engagement Panel for its thoughtful questions and enormous time commitment during SCE's evaluation," said Thompson, noting that SCE ultimately focused on cask designs licensed by the Nuclear Regulatory Commission for both storage *and* transport of used nuclear fuel.

While dry storage of nuclear fuel is a proven technology used for almost three decades in the United States, Thompson said SCE will go beyond industry practices by partnering with the Electric Power Research Institute to develop new inspection techniques to monitor cask integrity.

Holtec's HI-STORM UMAX underground storage system features corrosion-resistant, stainless-steel fuel canisters topped with a 24,000-pound steel and concrete lid. The canisters will be encased in a concrete monolith. Holtec is a global supplier and has nuclear fuel storage systems at two other California locations, Humboldt Bay and Diablo Canyon. More information is available in this fact sheet.

Thompson said engineering work begins immediately, followed by fabrication of canisters. Completion of the dry storage project facilitates major dismantlement work SCE plans to complete within 20 years.

SCE announced in June 2013 that it would retire San Onofre Units 2 and 3, and begin preparations to decommission the facility. SCE has established core principles of safety, stewardship and engagement to guide decommissioning. For more information about SCE, visit www.songscommunity.com.

About Southern California Edison
An Edison International (NYSE:EIX) company, Southern California Edison is one of the nation's largest electric utilities, serving a population of nearly 14 million via 4.9 million customer accounts in a 50,000-square-mile service area within Central, Coastal and Southern California.

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EXHIBIT 6

San Onofre Nuclear Waste Problems

Tom English, Ph.D., Samuel Lawrence Foundation
Subrata Chakraborty, Ph.D., UCSD, Dept. of Chemistry and Biochemistry
Rear Admiral Len Hering Sr. USN (ret)

January 2019

INTRODUCTION

In August 2018, a near-accident during the loading of nuclear waste into dry storage triggered a federal investigation and brought new urgency to the debate of how best to store some of the most dangerous waste known to humankind – spent nuclear fuel. The San Onofre Nuclear Generating Station (S.O.N.G.S.) closed in 2012 after a number of serious failures. Since then, Southern California Edison and its contractor, Holtec International, built a concrete storage vault to hold 3.6 million pounds of nuclear waste in dry storage. That vault is footsteps from the rising Pacific Ocean. In our brief report, we explore the fatal flaws of this location and recommend moving the storage facility to a technically defensible storage facility at a significantly higher elevation with distance from the ocean. We address the inadequacy of the equipment used to move and contain the nuclear waste material. We explore the gouging that occurs when stainless steel canisters are lowered into the storage vault and how gouging compromises the integrity of the containers. Finally, we examine management practices at San Onofre and an apparent lack of supervision, training and protocols. The examination of the perils of S.O.N.G.S. Independent Spent Fuel Storage Installations' poor location, poor technology and poor management, presents an urgent situation for regulators to: order Edison to permanently stop the loading of canisters into dry storage, require Edison to store the waste in canisters that may be inspected, and secure an independent analysis and risk assessment of canister loading procedure.

RATIONALE

Most serious of the issues facing the interim storage of nuclear waste at S.O.N.G.S. include the gouging damage to fully-loaded steel canisters upon downloading into the storage vault. These 54-ton thin-walled steel canisters are loaded with nuclear waste in wet storage – spent fuel pools – and are transported to the on-site concrete storage vault, adjacent to the reactor domes. With the Brinell hardness scale calculations our team demonstrates the depth and width of canister gouges upon downloading into the storage system. The current downloading procedure and on-site storage configuration provides the factors necessary to create gouges in the external steel walls of the canisters: operators have no visibility of the canister during downloading and precise adjustments to canister orientation cannot be made. These gouges remain undetected and unrepaired due to the lack of thorough inspection and monitoring at

the San Onofre Independent Spent Fuel Storage Installations (ISFSIs). The preliminary findings are found in this report.

1. POOR LOCATION

Today, two separate Independent Spent Fuel Storage Installations (ISFSIs) exist at San Onofre. The newest, built by Holtec, is located about 100 feet from the Pacific Ocean on the 85-acre grounds of S.O.N.G.S. The property is part of Marine Corps Base Camp Pendleton and is owned by the Department of the Navy. Two of the nation's busiest transportation corridors -- Interstate 5 and the Los Angeles-San Diego-San Luis Obispo Rail Line -- flank the site. The ISFSIs are clearly visible in Google Earth images and in numerous published photographs. The high accessibility and visibility of the site leaves it extremely vulnerable to an act of malfeasance.

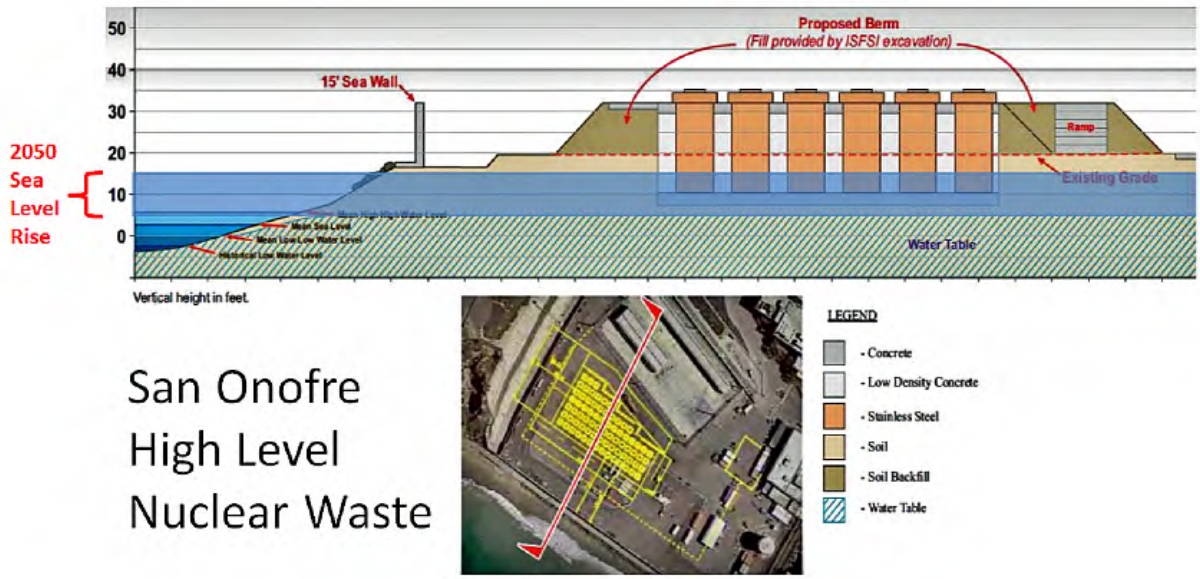

Figure 1. Independent Spent Fuel Storage Installations and Storage Vault.

Forces of nature, exacerbated by sea-level rise, carry further risks. Frequent high humidity and coastal fog make the metal at the site susceptible to short-term corrosion and stress-induced corrosion cracking. Also located at this site is a second, older ISFSI, which contains 51 thin-walled steel canisters that are up to 15 years old.

Numerous reports show that mean high tide level is about 18 inches below the base of the newer, oceanfront ISFSI, which was designed by Holtec. Since this is the mean height, the sea level frequently exceeds this height. Hence, it is likely the present ground water table will leach into the storage vault and result in at least damp storage. Further sea level rise due to climate change will make this problem far worse.

Dr. James Hansen, who managed NASA's climate change program for about 25 years, predicts sea levels could rise up to 10 feet during the next 50 years. At San Onofre, this would cause the bottom seven feet of the Holtec nuclear storage canisters to be submerged in seawater, unintentionally resulting in wet storage. This would invite a crisis similar to that of Fukushima, where spent fuel was exposed to moisture.

A second estimate appears in a comprehensive report by the Working Group of the California Ocean Protection Council Science Advisory Team. Published in 2017, the report shows 75% likelihood sea levels will rise by two feet by 2100. Either of these scenarios envisions that a major portion of the nuclear storage canisters as San Onofre would be submerged in seawater. The combination of the effects of sea-level rise and ground water inundation at the current location would change the Holtec ISFSI to wet storage site, for which it was not designed. Hence, little if anything would be accomplished by moving the waste from the spent-fuel pool to the dry storage ISFSI. The dangers would not be decreased. If anything, the inability to adequately measure and mitigate the impacts of corrosion on the underground nuclear canisters would lead to a significant increase in risk.

All of this can be avoided. If the nuclear waste at the two ISFSIs is transferred into thick-walled casks and then moved to a technically defensible storage facility at higher ground, the problems of ocean water and ground water intrusion can be avoided. As an added benefit, the waste would be easier to secure from an act of malfeasance.

2. POOR TECHNOLOGY

In California, the storage tanks at gas stations must be double-walled; painful experience has shown that single-walled containers can leak gasoline into the groundwater system. With a double-walled fuel tank, if a leak occurs it can be detected and the storage container can be repaired or replaced before any gasoline is released. At San Onofre, we certainly should expect that some kind of leak prevention system would be in place to contain extremely toxic high-level radioactive waste. Additionally, the canisters should be able to be monitored and inspected. The thin-walled canisters at the San Onofre ISFSIs cannot be adequately monitored or inspected. Regulators and Holtec officials have stated that the canisters cannot be inspected from the inside or the outside for cracks or other degradation and that, even if damage could be identified, it would be impossible to fix.

To illustrate the importance of adequate monitoring, we analyze a scenario in which one vent of a canister clogs. We refer to a Holtec non-proprietary safety analysis report[1] that calculates a temperature rise to about 90% of the maximum permissible limit (MPL) in 24 hours. This infers that within the next 12 hours the system will exceed the MPL rating and lead to a meltdown[2].

[1] Table 4.I.9, page 1050, Holtec International Final Safety Analysis Report for the HI-STORM 100 Cask System. USNRC Docket No.: 72-1014, Holtec Report No.: HI-2002444.
[2] S. Alyokhina, Thermal analysis of certain accident conditions of dry spent nuclear fuel storage, Nuclear Engineering and Technology 50 (2018) 717-723.

Through our own statistical analysis,[3] we prove that if the probability of clogging one of the vents during an event is 1%, then the chance that one of the 146 total vents (two vents on each of 73 canisters) will clog in such an event is 78%. This chance reduces to 53% if we reduce the probability of occurrence to .5% from 1%. Tsunamis followed by clogging are dependent events and thus the combined chance of such an event is about 11% during a 30-year period. The sea level rise, the rise of tide levels and the associated rise in the coastal aquifer are all interlinked, as discussed previously. These climate-related phenomena could cause serious damage to the ISFSIs. Therefore, close monitoring and the use of proven thick-walled cask technology for all nuclear waste storage containers is not only necessary but urgent. A mishap could imperil the lives and livelihoods of more than 8 million people who live within 50 miles of the ISFSIs.

2.1 NEAR MISS EVENT

David Fritch, an industrial safety inspector turned whistleblower, remembers August 3, 2018, as a bad day. Fritch worked at San Onofre during a loading failure that left a fully-loaded 54-ton canister of high-level radioactive waste stuck on the lip of a guide ring. Above the 17-foot-tall canister, the slings that attached it to the behemoth loading rig had gone slack.

The canister was, “hanging by about a quarter inch,” Fritch told attendees of the community engagement panel on August 9. “It’s a bad day. That happened, and you haven’t heard about it, and that’s not right. What we have is a canister that could have fallen 18 feet.”

Subsequent investigations revealed that the operators and managers could not see Canister No. 29 as it was being loaded into the storage cavity and became stuck for nearly an hour.

Since the near-accident, regulators have halted further loading of canisters into the seaside storage vault and researchers have explored what could have happened if Canister No. 29 had fallen.

Our own research explores the basic physics of a fully-loaded 54-ton canister in free fall to extrapolate the upper energy involved in the initial impact.

For example, the falling canister could hit the steel-lined concrete floor of the nuclear waste storage facility with explosive energy greater than that of several large sticks of dynamite. The resultant damage to the canister could cause a large radiation release.
At point of contact at the bottom of the storage cavity, damage to the concrete and metal structure could ruin the cooling system. The damage to the concrete would equal that of a fully-loaded 18-wheeler truck, with a gross weight of 80,000 pounds, crashing into reinforced concrete at 23 miles per hour. Our preliminary calculations show the combination of the weight and velocity of the dropped canister exceeds the ISFSIs’ “design criteria for tornado missiles,” by a factor of 4. Future experiments should include drop tests of the actual canisters with non-

[3] Chakraborty and English, 2019, ES&H Risk Estimation from “Interim Storage” of SNF at the Beach: The San Onofre NPP, WM2019 Conference, March 3-7, 2019, Phoenix, Arizona, USA (under review).

radioactive loads that simulate the weight of the spent fuel assemblies and fuel baskets to determine what would happen to the actual canisters.

Southern California Edison is set to move 73 canisters into the seaside storage vault and, at the time of publication, has moved 29. Each nuclear storage canister contains 37 spent fuel assemblies, which generate enormous amounts of heat. The systems are cooled by a simple air duct system, which could have been blocked by the damage caused by the canister's fall. If that had happened, great quantities of water would have been needed to cool the reaction and prevent or control a meltdown. The enveloping water would instantly become radioactive steam, as we saw at Fukushima. In the heavily-populated area surrounding San Onofre, however, radioactive steam could prompt the evacuation of millions of people. What's more, since both the canister and the surrounding structure could be badly damaged, there would be no available way to pull the damaged canister from the storage cavity.

Nuclear Regulatory Commission (NRC) computer simulations show what happens when a nuclear storage canister with slightly thinner walls[4] drops from 19 feet. In the test, a canister falls from a transfer cask onto a storage pedestal. The canister failure rate was 28%. Similar calculations must be performed at San Onofre to determine if that storage system has a similar probability of canister failure. At 28%, that is more than a one-in-four chance of catastrophic failure. Would you fly on an airplane with those odds? Our analysis alone should place the NRC, policymakers and Edison on alert. A more substantial analysis must be completed to examine the potential damage that can be caused by a falling, fully-loaded 54-ton nuclear storage canister.

Continued loading of the nuclear waste into canisters threatens the lives and livelihood of more than 8 million people. Software and computer resources are available by which estimates can be made of the impacts of a dropped canister on both the reinforced concrete and the canister walls. The NRC-approved Holtec technical specifications state that a canister drop of more than 11 inches requires the contents of the canister to be inspected for damage. This specification assumed the canister was in a transfer cask. The impact of an un-casked canister was never analyzed because Holtec and the NRC assumed it could never happen, citing triple-redundancy of the fuel transfer system. But a subsequent NRC inspection revealed that on August 3rd, all three components of this system simultaneously failed. Only the accidental snag of a quarter-inch of the 54-ton canister on the lip of the guide ring prevented a catastrophe.

Our research suggests the entire storage system may need to be redesigned to reduce the probability of canister failure to levels that are acceptable in such a highly-populated area.

[4] Pg. 4-24 Table 12, NUREG-1864 - A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant, March 2007, A. Malliakos, NRC Project Manager

RESULTS

2.2 GOUGES IN DROPPED CANISTER

In their 2007 report, the NRC's analysts did not consider the impact of gouges on the strength of canister walls. There was no need, the analysts and a Holtec official said, as gouges were not important to the system under examination. We disagree. A detailed analysis of gouging is necessary to properly evaluate the damage to Canister No. 29 during the botched loading and to every other canister loaded into the ISFSI.

We established preliminary results of such an analysis using the Brinell hardness scale approach to estimate the depth and width of expected gouges in 316 stainless steel, of which the Holtec canisters at San Onofre is made.

While the canister is stuck, the guide ring gouges the bottom of the canister.

As the canister drops it is gouged on two sides by a combination of the guide ring, the storage cavity wall and the inner diameter of the transfer cask. This gouging absorbs some of the kinetic energy of the canister.

When the canister smashes into the bottom of the cavity, the kinetic energy and momentum from the fall will be dissipated by damage to:

- the ISFSI;
- the canister; and
- the contents of the canister.

The formation process of gouges will exert a force on the canister. This is the force, P, shown in Figure 2.

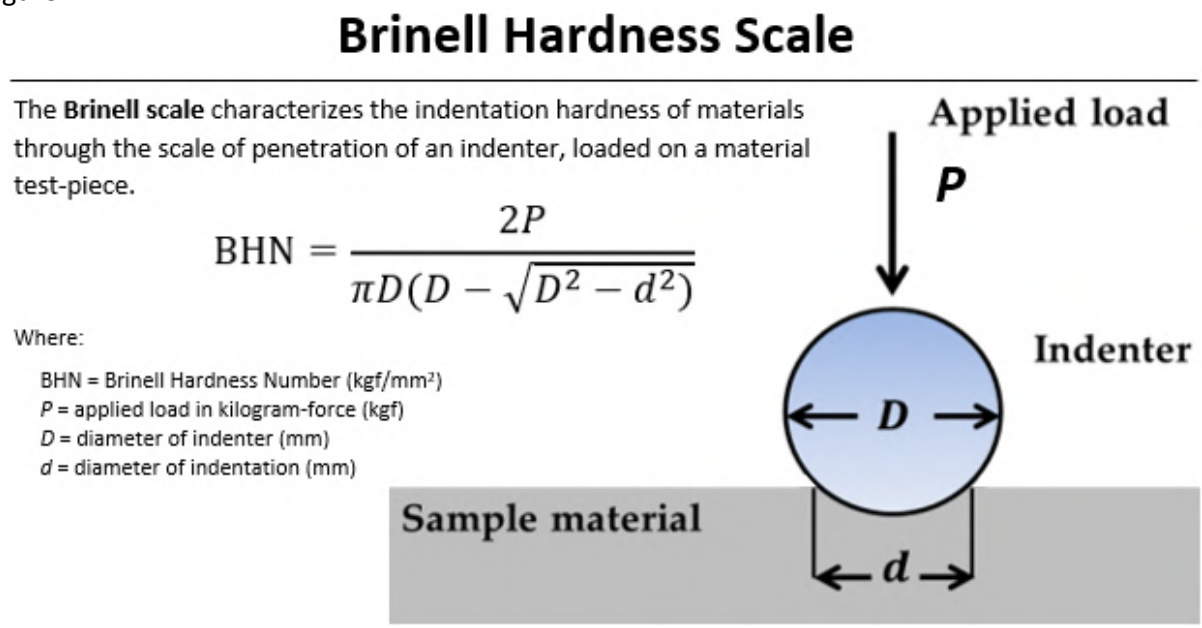

Figure 2. Brinell hardness scale calculation. Credit: *The Samuel Lawrence Foundation*.

In Figure 3, the width of a gouge is shown in relationship to the canister's weight. The expected range of gouge widths is shown in Figure 3. A variety of indenter widths are used as a surrogate for the gouging. The gouging widths range from 2 mm to 16 mm. This is highly significant, since the thickness of the nuclear canisters is 5/8", which is close to 16 mm. We recommend that tests be performed on actual canisters to experimentally determine the accuracy of these predictions.

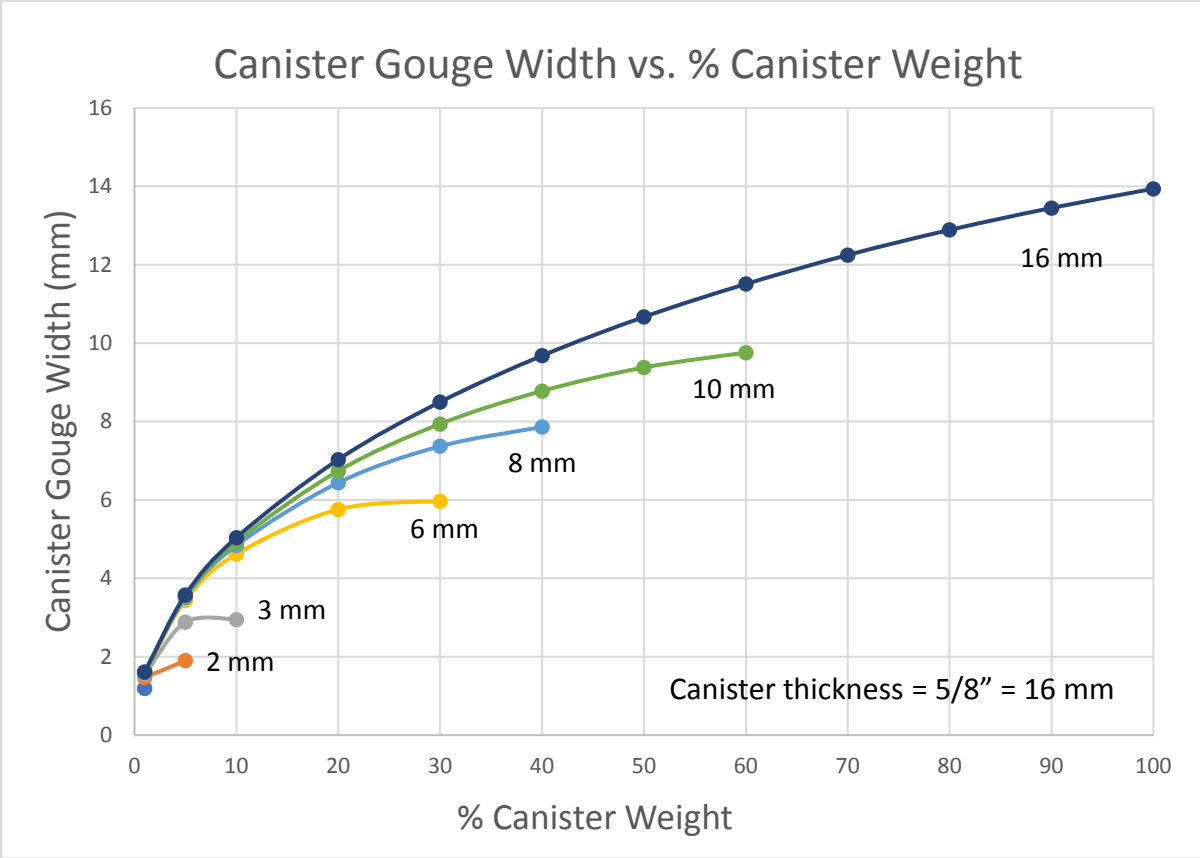

Figure 3. Calculated penetration width of gouge as a function of load for different intender diameter. The hardness number in Brinell scale for stainless steel 316 (BHN) is 217 kgf/mm^2. Saturated zone is eliminated.

The expected range of gouge depths is shown in Figure 4. A variety of indenter depths are used as a surrogate for the gouging. The gouging depths expected to be found range from 1 mm to 4.5 mm. This is highly significant, since 4.5 mm is 28% of the thickness of the nuclear storage canister.

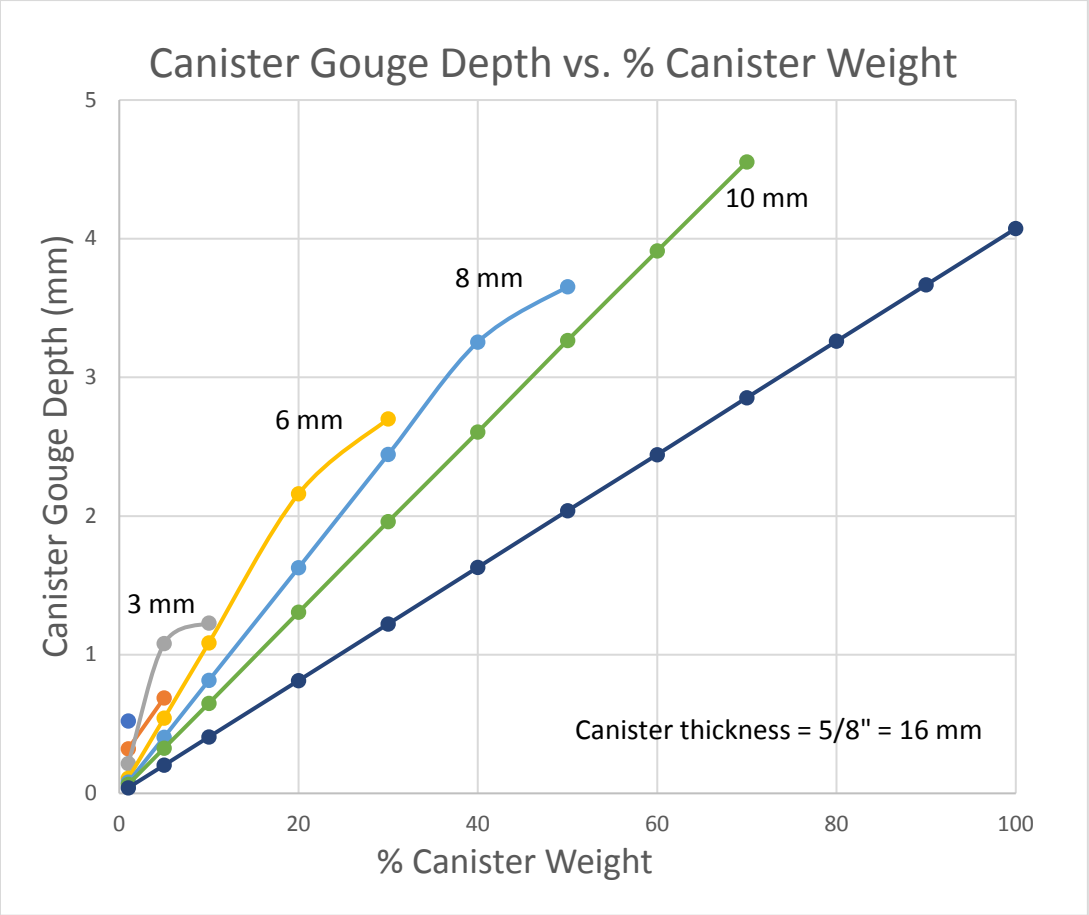

Figure 4. Calculated penetration depth of gouge as a function of load for different intender diameter. The hardness number in Brinell scale for stainless steel 316 (BHN) is 217 kgf/mm^2.

2.3 GOUGES DURING ROUTINE LOADING

Extensive gouging will also occur during routine loading of the nuclear storage canister into the storage cavity. By moving the Vertical Cask Transporter, shown in Figure 5, crude adjustments can be made to the alignment of the canister as it is lowered into the storage cavity. The bulky, tank-like machine travels on steel treads, like those found on earth-moving or military equipment. The transporter is not equipped to make the fine adjustments required to insert the nuclear storage canister into the narrow spacing of the storage cavity without banging the canister against the guide ring. This banging gouges the canister and causes the canister to move side-to-side, similar to a pendulum. An Edison official has referred to this process as “jiggling.” This jiggling process continues for 15 to 30 minutes as the canister is lowered to the bottom of the storage cavity. Each “jiggle” causes the type of gouging shown in Figure 3 and

Figure 4. We expect that this routine loading process produces a multitude of gouges that significantly damage the canister walls, rendering them unsuitable for storage of nuclear waste.

Figure 5. Vertical Cask Transporter during downloading and alignment of a canister. Credit: *San Onofre Special Inspection Webinar Presentation (NRC)*.

We strongly recommend that a sampling of the canisters previously lowered into the storage vault be removed and inspected so the extent of gouging can be experimentally determined. We expect the damage will be so severe that the current ISFSI will need to be replaced.

3. POOR MANAGEMENT

During the late 1970s and early 1980s, Rear Admiral Len Hering, USN (ret) served as a Nuclear Weapons Safety Officer, Handling Officer and Surety Officer. Admiral Hering provides the following assessment of management practices at the S.O.N.G.S. ISFSI.

When it comes to the handling and movement of nuclear material, you would expect that only those specifically qualified and trained for such an important task would be deployed to ensure the safe movement of that material. In the Department of Defense (DOD), strict requirements are in place to make sure this very dangerous material is properly handled, transported and stowed.

The DOD and Navy programs were created and built to make certain nuclear material was secure, safely handled and accounted for. Every person who has any contact with nuclear material is required to have a security clearance. A “two-person rule” is in effect at all times. Personnel at all levels perform countless hours of training, obtain certifications of qualification, and complete rigorous inspection and training events to both prove and assure their proficiency in performing the job they are assigned. All of this is all done before anyone is permitted to even gaze upon a real weapon.

Handling gear and all aspects of the evolution are vigilantly maintained, inspected, weight-tested and inspected again. Cranes and dollies or hoist equipment are tested, placed under extreme loading conditions and prepared for specific tasks. Nothing goes untested. Nothing. We leave nothing to chance and we never hypothetically presume. If it isn’t tested and proven, it isn’t done with the actual material in question.

Ashore, and specifically at S.O.N.G.S, I find that virtually none of the protocols that should be expected for the safe handling of this dangerous material are present. I find that personnel and companies are being hired virtually off the street, no specific qualification standards are present or for that matter even required, training is not specific to the risks of the material involved, and there is no fully-qualified and certified team assembled for this highly-critical operation. They have not been required to conduct dry runs to ensure handling teams are proficient and, more importantly, they have never trained specifically to be ready to execute emergency procedures should the unexpected occur. The manuals are not on site, nor are they being followed to step a team through the evolution of moving the nuclear waste. Team leaders have no specific handling qualifications or training. Even the industrial safety inspectors are not specifically nuclear-certified but are general industrial specialists. No manuals are available for procedural review and, by their own admission, the required number of safety officials are often absent during movement of the nuclear storage canisters. In the Navy, if a near-accident such as the one at S.O.N.G.S is uncovered, the Commanding Officer, Weapons Officer -- and anyone else with a significant position on the team -- are relieved. The ship is then ordered to stand-down while a team of experts off-loads its cargo.

The widely reported incident in which a 54-ton, thin-walled container nearly fell 18 feet while it was being lowered into its silo rocked me to the core. What made things worse was narrative in a follow-up report that stated the canister was left suspended for nearly an hour, held up by a mere guide ring installed in the silo, cables slack and operators clueless. There is no doubt that this incident occurred because those on-scene were completely unqualified, unprepared, untrained and incompetent. This very dangerous operation was being performed as if this crew were moving a simple stack of wood around a construction site when, in actuality, the crew was conducting one of the most dangerous operations in the industrial sector. No one was relieved, fired or held accountable. The investigation being conducted is flawed in that those responsible for this deplorable safety environment are the same people who will feed findings to the investigation.

The handling of nuclear waste at San Onofre and other sites across our country should scare every single American. We have a regulatory agency that has failed to make sure the most basic safety precautions are being applied to one of the most dangerous industrial evolutions of our time. The number of waivers being issued where safety is of concern is staggering.

In the DOD, the reason why there were and continue to be no significant accidents with the handling of nuclear material is because there are no waivers and there are no quick wins. Workers are fully qualified, inspected and certified to handle this very dangerous material. In this case, there is no room for error. One mistake is too many. It is my professional opinion that we need to hit the reset button before a disaster of unparalleled portion occurs.

CONCLUSION

The nuclear waste at San Onofre requires a much better storage configuration and must be moved to a technically defensible storage facility to reduce threats. From a security standpoint, the waste should be moved further away from major transportation corridors. The thin-walled nuclear waste storage canisters are at risk of failure due to gouging when downloaded into the seaside storage vault. Once lowered into the storage system, the canisters cannot be thoroughly inspected, monitored or repaired. A near-accident on August 3rd demonstrated that safety protocols are lacking, and that further study is needed to understand the consequences of dropping a fully-loaded 54-ton canister of nuclear waste. The incident revealed that the loading equipment is imprecise and revealed a pattern of mismanagement in canister loading procedure. A complete analysis of canister loading procedure and comprehensive risk assessment must be conducted by an independent party with absolute transparency. If an accident, natural disaster, negligence, or an act of terrorism were to cause a large-scale release of radiation, the health and safety of 8.4 million people within a 50-mile radius would be put at risk. To secure the nuclear waste properly, we recommend a permanent stop to the loading of nuclear storage canisters into the seaside storage vault, placing spent fuel into reliable canisters that can be monitored, inspected and repaired, and moving these canisters to an acceptable storage facility at a significantly higher elevation.

ACKNOWLEDGEMENTS

We thank UCSD Departments of Chemistry and Biochemistry and The Samuel Lawrence Foundation. For more information visit www.samuellawrencefoundation.org/nuclear-energy.

EXHIBIT 7

EXHIBIT 28

ARTICLE XII.
CONTRACTOR'S WARRANTIES

12.1 WARRANTIES.

(a) Contractor warrants to Company that all Equipment shall be (i) new and of good quality; (ii) free from improper workmanship and Defects; (iii) conform to all applicable requirements of all Applicable Laws and all Applicable Permits; and (iv) be fit for Company's use in the nuclear power industry for the intended purpose. If Contractor accepts the Existing Canisters for use, Contractor warrants that the Existing Canisters shall be free from Defects or improper workmanship to the extent caused by or due to Contractor's acts or omissions.

(b) Contractor warrants to Company that the Work will be performed in a good and workmanlike manner, and that the Work will: (i) conform to and be designed, engineered and constructed in accordance with the Drawings, Scope of Work, all Applicable Laws and Applicable Permits and other terms of the Contract Documents; (ii) conform with, and be designed and engineered according to professional standards and skill, expertise and diligence of design professionals regularly involved in decommissioning projects similar to the Project, and comply with the requirements of the relevant Government Authorities, including the NRC; (iii) be suitable for the use as set forth in the Technical Specification; (iv) be compatible with the spent fuel pools for Units 2 and 3, spent fuel, fuel handling building, the existing ISFSI, Jobsite, and the SONGS site conditions; (v) contain the Equipment, supplies and materials described in the Scope of Work, all installed in accord with the applicable Contract Documents; (vi) in the case of Apparatus be designed, engineered, licensed, fabricated and manufactured using appropriate and approved processes, procedures and materials and to comply with and satisfy all the terms of the Certificate of Compliance issued by the NRC to Contractor as modified or amended as contemplated herein; (vii) in the case of Drawings or documents required hereunder, accurately and completely present information required to be included therein or necessary to avoid misunderstandings of the included content; and (viii) at such times as the NRC issues or amends a Certificate of Compliance with respect to an Apparatus or Existing Canisters, as applicable, the Apparatus or such Existing Canister specifically approved by the NRC to perform functions required by regulation as described in such Certificate of Compliance shall perform its required functions set forth in such Certificate.

(c) Contractor warrants to Company that all of the documents prepared by Contractor for submittal to a Government Authority for review and approval shall be prepared in full compliance with Applicable Laws and in form and substance such that Company shall not be

required to modify or revise such documents due to a failure to include any required information, inaccuracies or the use of inappropriate forms or formats.

(d) Contractor warrants to Company that none of the Work, including the Equipment (but not including the Existing Canisters), the Drawings, Final Plans and the design, engineering and other services rendered by Contractor hereunder, nor the use or ownership thereof by Company in accordance with the licenses granted hereunder, infringes, violates or constitutes a misappropriation of any trade secrets, proprietary rights, intellectual property rights, patents, copyrights or trademarks.

(e) Except as expressly stated herein to the contrary, Contractor warrants that it shall remedy, in accordance with Section 12.2, any Defects in the Work due to faulty design, materials or workmanship which appear within a period commencing upon the date of ISFSI Scope Completion and continuing for the applicable period following the ISFSI Scope Completion Date (as such period may be extended in accordance with the terms hereof, the "Warranty Period"), as follows:

(i) with respect to the MPC-37 canisters, twenty five (25) years;

(ii) with respect to Contractor's Work on Existing Canisters used to store non-fuel waste from the spent fuel pools, twenty five (25) years; provided that the Warranty Period with respect to such Work shall commence on the date that the last of the Existing Canisters containing non-fuel waste are loaded on the ISFSI during Post-ISFSI Scope Work and the related Milestone has been completed;

(iii) with respect to the Contractor's Work on Existing Canisters used to store greater than class "C" radioactive waste from reactor vessel segmentation in the Post-ISFSI Scope Work, twenty five (25) years; provided that the Warranty Period with respect to such Work shall commence on the Final Acceptance Date;

(iv) with respect to the HI-STORM UMAX System, ten (10) years;

(v) with respect to any other Work that is required to be completed in order to achieve ISFSI Scope Completion, including Contractor's Work on any newly assembled AHSM-HS modules that are used by Contractor in the performance of the Work, two (2) years; and

(vi) with respect to any other Work that is completed after the ISFSI Scope Completion Date, two (2) years from the Final Acceptance Date.

Contractor shall bear all costs of corrections and repairs during the Warranty Period. The provisions of this Section 12.1 apply to Work performed by Subcontractors as well as Work performed directly by Contractor. The provisions of this Article XII do not apply to corrective work caused by the acts or omissions of Company or any separate contractor of Company. If and in the event Company notifies Contractor of a Defect within the Warranty Period, Contractor, at Contractor's expense, shall perform all Work necessary to remedy the Defect, and the repair or replacement Work performed by Contractor to accomplish that purpose shall be subject to an additional express warranty from the date the repair or replacement is completed which shall continue for a duration equivalent to the original Warranty Period.

(f) Notwithstanding anything to the contrary herein, the warranties set forth in this Section 12.1 shall not apply with respect to any claims to the extent arising from (i) any use of the Work or components thereof by Company that exceeds the requirements or recommendations in Contractor's operation and maintenance manuals; (ii) the failure of any Equipment or Work to be maintained in accordance with Contractor's written instructions; or (iii) the modification of any Equipment or Work without Contractor's written consent.

(g) THE WARRANTIES OF CONTRACTOR SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING AND USAGE OF TRADE). The foregoing sentence is not intended to disclaim any other obligations of Contractor set forth herein.

12.2 REPAIR OF NONCONFORMING WORK.

(a) If any of the Work is found to contain Defects, or Contractor is otherwise in breach of any of the warranties set forth in Section 12.1 within the Warranty Period, Contractor shall at its sole cost and expense and without reimbursement hereunder correct, reperform, repair or replace such Defect or otherwise cure such breach as promptly as practicable upon being given notice thereof. Subject to Section 12.3, Company shall give notice to Contractor within two (2) Business Days of discovery of such Defect. Company shall provide Contractor with reasonable access to the Project in order to perform such corrective Work and the Parties shall schedule such corrections or replacements as necessary so as to minimize disruptions to any on-going activities at SONGS. Contractor shall bear all costs and expenses associated with correcting any Defect or breach of warranty, including necessary disassembly, transportation, reassembly and retesting, as well as reworking, repair or replacement of such Work, disassembly and reassembly of piping, ducts, machinery, Equipment or other Work as necessary to give access to improper, defective or non-conforming Work and correction, removal or repair of any damage to other work or property that arises from the Defect. If Contractor is obligated to repair, replace or renew any Equipment, item or portion of the Work hereunder, Contractor will undertake a technical analysis of the problem and correct the "root cause" unless Contractor can demonstrate to Company's satisfaction that there is not a risk of the reoccurrence of such problem. Contractor's obligations under this Section 12.2 shall not be impaired or otherwise adversely affected by any actual or possible legal obligation or duty of any Subcontractor to Contractor or Company concerning any Defect or breach of warranty.

(b) If (i) Contractor fails to complete or commence with due diligence to complete the correction of any Defect or cure of any breach of warranty as required herein within twenty (20) days after receipt of written request from Company to perform such obligations, or (ii) a Defect cannot be corrected within twenty (20) days and Contractor fails to provide a correction plan within five (5) Business Days after receipt of Company's written request to perform such obligations or thereafter fails to implement the plan with due diligence following Company's approval of the plan, then Company may correct or cause to be corrected such Defect or cure such breach of warranty and Contractor shall be liable for all reasonable costs, charges, and expenses incurred by Company in connection therewith (including reasonable and necessary consultants' fees), and Contractor shall, within fifteen (15) days after request therefore, pay to

Company an amount equal to such reasonable costs, charges, and expenses. Any such request by Company shall be accompanied by proper documentation evidencing such reasonable costs, charges and expenses. Any amounts not paid when due shall accrue interest at the Reference Rate (established as of the first day of the month in which payment is due) from the date due until paid. Company and Contractor agree to treat (and shall cause each of their respective Affiliates to treat) any payment made to Company pursuant to this Section 12.2(b) as an adjustment to the Contract Price unless a final determination (which shall include execution of an Internal Revenue Service Form 870-AD or successor form) provides otherwise.

(c) If, during the Warranty Period, Contractor shall change, repair or replace any major Equipment item or component, Company, in its reasonable discretion and consistent with Applicable Laws or Applicable Permits, may require Contractor to assist Company in conducting any test required by any Applicable Law or Applicable Permit with respect to the affected Equipment; provided, however, in connection with any such test, appropriate allowance with respect to the performance of such Equipment shall be made for the fact that such Equipment may have operated prior thereto. If after running such test, the results indicate Contractor has not fulfilled any of its warranty obligations and there is a degradation in the performance of the Project and such degradation results from the warranty Work performed in accordance with this Article XII, then Contractor shall repair, correct or replace such affected Equipment and assist Company in re-running such test until the results no longer indicate a degradation in the performance of the Project resulting from the warranty Work performed in accordance with this Article XII. If Contractor cannot reasonably correct such degraded warranted performance condition then the Parties shall negotiate an equitable settlement of Company's damages based on the amount and scope of such deficient warranted performance, or if the amount of such deficient warranted performance is considered by Company to be a material breach of the terms of this Agreement, then Company may declare such breach to be a Contractor Event of Default pursuant to Section 15.1.

12.3 REPAIRS AND TESTING BY COMPANY.

During the Warranty Period, in the event of an emergency and if, in the reasonable judgment of Company, the delay that would result from giving notice to Contractor could cause serious loss or damage which could be prevented by immediate action, any action (including correction of Defects) may be taken by Company or a third party chosen by Company. Company shall give notice to Contractor within two (2) Business Days of discovery, and in the case of a Defect, the reasonable cost of correction shall be paid by Contractor. In the event such action is taken by Company, Contractor shall promptly respond within five (5) Business Days after correction efforts are implemented, and shall assist whenever and wherever possible in making the necessary corrections. All such warranties obtained shall be in addition to, and shall not alter the warranties of, Contractor. Upon Company's request, Contractor shall use all reasonable efforts to cause Subcontractors to honor warranties including filing suit to enforce same.

12.4 SUBCONTRACTORS. Contractor shall, for the protection of Contractor and Company, obtain from the Subcontractors such guarantees and warranties with respect to Work performed and Equipment supplied, used and installed hereunder as are reasonably obtainable, which guarantees and warranties shall equal or exceed those set forth in Section 12.1 and shall be made available and assignable to Company to the full extent of the terms thereof upon the expiration of Contractor's warranty hereunder. Company shall be an express third party

beneficiary of all such guarantees and warranties, provided such third party beneficiary rights shall not be effective unless this Agreement has been terminated. If available, Company may require Contractor to secure additional warranty or extended guarantee protection pursuant to a Change Order issued in accordance with the provisions of Article VI. Upon the earlier of the ISFSI Scope Completion Date or termination of this Agreement, Contractor shall deliver to Company copies of all relevant contracts providing for such guarantees and warranties.

12.5 CONDITIONS OF WARRANTIES. The warranties set forth in this Article XII are subject to the following conditions applicable to the item for which Company claims a breach of warranty exists:

(a) Company shall notify Contractor in writing of any Defect in the Work as soon as reasonably practicable after Company becomes aware of such Defect.

(b) Company shall have the right to continue to use the Equipment, including the Apparatus, as applicable, or any part thereof, which may require warranty correction or repair until such time as Company elects to remove such Equipment, or part thereof, as applicable, from service; provided, however, in such event, Company shall release Contractor from any additional claims for further defects or damage incurred as a result of such continued operation.

(c) Company shall use and maintain the Equipment, including the Apparatus, in accordance with the operation and maintenance procedures agreed upon by the Parties pursuant to this Agreement (these procedures shall be written by Contractor as part of Contractor's Work so as to integrate (where applicable) or replace and supersede (where not applicable) the operations and maintenance procedures required by the original manufacturer for the Existing Equipment and Existing Canisters such that Contractor may not assert that Company's failure to comply with any separate requirements from the existing manufacturer limits the warranty provided herein by Contractor).

(d) Completion of payments by Company shall not relieve Contractor of any of its warranty obligations.

12.6 ASSIGNMENT OF WARRANTIES. Contractor shall assign to Company or obtain for Company's benefit the manufacturer's warranties for all of the Equipment, including the Apparatus and other deliverables, which are provided in connection with the Work, but which are not manufactured by Contractor, including for Work performed under Section 12.3. Such assignment of warranties to Company must also allow Company to further assign such warranties.

12.7 SURVIVAL OF WARRANTIES. The provisions of this Article XII shall survive the expiration or termination of this Agreement.

EXHIBIT 8

NRC FORM 651
(10-2004)
10 CFR 72

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS

The U.S. Nuclear Regulatory Commission is issuing this Certificate of Compliance pursuant to Title 10 of the Code of Federal Regulations, Part 72, "Licensing Requirements for Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste" (10 CFR Part 72). This certificate is issued in accordance with 10 CFR 72.238, certifying that the storage design and contents described below meet the applicable safety standards set forth in 10 CFR Part 72, Subpart L, and on the basis of the Final Safety Analysis Report (FSAR) of the cask design. This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Certificate No.	Effective Date	Expiration Date	Docket No.	Amendment No.	Amendment Effective Date	Package Identification No.
1040	TBD	TBD	72-1040	0		USA/72-1040

Issued To: (Name/Address)

Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

Safety Analysis Report Title

Holtec International
Final Safety Analysis Report for the
HI-STORM UMAX Canister Storage System

This certificate is conditioned upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features), and the conditions specified below:

APPROVED SPENT FUEL STORAGE CASK

Model No.: HI-STORM UMAX Canister Storage System

DESCRIPTION:

The HI-STORM UMAX Canister Storage System consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) underground Vertical Ventilated Modules (VVMs), which contains the MPCs during storage; and (3) a transfer cask (HI-TRAC VW), which contains the MPC during loading, unloading and transfer operations. The MPC stores up to 37 pressurized water reactor fuel assemblies or up to 89 boiling water reactor fuel assemblies.

The HI-STORM UMAX Canister Storage System is certified as described in the" UMAX" Final Safety Analysis Report (FSAR) supplemented by the information on the MPCs and transfer cask in the HI-STORM FW FSAR, and in the U. S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance (CoC).

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel. The honeycombed basket provides criticality control.

DESCRIPTION (continued)

There are two types of MPCs permitted for storage in HI-STORM UMAX VVM: the MPC-37 and MPC-89. The number suffix indicates the maximum number of fuel assemblies permitted to be loaded in the MPC. Both MPC models have the same external diameter.

The HI-TRAC VW transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the cask loading area to the VVM. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a neutron shield jacket attached to the exterior and a retractable bottom lid used during transfer operations.

The HI-STORM UMAX VVM utilizes a storage design identified as an air-cooled vault or caisson. The HI-STORM UMAX VVM relies on vertical ventilation instead of conduction through the fill material around the VVM, as it is essentially a below-grade storage cavity. Air inlets and an air outlet allow air to circulate naturally through the cavity to cool the MPC inside. The subterranean steel structure is seal welded to prevent ingress of any groundwater in the MPC storage cavity from the surrounding subgrade, and it is mounted on a stiff foundation. The surrounding subgrade and a top surface pad provide significant radiation shielding. A loaded MPC is stored within the HI-STORM UMAX VVM in a vertical orientation.

CONDITIONS

1. OPERATING PROCEDURES

Written operating procedures shall be prepared for handling, loading, movement, surveillance, and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 9 of the FSAR.

2. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

Written acceptance tests and a maintenance program shall be prepared consistent with the technical basis described in Chapter 10 of the FSAR. At completion of welding the MPC shell to baseplate, an MPC confinement weld helium leak test shall be performed using a helium mass spectrometer. This test shall include the base metals of the MPC shell and baseplate. A helium leakage test shall also be performed on the base metal of the fabricated MPC lid. The confinement boundary welds leakage rate test shall be performed in accordance with ANSI N14.5 to "leaktight" criterion. If a leakage rate exceeding the acceptance criteria is detected, then the area of leakage shall be determined and the area repaired per ASME Code Section III, Subsection NB, Article NB-4450 requirements. Re-testing shall be performed until the leakage rate acceptance criterion is met.

3. QUALITY ASSURANCE

Activities in the areas of design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems and components, and decommissioning that are important-to-safety shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 72, Subpart G, and which is established, maintained, and executed with regard to the storage system

4. HEAVY LOADS REQUIREMENTS

Each lift of an MPC or a HI-TRAC VW transfer cask must be made in accordance to the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant-specific review of the heavy load handling procedures (under 10 CFR 50.59 or 10 CFR 72.48, as applicable) is required to show operational compliance with existing plant specific heavy loads requirements. Lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Section 5.2 of Appendix A.

5. APPROVED CONTENTS

Contents of the HI-STORM UMAX Canister Storage System must meet the fuel specifications given in Appendix B to this certificate.

6. DESIGN FEATURES

Features or characteristics for the site or system must be in accordance with Appendix B to this certificate.

7. CHANGES TO THE CERTIFICATE OF COMPLIANCE

The holder of this certificate who desires to make changes to the certificate, which includes Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features), shall submit an application for amendment of the certificate.

8. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE

A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM UMAX Canister Storage System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:

a. Moving the MPC and the transfer cask into the spent fuel pool or cask loading pool.

b. Preparation of the HI-STORM UMAX Canister Storage System for fuel loading.

c. Selection and verification of specific fuel assemblies to ensure type conformance.

d. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.

e. Remote installation of the MPC lid and removal of the MPC and transfer cask from the spent fuel pool or cask loading pool.

f. MPC welding, NDE inspections, pressure testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), and helium backfilling. (A mockup may be used for this dry-run exercise.)

g. Transfer of the MPC from the transfer cask to the VVM.

h. HI-STORM UMAX Canister Storage System unloading, including flooding MPC cavity and removing MPC lid welds. (A mockup may be used for this dry-run exercise.)

Any of the above steps can be omitted if the site has already successfully loaded a Holtec MPC System.

9. AUTHORIZATION

The HI-STORM UMAX Canister Storage System, which is authorized by this certificate, is hereby approved for general use by holders of 10 CFR Part 50 licenses for nuclear reactors at reactor sites under the general license issued pursuant to 10 CFR 72.210, subject to the conditions specified by 10 CFR 72.212, this certificate, and the attached Appendices A and B. The HI-STORM UMAX Canister Storage System may be fabricated and used in accordance with any approved amendment to CoC No. 1040 listed in 10 CFR 72.214. Each of the licensed HI-STORM UMAX Canister Storage System components (i.e., the MPC, overpack, and transfer cask), if fabricated in accordance with any of the approved CoC Amendments, may be used with one another provided an assessment is performed by the CoC holder that demonstrates design compatibility.

FOR THE U. S. NUCLEAR REGULATORY COMMISSION

DRAFT

Michele M. Sampson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards
Washington, DC 20555

Dated TBD

Attachments:
1. Appendix A
2. Appendix B

CERTIFICATE OF COMPLIANCE NO. 1040

APPENDIX A

TECHNICAL SPECIFICATIONS

FOR THE HI-STORM UMAX CANISTER STORAGE SYSTEM

TABLE OF CONTENTS

1.0 USE AND APPLICATION

----------NOTE----------
The defined terms of this section appear in capitalized type and are applicable throughout these Technical Specifications and Bases.

1.1 Definitions

Term	Definition
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
AMBIENT TEMPERATURE	AMBIENT TEMPERATURE for Short Term Operations (operations involving use of the HI-TRAC, a Lifting device, and/or an on-site transport device) is defined as the 24 hour average of the local temperature as forecast by the National Weather Service.
DAMAGED FUEL ASSEMBLY	DAMAGED FUEL ASSEMBLIES are fuel assemblies with known or suspected cladding defects, as determined by a review of records, greater than pinhole leaks or hairline cracks, empty fuel rod locations that are not filled with dummy fuel rods, missing structural components such as grid spacers, whose structural integrity has been impaired such that geometric rearrangement of fuel or gross failure of the cladding is expected based on engineering evaluations, or that cannot be handled by normal means. Fuel assemblies that cannot be handled by normal means due to fuel cladding damage are considered FUEL DEBRIS.
DAMAGED FUEL CONTAINER (DFC)	DFCs are specially designed enclosures for DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS which permit gaseous and liquid media to escape while minimizing dispersal of gross particulates. DFCs authorized for use in the HI-STORM UMAX System are as follows: 1. Holtec Generic BWR design 2. Holtec Generic PWR design

1.1 Definitions

Term	Definition
FUEL DEBRIS	FUEL DEBRIS is ruptured fuel rods, severed rods, loose fuel pellets, containers or structures that are supporting these loose fuel assembly parts, or fuel assemblies with known or suspected defects which cannot be handled by normal means due to fuel cladding damage.
FUEL BUILDING	The FUEL BUILDING is the site-specific power plant facility, governed by the regulations of 10 CFR Part 50, where the loaded OVERPACK or TRANSFER CASK is transferred to or from the transporter.
GROSSLY BREACHED SPENT FUEL ROD	Spent nuclear fuel rod with a cladding defect that could lead to the release of fuel particulate greater than the average size fuel fragment for that particular assembly. A gross cladding breach may be confirmed by visual examination, through a review of reactor operating records indicating the presence of heavy metal isotopes, or other acceptable inspection means.
LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on a TRANSFER CASK while it is being loaded with fuel assemblies. LOADING OPERATIONS begin when the first fuel assembly is placed in the MPC and end when the TRANSFER CASK is suspended from or secured on the transporter. LOADING OPERATIONS does not include MPC TRANSFER.
MULTI-PURPOSE CANISTER (MPC)	MPCs are the sealed spent nuclear fuel canisters which consist of a honeycombed fuel basket contained in a cylindrical canister shell which is welded to a baseplate, lid with welded port cover plates, and closure ring. The MPC provides the confinement boundary for the contained radioactive materials.
MPC TRANSFER	MPC TRANSFER begins when the MPC is lifted off the TRANSFER CASK bottom lid and ends when the MPC is supported from beneath by the OVERPACK (or the reverse).
NON-FUEL HARDWARE	NON-FUEL HARDWARE is defined as Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Devices (TPDs), Control Rod Assemblies (CRAs), Axial Power Shaping Rods (APSRs), Wet Annular

1.1 Definitions

Term	Definition
	Burnable Absorbers (WABAs), Rod Cluster Control Assemblies (RCCAs), Control Element Assemblies (CEAs), Neutron Source Assemblies (NSAs), water displacement guide tube plugs, orifice rod assemblies, instrument tube tie rods (ITTRs), vibration suppressor inserts, and components of these devices such as individual rods.
OVERPACK	For the HI-STORM UMAX, the term OVERPACK is synonyms with the term VVM defined below.
PLANAR-AVERAGE INITIAL ENRICHMENT	PLANAR AVERAGE INITIAL ENRICHMENT is the average of the distributed fuel rod initial enrichments within a given axial plane of the assembly lattice.
REPAIRED/RECONSITUTED FUEL ASSEMBLY	Spent nuclear fuel assembly which contains dummy fuel rods that displaces an amount of water greater than or equal to the original fuel rods and/or which contains structural repairs so it can be handled by normal means.
SPENT FUEL STORAGE CASKS (SFSCs)	SFSCs are containers approved for the storage of spent fuel assemblies at the ISFSI. The HI-STORM UMAX SFSC System consists of the OVERPACK and its integral MPC.
STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI while an SFSC containing spent fuel is situated within the ISFSI perimeter. STORAGE OPERATIONS does not include MPC TRANSFER.
TRANSFER CASK	TRANSFER CASKs are containers designed to contain the MPC during and after loading of spent fuel assemblies, and prior to and during unloading and to transfer the MPC to or from the OVERPACK.
TRANSPORT OPERATIONS	TRANSPORT OPERATIONS include all licensed activities performed on a TRANSFER CASK loaded with one or more fuel assemblies when it is being moved after LOADING OPERATIONS or before UNLOADING OPERATIONS. TRANSPORT OPERATIONS begin when the TRANSFER CASK is first suspended from or secured on the transporter and end when the TRANSFER CASK is at its destination and no longer secured on or suspended from the transporter. TRANSPORT OPERATIONS includes

1.1 Definitions

Term	Definition
	MPC TRANSFER.
VERTICAL VENTILATED MODULE (VVM)	The VVM is a subterranean type overpack which receives and contains the sealed MPC for interim storage at the ISFSI. The VVM supports the MPC in a vertical orientation and provide gamma and neutron shielding and also provides air flow through cooling passages to promote heat transfer from the MPC to the environs.
UNDAMAGED FUEL ASSEMBLY	UNDAMAGED FUEL ASSEMBLIES are: a) fuel assemblies without known or suspected cladding defects greater than pinhole leaks or hairline cracks and which can be handled by normal means; or b) a BWR fuel assembly with an intact channel, a maximum planar average initial of 3.3 wt% U-235, without known or suspected GROSSLY BREACHED SPENT FUEL RODS, and which can be handled by normal means. An UNDAMAGED FUEL ASSEMBLY may be a REPAIRED/RECONSTITUTED FUEL ASSEMBLY.
UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on an SFSC to be unloaded of the contained fuel assemblies. UNLOADING OPERATIONS begin when the TRANSFER CASK is no longer suspended from or secured on the transporter and end when the last fuel assembly is removed from the SFSC. UNLOADING OPERATIONS does not include MPC TRANSFER.
ZR	ZR means any zirconium-based fuel cladding or fuel channel material authorized for use in a commercial nuclear power plant reactor.

PURPOSE	The purpose of this section is to explain the meaning of logical connectors. Logical connectors are used in Technical Specifications (TS) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TS are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.
BACKGROUND	Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors. When logical connectors are used to state a Condition, Completion Time, Surveillance, or Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance, or Frequency.

1.0 USE AND APPLICATION

1.2 Logical Connectors

EXAMPLES The following examples illustrate the use of logical connectors.

EXAMPLE 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 VERIFY . . . AND A.2 Restore . . .	

In this example the logical connector AND is used to indicate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

(continued)

1.2 Logical Connectors

EXAMPLES (continued)

EXAMPLE 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Stop . . . OR A.2.1 Verify . . . AND A.2.2.1 Reduce . . . OR A.2.2.2 Perform . . . OR A.3 Remove . . .	

This example represents a more complicated use of logical connectors. Required Actions A.1, A.2, and A.3 are alternative choices, only one of which must be performed as indicated by the use of the logical connector OR and the left justified placement. Any one of these three ACTIONS may be chosen. If A.2 is chosen, then both A.2.1 and A.2.2 must be performed as indicated by the logical connector AND. Required Action A.2.2 is met by performing A.2.2.1 or A.2.2.2. The indented position of the logical connector OR indicates that A.2.2.1 and A.2.2.2 are alternative choices, only one of which must be performed.

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.
BACKGROUND	Limiting Conditions for Operation (LCOs) specify the lowest functional capability or performance levels of equipment required for safe operation of the facility. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Times(s).
DESCRIPTION	The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the HI-STORM UMAX System is in a specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the HI-STORM UMAX System is not within the LCO Applicability. Once a Condition has been entered, subsequent subsystems, components, or variables expressed in the Condition, discovered to be not within limits, will not result in separate entry into the Condition unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

(continued)

1.3 Completion Times (continued)

EXAMPLES

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Perform Action B.1 AND B.2 Perform Action B.2	12 hours 36 hours

Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to complete action B.1 within 12 hours AND complete action B.2 within 36 hours. A total of 12 hours is allowed for completing action B.1 and a total of 36 hours (not 48 hours) is allowed for completing action B.2 from the time that Condition B was entered. If action B.1 is completed within 6 hours, the time allowed for completing action B.2 is the next 30 hours because the total time allowed for completing action B.2 is 36 hours.

(continued)

1.3 Completion Times (continued)

EXAMPLES (continued)

EXAMPLE 1.3-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One system not within limit.	A.1 Restore system to within limit.	7 days
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1. AND B.2 Complete action B.2.	12 hours 36 hours

When a system is determined not to meet the LCO, Condition A is entered. If the system is not restored within 7 days, Condition B is also entered and the Completion Time clocks for Required Actions B.1 and B.2 start. If the system is restored after Condition B is entered, Conditions A and B are exited, and therefore, the Required Actions of Condition B may be terminated.

(continued)

1.3 Completion Times (continued)

EXAMPLES (continued)

EXAMPLE 1.3-3

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each component.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Restore compliance with LCO.	4 hours
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1. AND B.2 Complete action B.2.	6 hours 12 hours

The Note above the ACTIONS table is a method of modifying how the Completion Time is tracked. If this method of modifying how the Completion Time is tracked was applicable only to a specific Condition, the Note would appear in that Condition rather than at the top of the ACTIONS Table.

The Note allows Condition A to be entered separately for each component, and Completion Times tracked on a per component basis. When a component is determined to not meet the LCO, Condition A is entered and its Completion Time starts. If subsequent components are determined to not meet the LCO, Condition A is entered for each component and separate Completion Times start and are tracked for each component.

(continued)

1.3 Completion Times (continued)

IMMEDIATE COMPLETION TIME	When "Immediately" is used as a Completion Time, the Required Action should be pursued without delay and in a controlled manner.

1.0 USE AND APPLICATION

1.4 Frequency

PURPOSE	The purpose of this section is to define the proper use and application of Frequency requirements.
DESCRIPTION	Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Limiting Condition for Operation (LCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the SR. The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Surveillance Requirement (SR) Applicability. The "specified Frequency" consists of the requirements of the Frequency column of each SR. Situations where a Surveillance could be required (i.e., its Frequency could expire), but where it is not possible or not desired that it be performed until sometime after the associated LCO is within its Applicability, represent potential SR 3.0.4 conflicts. To avoid these conflicts, the SR (i.e., the Surveillance or the Frequency) is stated such that it is only "required" when it can be and should be performed. With an SR satisfied, SR 3.0.4 imposes no restriction.

(continued)

1.4 Frequency (continued)

EXAMPLES

The following examples illustrate the various ways that Frequencies are specified.

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify pressure within limit	12 hours

Example 1.4-1 contains the type of SR most often encountered in the Technical Specifications (TS). The Frequency specifies an interval (12 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 12 hours, an extension of the time interval to 1.25 times the interval specified in the Frequency is allowed by SR 3.0.2 for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1 (such as when the equipment or variables are outside specified limits, or the facility is outside the Applicability of the LCO). If the interval specified by SR 3.0.2 is exceeded while the facility is in a condition specified in the Applicability of the LCO, the LCO is not met in accordance with SR 3.0.1.

If the interval as specified by SR 3.0.2 is exceeded while the facility is not in a condition specified in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2 prior to entry into the specified condition. Failure to do so would result in a violation of SR 3.0.4

(continued)

1.4 Frequency (continued)

EXAMPLES (continued)

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify flow is within limits.	Once within 12 hours prior to starting activity AND 24 hours thereafter

Example 1.4-2 has two Frequencies. The first is a one time performance Frequency, and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicates that both Frequency requirements must be met. Each time the example activity is to be performed, the Surveillance must be performed within 12 hours prior to starting the activity.

The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2.

"Thereafter" indicates future performances must be established per SR 3.0.2, but only after a specified condition is first met (i.e., the "once" performance in this example). If the specified activity is canceled or not performed, the measurement of both intervals stops. New intervals start upon preparing to restart the specified activity.

2.0

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3.0 LIMITING CONDITIONS FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1	LCOs shall be met during specified conditions in the Applicability, except as provided in LCO 3.0.2.
LCO 3.0.2	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.
LCO 3.0.3	Not applicable.
LCO 3.0.4	When an LCO is not met, entry into a specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS or that are related to the unloading of an SFSC.
LCO 3.0.5	Equipment removed from service or not in service in compliance with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate it meets the LCO or that other equipment meets the LCO. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during the specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on equipment or variables outside specified limits.
SR 3.0.2	The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met. For Frequencies specified as “once,” the above interval extension does not apply. If a Completion Time requires periodic performance on a “once per...” basis, the above Frequency extension applies to each performance after the initial performance. Exceptions to this Specification are stated in the individual Specifications.
SR 3.0.3	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is less. This delay period is permitted to allow performance of the Surveillance. If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

(continued)

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.3 (continued)	When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.
SR 3.0.4	Entry into a specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into specified conditions in the Applicability that are required to comply with Actions or that are related to the unloading of an SFSC.

3.1 SFSC INTEGRITY

3.1.1 Multi-Purpose Canister (MPC)

LCO 3.1.1 The MPC shall be dry and helium filled.

Table 3-1 provides decay heat and burnup limits for forced helium dehydration (FHD) and vacuum drying.

APPLICABILITY: Prior to TRANSPORT OPERATIONS

ACTIONS

----------NOTES----------
Separate Condition entry is allowed for each MPC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MPC cavity vacuum drying pressure or demoisturizer exit gas temperature limit not met.	A.1 Perform an engineering evaluation to determine the quantity of moisture left in the MPC. AND	7 days
	A.2 Develop and initiate corrective actions necessary to return the MPC to compliance with Table 3-1.	30 days

ACTIONS (continued)

B.	MPC helium backfill limit not met.	B.1 Perform an engineering evaluation to determine the impact of helium differential. AND B.2.1 Develop and initiate corrective actions necessary to return the MPC to an analyzed condition by adding helium to or removing helium from the MPC. OR B.2.2 Develop and initiate corrective actions necessary to demonstrate through analysis, using the models and methods from the HI-STORM UMAX FSAR, that all limits for MPC components and contents will be met.	72 hours 14 days
C.	MPC helium leak rate limit for vent and drain port cover plate welds not met.	C.1 Perform an engineering evaluation to determine the impact of increased helium leak rate on heat removal capability and offsite dose. AND C.2 Develop and initiate corrective actions necessary to return the MPC to compliance with SR 3.1.1.3.	24 hours 7 days

D.	Required Actions and associated Completion Times not met.	D.1	Remove all fuel assemblies from the SFSC.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify that the MPC cavity has been dried in accordance with the applicable limits in Table 3-1.	Once, prior to TRANSPORT OPERATIONS
SR 3.1.1.2	Verify MPC helium backfill quantity is within the limit specified in Table 3-2 for the applicable MPC model. Re-performance of this surveillance is not required upon successful completion of Action B.2.2.	Once, prior to TRANSPORT OPERATIONS
SR 3.1.1.3	Verify that the helium leak rate through the MPC vent and drain port cover plates (confinement welds and the base metal)meets the leaktight criteria of ANSI N14.5-1997.	Once, prior to TRANSPORT OPERATIONS

3.1 SFSC INTEGRITY

3.1.2 SFSC Heat Removal System

LCO 3.1.2 The SFSC Heat Removal System shall be operable

---NOTE---
The SFSC Heat Removal System is operable when 50% or more of the inlet vent duct areas are unblocked and available for flow or when air temperature requirements are met.

APPLICABILITY: During STORAGE OPERATIONS.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each SFSC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SFSC Heat Removal System operable, but partially (<50%) blocked.	A.1 Remove blockage.	N/A
B. SFSC Heat Removal System inoperable.	B.1 Restore SFSC Heat Removal System to operable status.	8 hours
C. Required Action B.1 and associated Completion Time not met.	C.1 Measure SFSC dose rates in accordance with the Radiation Protection Program. AND	Immediately and once per 12 hours thereafter
	C.2.1 Restore SFSC Heat Removal System to operable status. OR	24 hours
	C.2.2 Transfer the MPC into a TRANSFER CASK.	24 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.2	Verify all VVM inlets and outlets duct screen are free of blockage from solid debris or floodwater.	24 hours
	OR	
	For VVMs with installed temperature monitoring equipment, verify that the difference between the average VVM air outlet duct temperature and ISFSI ambient temperature is ≤ 80°F for VVMs containing MPC-37s and ≤ 85°F for VVMs containing MPC-89s.	24 hours

3.1 SFSC INTEGRITY

3.1.3 MPC Cavity Reflooding

LCO 3.1.3 The MPC cavity pressure shall be < 100 psig

----------NOTE----------
The LCO is only applicable to wet UNLOADING OPERATIONS.

APPLICABILITY: UNLOADING OPERATIONS prior to and during re-flooding.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each MPC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MPC cavity pressure not within limit.	A.1 Stop re-flooding operations until MPC cavity pressure is within limit. AND A.2 Ensure MPC vent port is not closed or blocked.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Ensure via analysis or direct measurement that MPC cavity pressure is within limit.	Once, prior to MPC re-flooding operations. OR Once every 1 hour thereafter when using direct measurement.

3.2 SFSC RADIATION PROTECTION.

3.2.1 TRANSFER CASK Surface Contamination.

LCO 3.2.1 Removable contamination on the exterior surfaces of the TRANSFER CASK and accessible portions of the MPC shall each not exceed:

a. 1000 dpm/100 cm^2 from beta and gamma sources

b. 20 dpm/100 cm^2 from alpha sources.

APPLICABILITY: During TRANSPORT OPERATIONS.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each TRANSFER CASK.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. TRANSFER CASK or MPC removable surface contamination limits not met.	A.1 Restore removable surface contamination to within limits.	7 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify that the removable contamination on the exterior surfaces of the TRANSFER CASK and accessible portions of the MPC containing fuel is within limits.	Once, prior to TRANSPORT OPERATIONS

3.3 SFSC CRITICALITY CONTROL

3.3.1 Boron Concentration

LCO 3.3.1 The concentration of boron in the water in the MPC shall meet the following limits for the applicable MPC model and the most limiting fuel assembly array/class to be stored in the MPC:

MPC-37: Minimum soluble boron concentration as required by the table below†.

Array/Class	All Undamaged Fuel Assemblies		One or more Damaged Fuel Assemblies or Fuel Debris	
	Maximum Initial Enrichment ≤ 4.0 wt% ^{235}U (ppmb)	Maximum Initial Enrichment 5.0 wt% ^{235}U (ppmb)	Maximum Initial Enrichment ≤ 4.0 wt% ^{235}U (ppmb)	Maximum Initial Enrichment 5.0 wt% ^{235}U (ppmb)
All 14x14 and 16x16A	1000	1500	1300	1800
All 15x15 and 17x17	1500	2000	1800	2300

† For maximum initial enrichments between 4.0 wt% and 5.0 wt% ^{235}U, the minimum soluble boron concentration may be determined by linear interpolation between the minimum soluble boron concentrations at 4.0 wt% and 5.0 wt%.

APPLICABILITY: During PWR fuel LOADING OPERATIONS with fuel and water in the MPC

AND

During PWR fuel UNLOADING OPERATIONS with fuel and water in the MPC.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each MPC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Boron concentration not within limit.	A.1 Suspend LOADING OPERATIONS or UNLOADING OPERATIONS. AND A.2 Suspend positive reactivity additions. AND A.3 Initiate action to restore boron concentration to within limit.	Immediately Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- This surveillance is only required to be performed if the MPC is submerged in water or if water is to be added to, or recirculated through the MPC. ----------	Once, within 4 hours prior to entering the Applicability of this LCO.
SR 3.3.1.1 Verify boron concentration is within the applicable limit using two independent measurements.	AND Once per 48 hours thereafter.

Table 3-1
MPC Cavity Drying Limits

Fuel Burnup (MWD/MTU)	MPC Type (Note 5)	Cell Heat Load Limits (Note 6)	Method of Moisture Removal (Notes 1 and 2)
All Assemblies ≤ 45,000	MPC-37 (Short Fuel)	Figure 2.3-1, 2.3-2, or 2.3-3 of Appendix B	VDS (Notes 3 and 4) or FHD (Note 4)
	MPC-37 (Standard Fuel)	Figure 2.3-1, 2.3-2, or 2.3-4 of Appendix B	
	MPC-37 (Long Fuel)	Figure 2.3-5, 2.3-6, or 2.3-7 of Appendix B	
	MPC-89	Figure 2.3-10 of Appendix B	
One or more assemblies > 45,000	MPC-37 (Short, Standard and Long Fuel)	Figure 2.3-12 of Appendix B	VDS (Notes 3 and 4) or FHD (Note 4)
	MPC-89	Figure 2.3-13 of Appendix B	
One or more assemblies > 45,000	MPC-37 (Short Fuel)	Figure 2.3-1, 2.3-2, or 2.3-3 of Appendix B	FHD (Note 4)
	MPC-37 (Standard Fuel)	Figure 2.3-1, 2.3-2, or 2.3-4 of Appendix B	
	MPC-37 (Long Fuel)	Figure 2.3-5, 2.3-6, or 2.3-7 of Appendix B	
	MPC-89	Figure 2.3-10 of Appendix B	

Notes:

1. VDS means a vacuum drying system. The acceptance criterion when using a VDS is the MPC cavity pressure shall be ≤ 3 torr for ≥ 30 minutes while the MPC is isolated from the vacuum pump.

2. FHD means a forced helium dehydration system. The acceptance criterion when using an FHD system is the gas temperature exiting the demoisturizer shall be ≤ 21°F for ≥ 30 minutes or the gas dew point exiting the MPC shall be ≤ 22.9°F for ≥ 30 minutes.

3. Vacuum drying of the MPC must be performed with the annular gap between the MPC and the TRANSFER CASK filled with water.

4. Heat load limits are set for each cell; see Appendix B Section 2.3.

5. The fuel assembly lengths loaded in MPC-37 are catalogued as short, standard and long fuel based on the active fuel lengths specified in Appendix B Table 2.1-4.

6. For additional aggregate heat load limits for storage, see Appendix B Table 2.3-1

Table 3-2 MPC Helium Backfill Limits [1]

MPC Type	Helium Backfill Pressure Option	Helium Backfill Pressure Range (psig)
MPC-37	1	≥ 41.0 and ≤ 44.2
	2	≥ 41.0 and ≤ 44.5
	3	≥ 39.0 and ≤ 46.0
MPC-89	1	≥ 42.0 and ≤ 45.2
	2	≥ 39.0 and ≤ 46.0

Note: For Permissible Aggregate Heat Load Limit for each helium backfill pressure option see Appendix B, Table 2.3-1.

1 Helium used for backfill of MPC shall have a purity of ≥ 99.995%. Pressure range is at a reference temperature of 70°F

4.0

4.0

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5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS

The following programs shall be established, implemented and maintained.

5.1 Radioactive Effluent Control Program

This program implements the requirements of 10 CFR 72.44(d).

a. The HI-STORM UMAX Canister Storage System does not create any radioactive materials or have any radioactive waste treatment systems. Therefore, specific operating procedures for the control of radioactive effluents are not required. Specification 3.1.1, Multi-Purpose Canister (MPC), provides assurance that there are not radioactive effluents from the SFSC.

b. This program includes an environmental monitoring program. Each general license user may incorporate SFSC operations into their environmental monitoring programs for 10 CFR Part 50 operations.

c. An annual report shall be submitted pursuant to 10 CFR 72.44(d)(3).

(continued)

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.2 Transport Evaluation Program

a. For lifting of the loaded MPC or TRANSFER CASK using equipment which is integral to a structure governed by 10 CFR Part 50 regulations, 10 CFR 50 requirements apply.

b. This program is not applicable when the TRANSFER CASK is in the FUEL BUILDING or is being handled by equipment providing support from underneath (i.e., on a rail car, heavy haul trailer, air pads, etc...).

c. The TRANSFER CASK when loaded with spent fuel, may be lifted to and carried at any height necessary during TRANSPORT OPERATIONS and MPC TRANSFER, provided the lifting equipment is designed in accordance with items 1, 2, and 3 below.

    1. The metal body and any vertical columns of the lifting equipment shall be designed to comply with stress limits of ASME Section III, Subsection NF, Class 3 for linear structures. All vertical compression loaded primary members shall satisfy the buckling criteria of ASME Section III, Subsection NF.

    2. The horizontal cross beam and any lifting attachments used to connect the load to the lifting equipment shall be designed, fabricated, operated, tested, inspected, and maintained in accordance with applicable sections and guidance of NUREG-0612, Section 5.1. This includes applicable stress limits from ANSI N14.6.

    3. The lifting equipment shall have redundant drop protection features which prevent uncontrolled lowering of the load.

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.3 Radiation Protection Program

5.3.1 Each cask user shall ensure that the Part 50 radiation protection program appropriately addresses dry storage cask loading and unloading, as well as ISFSI operations, including transport of the loaded TRANSFER CASK outside of facilities governed by 10 CFR Part 50. The radiation protection program shall include appropriate controls for direct radiation and contamination, ensuring compliance with applicable regulations, and implementing actions to maintain personnel occupational exposures As Low As Reasonably Achievable (ALARA). The actions and criteria to be included in the program are provided below.

5.3.2 As part of its evaluation pursuant to 10 CFR 72.212(b)(2)(i)(C), the licensee shall perform an analysis to confirm that the dose limits of 10 CFR 72.104(a) will be satisfied under the actual site conditions and ISFSI configuration, considering the planned number of casks to be deployed and the cask contents.

5.3.3 Based on the analysis performed pursuant to Section 5.3.2, the licensee shall establish individual cask surface dose rate limits for the TRANSFER CASK and the VVM to be used at the site. Total (neutron plus gamma) dose rate limits shall be established at the following locations:

a. The top of the VVM.
b. The side of the TRANSFER CASK
c. The outlet vents on the VVM

5.3.4 Notwithstanding the limits established in Section 5.3.3, the average of the measured dose rates on a loaded VVM or TRANSFER CASK shall not exceed the following values:

a. 30 mrem/hr (gamma + neutron) on the top of the closure lid of the VVM
b. 3500 mrem/hr (gamma + neutron) on the side of the TRANSFER CASK

5.3.5 The licensee shall measure the TRANSFER CASK and VVM surface neutron and gamma dose rates as described in Section 5.3.8 for comparison against the limits established in Section 5.3.3 or Section 5.3.4, whichever are lower.

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.3 Radiation Protection Program (continued)

5.3.6 If the measured surface dose rates exceed the lower of the two limits established in Section 5.3.3 or Section 5.3.4, the licensee shall:

a. Administratively verify that the correct contents were loaded in the correct fuel storage cell locations.
b. Perform a written evaluation to verify whether a VVM at the ISFSI containing the as-loaded MPC will cause the dose limits of 10 CFR 72.104 to be exceeded.
c. Perform a written evaluation within 30 days to determine why the surface dose rate limits were exceeded.

5.3.7 If the evaluation performed pursuant to Section 5.3.6 shows that the dose limits of 10 CFR 72.104 will be exceeded, the MPC shall not be placed into a VVM or the MPC shall be removed from the VVM until appropriate corrective action is taken to ensure the dose limits are not exceeded.

5.3.8 TRANSFER CASK and VVM surface dose rates shall be measured at approximately the following locations:

a. A minimum of four (4) dose rate measurements shall be taken on the top of the VVM. These measurements shall be taken approximately 90 degrees apart around the circumference of the lid, approximately 18 inches radially inward from the edge of the lid.

b. A minimum of four (4) dose rate measurements shall be taken adjacent to the outlet vent duct screen of the VVM, approximately 90 degrees apart.

c. A minimum of four (4) dose rate measurements shall be taken on the side of the TRANSFER CASK approximately at the cask mid-height plane. The measurement locations shall be approximately 90 degrees apart around the circumference of the cask. Dose rates shall be measured between the radial ribs of the water jacket.

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.3 Radiation Protection Program (continued)

5.3.9 The “Radiation Protection Space” (RPS) is the prismatic subgrade buffer zone surrounding the VVMs in a loaded ISFSI. The RPS boundary is indicated in the Licensing Drawings in Section 1.5 of the system FSAR. The RPS boundary shall not be encroached upon during any site construction activity. The jurisdictional boundary of the RPS extends down from the top of the ISFSI pad to the elevation of the Bottom surface of the Support Foundation Pad. The ISFSI design shall ensure that there is no significant loss of shielding in the RPS due to a credible accident or an extreme environment event during construction activity involving excavation adjacent to the RPS boundary.

CERTIFICATE OF COMPLIANCE NO. 1040

APPENDIX B

APPROVED CONTENTS AND DESIGN FEATURES

FOR THE HI-STORM UMAX CANISTER STORAGE SYSTEM

TABLE OF CONTENTS

1.0 Definitions

Refer to Appendix A for Definitions.

2.0 APPROVED CONTENTS

2.1 Fuel Specifications and Loading Conditions

2.1.1 Fuel to Be Stored in the HI-STORM UMAX Canister Storage System

a. UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, FUEL DEBRIS, and NON-FUEL HARDWARE meeting the limits specified in Table 2.1-1 and other referenced tables may be stored in the HI-STORM UMAX Canister Storage System.

b. All BWR fuel assemblies may be stored with or without ZR channels.

2.1.2 Fuel Loading

Figures 2.3-1 through 2.3-7 and 2.3-12 define the unique cell numbers for the MPC-37 and MPC-89 models, respectively, and the maximum allowable heat load per fuel assembly for each cell under multiple loading conditions. Fuel assembly decay heat limits are specified in Section 2.3.1. Fuel assemblies shall meet all other applicable limits specified in Tables 2.1-1 through 2.1-3.

2.2 Violations

If any Fuel Specifications or Loading Conditions of 2.1 are violated, the following actions shall be completed:

2.2.1 The affected fuel assemblies shall be placed in a safe condition.

2.2.2 Within 24 hours, notify the NRC Operations Center.

2.2.3 Within 30 days, submit a special report which describes the cause of the violation, and actions taken to restore compliance and prevent recurrence.

Table 2.1-1 (page 1 of 4)
Fuel Assembly Limits

I. MPC MODEL: MPC-37

A. Allowable Contents

1. Uranium oxide PWR UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, and/or FUEL DEBRIS meeting the criteria in Table 2.1-2, with or without NON-FUEL HARDWARE and meeting the following specifications (Note 1):

a. Cladding Type:	ZR
b. Maximum Initial Enrichment:	5.0 wt. % U-235 with soluble boron credit per LCO 3.3.1
c. Post-irradiation Cooling Time and Average Burnup Per Assembly:	Cooling Time ≥ 3 years Assembly Average Burnup ≤ 68.2 GWD/MTU
d. Decay Heat Per Fuel Storage Location:	As specified in Section 2.3
e. Fuel Assembly Length:	≤ 199.2 inches (nominal design including NON-FUEL HARDWARE and DFC)
f. Fuel Assembly Width:	≤ 8.54 inches (nominal design)
g. Fuel Assembly Weight:	≤ 2050 lbs (including NON-FUEL HARDWARE and DFC)

Table 2.1-1 (page 2 of 4)
Fuel Assembly Limits

I. MPC MODEL: MPC-37 (continued)

B. Quantity per MPC: 37 FUEL ASSEMBLIES with up to twelve (12) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 1, 3, 4, 8, 9, 15, 23, 29, 30, 34, 35, and 37 (see Figures 2.3-1 through 2.3-7). The remaining fuel storage locations may be filled with PWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications.

C. One (1) Neutron Source Assembly (NSA) is authorized for loading in the MPC-37.

D. Up to thirty (30) BRPAs are authorized for loading in the MPC-37.

Note 1: Fuel assemblies containing BPRAs, TPDs, WABAs, water displacement guide tube plugs, orifice rod assemblies, or vibration suppressor inserts, with or without ITTRs, may be stored in any fuel storage location. Fuel assemblies containing APSRs, RCCAs, CEAs, CRAs, or NSAs may only be loaded in fuel storage locations 5 through 7, 10 through 14, 17 through 21, 24 through 28, and 31 through 33 (see Figures 2.3-1 through 2.3-7).

Table 2.1-1 (page 3 of 4)
Fuel Assembly Limits

II. MPC MODEL: MPC-89

A. Allowable Contents

1. Uranium oxide BWR UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, and/or FUEL DEBRIS meeting the criteria in Table 2.1-3, with or without channels and meeting the following specifications:

a. Cladding Type:	ZR
b. Maximum PLANAR-AVERAGE INITIAL ENRICHMENT(Note 1):	As specified in Table 2.1-3 for the applicable fuel assembly array/class.
c. Initial Maximum Rod Enrichment	5.0 wt. % U-235
d. Post-irradiation Cooling Time and Average Burnup Per Assembly	
i. Array/Class 8x8F	Cooling time ≥ 10 years and an assembly average burnup ≤ 27.5 GWD/MTU.
ii. All Other Array Classes	Cooling Time ≥ 3 years and an assembly average burnup ≤ 65 GWD/MTU
e. Decay Heat Per Assembly	
i. Array/Class 8x8F	≤ 183.5 Watts
ii. All Other Array Classes	As specified in Section 2.3
f. Fuel Assembly Length	≤ 176.5 inches (nominal design)
g. Fuel Assembly Width	≤ 5.95 inches (nominal design)
h. Fuel Assembly Weight	≤ 850 lbs, including a DFC as well as a channel

Table 2.1-1 (page 4 of 4)
Fuel Assembly Limits

II. MPC MODEL: MPC-89 (continued)

B. Quantity per MPC: 89 FUEL ASSEMBLIES with up to sixteen (16) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 1, 3, 4, 10, 11, 19, 29, 39, 51, 61, 71, 79, 80, 86, 87, and 89 (see Figure 2.3-12). The remaining fuel storage locations may be filled with BWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications.

Note 1: The lowest maximum allowable enrichment of any fuel assembly loaded in an MPC-89, based on fuel array class and fuel classification, is the maximum allowable enrichment for the remainder of the assemblies loaded in that MPC.

Table 2.1-2 (page 1 of 3)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array/ Class	**14x14 A**	**14x14 B**	**14x14 C**	**15x15 B**	**15x15 C**
No. of Fuel Rod Locations	179	179	176	204	204
Fuel Clad O.D. (in.)	≥ 0.400	≥ 0.417	≥ 0.440	≥ 0.420	≥ 0.417
Fuel Clad I.D. (in.)	≤ 0.3514	≤ 0.3734	≤ 0.3880	≤ 0.3736	≤ 0.3640
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3444	≤ 0.3659	≤ 0.3805	≤ 0.3671	≤ 0.3570
Fuel Rod Pitch (in.)	≤ 0.556	≤ 0.556	≤ 0.580	≤ 0.563	≤ 0.563
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	5 (Note 2)	21	21
Guide/Instrument Tube Thickness (in.)	≥ 0.017	≥ 0.017	≥ 0.038	≥ 0.015	≥ 0.0165

Table 2.1-2 (page 2 of 3)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array/Class	**15x15 D**	**15x15 E**	**15x15 F**	**15x15 H**	**15x15 I**
No. of Fuel Rod Locations	208	208	208	208	216
Fuel Clad O.D. (in.)	≥ 0.430	≥ 0.428	≥ 0.428	≥ 0.414	≥ 0.413
Fuel Clad I.D. (in.)	≤ 0.3800	≤ 0.3790	≤ 0.3820	≤ 0.3700	≤ 0.3670
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3735	≤ 0.3707	≤ 0.3742	≤ 0.3622	≤ 0.3600
Fuel Rod Pitch (in.)	≤ 0.568	≤ 0.568	≤ 0.568	≤ 0.568	≤ 0.550
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	17	17	9 (Note 4)
Guide/Instrument Tube Thickness (in.)	≥ 0.0150	≥ 0.0140	≥ 0.0140	≥ 0.0140	≥ 0.0140

Table 2.1-2 (page 3 of 3)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array and Class	**16x16 A**	**17x17A**	**17x17 B**	**17x17 C**	**17x17 D**	**17x17 E**
No. of Fuel Rod Locations	236	264	264	264	264	265
Fuel Clad O.D. (in.)	≥ 0.382	≥ 0.360	≥ 0.372	≥ 0.377	≥ 0.372	≥ 0.372
Fuel Clad I.D. (in.)	≤ 0.3350	≤ 0.3150	≤ 0.3310	≤ 0.3330	≤ 0.3310	≤ 0.3310
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3255	≤ 0.3088	≤ 0.3232	≤ 0.3252	≤ 0.3232	≤ 0.3232
Fuel Rod Pitch (in.)	≤ 0.506	≤ 0.496	≤ 0.496	≤ 0.502	≤ 0.496	≤ 0.496
Active Fuel length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 170	≤ 170
No. of Guide and/or Instrument Tubes	5 (Note 2)	25	25	25	25	24
Guide/Instrument Tube Thickness (in.)	≥ 0.0350	≥ 0.016	≥ 0.014	≥ 0.020	≥ 0.014	≥ 0.014

Notes:

1. All dimensions are design nominal values. Maximum and minimum dimensions are specified to bound variations in design nominal values among fuel assemblies within a given array/class.
2. Each guide tube replaces four fuel rods.
3. Annular fuel pellets are allowed in the top and bottom 12” of the active fuel length.
4. One Instrument Tube and eight Guide Bars (Solid ZR)

Table 2.1-3 (page 1 of 4)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array and Class	**7x7 B**	**8x8 B**	**8x8 C**	**8x8 D**	**8x8 E**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations (Full Length or Total/Full Length)	49	63 or 64	62	60 or 61	59
Fuel Clad O.D. (in.)	≥ 0.5630	≥ 0.4840	≥ 0.4830	≥ 0.4830	≥ 0.4930
Fuel Clad I.D. (in.)	≤ 0.4990	≤ 0.4295	≤ 0.4250	≤ 0.4230	≤ 0.4250
Fuel Pellet Dia. (in.)	≤ 0.4910	≤ 0.4195	≤ 0.4160	≤ 0.4140	≤ 0.4160
Fuel Rod Pitch (in.)	≤ 0.738	≤ 0.642	≤ 0.641	≤ 0.640	≤ 0.640
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	0	1 or 0	2	1 - 4 (Note 6)	5
Water Rod Thickness (in.)	N/A	≥ 0.034	> 0.00	> 0.00	≥ 0.034
Channel Thickness (in.)	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.100

Table 2.1-3 (2 of 4)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array and Class	**8x8F**	**9x9 A**	**9x9 B**	**9x9 C**	**9x9 D**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.5 (Note 12)	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations	64	74/66 (Note 4)	72	80	79
Fuel Clad O.D. (in.)	≥ 0.4576	≥ 0.4400	≥ 0.4330	≥ 0.4230	≥ 0.4240
Fuel Clad I.D. (in.)	≤ 0.3996	≤ 0.3840	≤ 0.3810	≤ 0.3640	≤ 0.3640
Fuel Pellet Dia. (in.)	≤ 0.3913	≤ 0.3760	≤ 0.3740	≤ 0.3565	≤ 0.3565
Fuel Rod Pitch (in.)	≤ 0.609	≤ 0.566	≤ 0.572	≤ 0.572	≤ 0.572
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	N/A (Note 2)	2	1 (Note 5)	1	2
Water Rod Thickness (in.)	≥ 0.0315	> 0.00	> 0.00	≥ 0.020	≥ 0.0300
Channel Thickness (in.)	≤ 0.055	≤ 0.120	≤ 0.120	≤ 0.100	≤ 0.100

Table 2.1-3 (page 3 of 4)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array and Class	**9x9 E (Note 2)**	**9x9 F (Note 2)**	**9x9 G**	**10x10 A**	**10x10 B**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.5 (Note 12)	≤ 4.5 (Note 12)	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations	76	76	72	92/78 (Note 7)	91/83 (Note 8)
Fuel Clad O.D. (in.)	≥0.4170	≥0.4430	≥0.4240	≥0.4040	≥0.3957
Fuel Clad I.D. (in.)	≤0.3640	≤0.3860	≤0.3640	≤ 0.3520	≤ 0.3480
Fuel Pellet Dia. (in.)	≤0.3530	≤0.3745	≤0.3565	≤ 0.3455	≤ 0.3420
Fuel Rod Pitch (in.)	≤ 0.572	≤ 0.572	≤ 0.572	≤ 0.510	≤ 0.510
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	5	5	1 (Note 5)	2	1 (Note 5)
Water Rod Thickness (in.)	≥0.0120	≥0.0120	≥0.0320	≥0.0300	> 0.00
Channel Thickness (in.)	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120

Table 2.1-3 (page 4 of 4)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array and Class	**10x10 C**	**10x10 F**	**10x10 G**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.8	≤ 4.7 (Note 13)	≤ 4.6 (Note 12)
No. of Fuel Rod Locations	96	92/78 (Note 7)	96/84
Fuel Clad O.D. (in.)	≥ 0.3780	≥ 0.4035	≥ 0.387
Fuel Clad I.D. (in.)	≤ 0.3294	≤ 0.3570	≤ 0.340
Fuel Pellet Dia. (in.)	≤ 0.3224	≤ 0.3500	≤ 0.334
Fuel Rod Pitch (in.)	≤ 0.488	≤ 0.510	≤ 0.512
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	5 (Note 9)	2	5 (Note 9)
Water Rod Thickness (in.)	≥ 0.031	≥ 0.030	≥ 0.031
Channel Thickness (in.)	≤ 0.055	≤ 0.120	≤ 0.060

NOTES:

1. All dimensions are design nominal values. Maximum and minimum dimensions are specified to bound variations in design nominal values among fuel assemblies within a given array/class.
2. This assembly is known as “QUAD+.” It has four rectangular water cross segments dividing the assembly into four quadrants.
3. For the SPC 9x9-5 fuel assembly, each fuel rod must meet either the 9x9E or the 9x9F set of limits or clad O.D., clad I.D., and pellet diameter.
4. This assembly class contains 74 total rods; 66 full length rods and 8 partial length rods.
5. Square, replacing nine fuel rods.
6. Variable.
7. This assembly contains 92 total fuel rods; 78 full length rods and 14 partial length rods.
8. This assembly class contains 91 total fuel rods; 83 full length rods and 8 partial length rods.
9. One diamond-shaped water rod replacing the four center fuel rods and four rectangular water rods dividing the assembly into four quadrants.
10. These rods may also be sealed at both ends and contain ZR material in lieu of water.
11. Not used.
12. When loading fuel assemblies classified as DAMAGED FUEL, all assemblies in the MPC are limited to 4.0 wt.% U-235.
13. When loading fuel assemblies classified as DAMAGED FUEL, all assemblies in the MPC are limited to 4.6 wt.% U-235.
14. In accordance with the definition of UNDAMAGED FUEL, certain assemblies may be limited to 3.3 wt.% U-235. When loading these fuel assemblies, all assemblies in the MPC are limited to 3.3 wt.% U-235.

Table 2.1-4
CLASSIFICATION OF FUEL ASSEMBLY FOR MPC-37 IN THE HI-STORM UMAX ISFSI

MPC Type	Classification	Nominal Active Fuel Length
MPC-37	Short Fuel	128 inches $\leq$ L < 144 inches
	Standard Fuel	144 inches $\leq$ L < 168 inches
	Long Fuel	L $\geq$ 168 inches

Note 1: L means "nominal active fuel length".

2.3 Decay Heat Limits

This section provides the limits on fuel assembly decay heat for storage in the HI-STORM UMAX Canister Storage System. The method to verify compliance, including examples, is provided in Chapter 13 of the HI-STORM UMAX FSAR.

2.3.1 Fuel Loading Decay Heat Limits

Table 2.3-1 provides the maximum permissible decay heat under long-term storage for MPC-37 and MPC-89. Table 2.3-1 also lists the applicable figures providing the permissible decay heat per fuel storage location, including MPCs using the optional helium backfill pressure ranges permitted in Table 3-2 of Appendix A.

TABLE 2.3-1
PERMISSIBLE HEAT LOAD FOR LONG-TERM STORAGE

MPC Type		Heat Load Chart	Helium Backfill Pressure Option (Notes 1,2)	Permissible Heat Load Per Storage Cell	Permissible Aggregate Heat Load, kW (Note 4)
MPC-37	Short Fuel (Note 3)	1	1	Figure 2.3-1	33.88
		2	2	Figure 2.3-2	33.70
		3	1	Figure 2.3-3	33.53
	Standard Fuel (Note 3)	1	1	Figure 2.3-1	33.88
		2	2	Figure 2.3-2	33.70
		3	1	Figure 2.3-4	35.30
	Long Fuel (Note 3)	1	1	Figure 2.3-5	35.76
		2	2	Figure 2.3-6	35.57
		3	1	Figure 2.3-7	37.06
	Short Fuel (Note 3)		3	Figure 2.3-8	34.28
			3	Figure 2.3-12	33.46
	Standard Fuel (Note 3)		3	Figure 2.3-8	34.28
			3	Figure 2.3-12	33.46
	Long Fuel (Note 3)		3	Figure 2.3-9	36.19
			3	Figure 2.3-12	33.46
MPC-89			1	Figure 2.3-10	36.32
			2	Figure 2.3-11	36.72
			2	Figure 2.3-13	34.75

Notes:

1. For helium backfill pressure option pressure ranges see Appendix A, Table 3-2
2. For the details on the use of VDS to dry High Burnup Fuel see Appendix A, Table 3-1
3. See Table 2.1-4 for fuel length data
4. Aggregate heat load is defined as the sum of heat loads of all stored fuel

assemblies. The permissible aggregate heat load is set to 80% of the design basis heat load.

2.3.2 When complying with the maximum fuel storage location decay heat limits, users must account for the decay heat from both the fuel assembly and any NON-FUEL HARDWARE, as applicable for the particular fuel storage location, to ensure the decay heat emitted by all contents in a storage location does not exceed the limit.

		1 0.873	2 0.873	3 0.873		
	4 0.873	5 1.602	6 1.602	7 1.602	8 0.873	
9 0.873	10 1.602	11 1.017	12 1.017	13 1.017	14 1.602	15 0.873
16 0.873	17 1.602	18 1.017	19 1.017	20 1.017	21 1.602	22 0.873
23 0.873	24 1.602	25 1.017	26 1.017	27 1.017	28 1.602	29 0.873
	30 0.873	31 1.602	32 1.602	33 1.602	34 0.873	
		35 0.873	36 0.873	37 0.873		

Legend

Cell ID Heat Load, kW

Figure 2.3-1
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 1 for Long-term Storage for Short and Standard Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 1.215	2 1.215	3 1.215		
	4 1.215	5 1.080	6 1.080	7 1.080	8 1.215	
9 1.215	10 1.080	11 1.080	12 1.080	13 1.080	14 1.080	15 1.215
16 1.215	17 1.080	18 1.080	19 1.080	20 1.080	21 1.080	22 1.215
23 1.215	24 1.080	25 1.080	26 1.080	27 1.080	28 1.080	29 1.215
	30 1.215	31 1.080	32 1.080	33 1.080	34 1.215	
		35 1.215	36 1.215	37 1.215		

Legend

Cell ID Heat Load, kW

Figure 2.3-2
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 2 for Long-term Storage for Short and Standard Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.922	2 0.922	3 0.922		
	4 0.922	5 1.520	6 1.520	7 1.520	8 0.922	
9 0.922	10 1.710	11 0.950	12 0.950	13 0.950	14 1.710	15 0.922
16 0.922	17 1.520	18 0.950	19 0.570	20 0.950	21 1.520	22 0.922
23 0.922	24 1.710	25 0.950	26 0.950	27 0.950	28 1.710	29 0.922
	30 0.922	31 1.520	32 1.520	33 1.520	34 0.922	
		35 0.922	36 0.922	37 0.922		

Legend

Cell ID Heat Load, kW

Figure 2.3-3
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 3 for Long-term Storage for Short Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.970	2 0.970	3 0.970		
	4 0.970	5 1.600	6 1.600	7 1.600	8 0.970	
9 0.970	10 1.800	11 1.000	12 1.000	13 1.000	14 1.800	15 0.970
16 0.970	17 1.600	18 1.000	19 0.600	20 1.000	21 1.600	22 0.970
23 0.970	24 1.800	25 1.000	26 1.000	27 1.000	28 1.800	29 0.970
	30 0.970	31 1.600	32 1.600	33 1.600	34 0.970	
		35 0.970	36 0.970	37 0.970		

Legend

Cell ID Heat Load, kW

Figure 2.3-4
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 3 for Long-term Storage for Standard Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.922	2 0.922	3 0.922		
	4 0.922	5 1.691	6 1.691	7 1.691	8 0.922	
9 0.922	10 1.691	11 1.074	12 1.074	13 1.074	14 1.691	15 0.922
16 0.922	17 1.691	18 1.074	19 1.074	20 1.074	21 1.691	22 0.922
23 0.922	24 1.691	25 1.074	26 1.074	27 1.074	28 1.691	29 0.922
	30 0.922	31 1.691	32 1.691	33 1.691	34 0.922	
		35 0.922	36 0.922	37 0.922		

Legend

Cell ID Heat Load, kW

Figure 2.3-5
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 1 for Long-term Storage for Long Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 1.283	2 1.283	3 1.283		
	4 1.283	5 1.140	6 1.140	7 1.140	8 1.283	
9 1.283	10 1.140	11 1.140	12 1.140	13 1.140	14 1.140	15 1.283
16 1.283	17 1.140	18 1.140	19 1.140	20 1.140	21 1.140	22 1.283
23 1.283	24 1.140	25 1.140	26 1.140	27 1.140	28 1.140	29 1.283
	30 1.283	31 1.140	32 1.140	33 1.140	34 1.283	
		35 1.283	36 1.283	37 1.283		

Legend

Cell ID Heat Load, kW

Figure 2.3-6
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 2 for Long-term Storage for Long Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 1.019	2 1.019	3 1.019		
	4 1.019	5 1.680	6 1.680	7 1.680	8 1.019	
9 1.019	10 1.890	11 1.050	12 1.050	13 1.050	14 1.890	15 1.019
16 1.019	17 1.680	18 1.050	19 0.630	20 1.050	21 1.680	22 1.019
23 1.019	24 1.890	25 1.050	26 1.050	27 1.050	28 1.890	29 1.019
	30 1.019	31 1.680	32 1.680	33 1.680	34 1.019	
		35 1.019	36 1.019	37 1.019		

Legend

Cell ID Heat Load, kW

Figure 2.3-7
HI-STORM UMAX MPC-37 Permissible Heat Load Chart 3 for Long-term Storage for Long Fuel

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.785	2 0.785	3 0.785		
	4 0.785	5 1.441	6 1.441	7 1.441	8 0.785	
9 0.785	10 1.441	11 0.915	12 0.915	13 0.915	14 1.441	15 0.785
16 0.785	17 1.441	18 0.915	19 0.915	20 0.915	21 1.441	22 0.785
23 0.785	24 1.441	25 0.915	26 0.915	27 0.915	28 1.441	29 0.785
	30 0.785	31 1.441	32 1.441	33 1.441	34 0.785	
		35 0.785	36 0.785	37 0.785		

Legend

Cell ID Heat Load, kW

Figure 2.3-8
HI-STORM UMAX MPC-37 Permissible Heat Load for Short and Standard Fuel for Helium Backfill Option 3 in Table 3-2 of Appendix A

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.829	2 0.829	3 0.829		
	4 0.829	5 1.521	6 1.521	7 1.521	8 0.829	
9 0.829	10 1.521	11 0.966	12 0.966	13 0.966	14 1.521	15 0.829
16 0.829	17 1.521	18 0.966	19 0.966	20 0.966	21 1.521	22 0.829
23 0.829	24 1.521	25 0.966	26 0.966	27 0.966	28 1.521	29 0.829
	30 0.829	31 1.521	32 1.521	33 1.521	34 0.829	
		35 0.829	36 0.829	37 0.829		

Legend

Cell ID Heat Load, kW

Figure 2.3-9
HI-STORM UMAX MPC-37 Permissible Heat Load for Long Fuel for Helium Backfill Option 3 in Table 3-2 of Appendix A

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

			1 0.431	2 0.431	3 0.431					
		4 0.431	5 0.431	6 0.431	7 0.607	8 0.431	9 0.431	10 0.431		
	11 0.431	12 0.431	13 0.607	14 0.607	15 0.607	16 0.607	17 0.607	18 0.431	19 0.431	
	20 0.431	21 0.607	22 0.607	23 0.607	24 0.607	25 0.607	26 0.607	27 0.607	28 0.431	
29 0.431	30 0.431	31 0.607	32 0.607	33 0.431	34 0.431	35 0.431	36 0.607	37 0.607	38 0.431	39 0.431
40 0.431	41 0.607	42 0.607	43 0.607	44 0.431	45 0.431	46 0.431	47 0.607	48 0.607	49 0.607	50 0.431
51 0.431	52 0.431	53 0.607	54 0.607	55 0.431	56 0.431	57 0.431	58 0.607	59 0.607	60 0.431	61 0.431
	62 0.431	63 0.607	64 0.607	65 0.607	66 0.607	67 0.607	68 0.607	69 0.607	70 0.431	
	71 0.431	72 0.431	73 0.607	74 0.607	75 0.607	76 0.607	77 0.607	78 0.431	79 0.431	
		80 0.431	81 0.431	82 0.431	83 0.607	84 0.431	85 0.431	86 0.431		
				87 0.431	88 0.431	89 0.431				

Legend

Cell ID
Heat Load, kW

Figure 2.3-10
HI-STORM UMAX MPC-89 Permissible Heat Load for Long-Term Storage

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

			1 0.387	2 0.387	3 0.387					
		4 0.387	5 0.387	6 0.387	7 0.546	8 0.387	9 0.387	10 0.387		
	11 0.387	12 0.387	13 0.546	14 0.546	15 0.546	16 0.546	17 0.546	18 0.387	19 0.387	
	20 0.387	21 0.546	22 0.546	23 0.546	24 0.546	25 0.546	26 0.546	27 0.546	28 0.387	
29 0.387	30 0.387	31 0.546	32 0.546	33 0.387	34 0.387	35 0.387	36 0.546	37 0.546	38 0.387	39 0.387
40 0.387	41 0.546	42 0.546	43 0.546	44 0.387	45 0.387	46 0.387	47 0.546	48 0.546	49 0.546	50 0.387
51 0.387	52 0.387	53 0.546	54 0.546	55 0.387	56 0.387	57 0.387	58 0.546	59 0.546	60 0.387	61 0.387
	62 0.387	63 0.546	64 0.546	65 0.546	66 0.546	67 0.546	68 0.546	69 0.546	70 0.387	
	71 0.387	72 0.387	73 0.546	74 0.546	75 0.546	76 0.546	77 0.546	78 0.387	79 0.387	
		80 0.387	81 0.387	82 0.387	83 0.546	84 0.387	85 0.387	86 0.387		
				87 0.387	88 0.387	89 0.387				

Legend

Cell ID
Heat Load, kW

Figure 2.3-11
HI-STORM UMAX MPC-89 Permissible Heat Load for Helium Backfill
Option 2 in Table 3-2 of Appendix A

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

		1 0.97	2 0.97	3 0.97		
	4 0.97	5 0.97	6 0.97	7 0.97	8 0.97	
9 0.97	10 0.97	11 0.7	12 0.7	13 0.7	14 0.97	15 0.97
16 0.97	17 0.97	18 0.7	19 0.7	20 0.7	21 0.97	22 0.97
23 0.97	24 0.97	25 0.7	26 0.7	27 0.7	28 0.97	29 0.97
	30 0.97	31 0.97	32 0.97	33 0.97	34 0.97	
		35 0.97	36 0.97	37 0.97		

Legend

Cell ID Heat Load, kW

Figure 2.3-12
HI-STORM UMAX MPC-37 Permissible Threshold Heat Load for VDS High Burnup Fuel in Table 3-1 of Appendix A and Helium Backfill Option 3 in Table 3-2 of Appendix A

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

			1 0.44	2 0.44	3 0.44				
		4 0.44	5 0.44	6 0.44	7 0.35	8 0.44	9 0.44	10 0.44		
	11 0.44	12 0.44	13 0.35	14 0.35	15 0.35	16 0.35	17 0.35	18 0.44	19 0.44	
	20 0.44	21 0.35	22 0.35	23 0.35	24 0.35	25 0.35	26 0.35	27 0.35	28 0.44	
29 0.44	30 0.44	31 0.35	32 0.35	33 0.35	34 0.35	35 0.35	36 0.35	37 0.35	38 0.44	39 0.44
40 0.44	41 0.35	42 0.35	43 0.35	44 0.35	45 0.35	46 0.35	47 0.35	48 0.35	49 0.35	50 0.44
51 0.44	52 0.44	53 0.35	54 0.35	55 0.35	56 0.35	57 0.35	58 0.35	59 0.35	60 0.44	61 0.44
	62 0.44	63 0.35	64 0.35	65 0.35	66 0.35	67 0.35	68 0.35	69 0.35	70 0.44	
	71 0.44	72 0.44	73 0.35	74 0.35	75 0.35	76 0.35	77 0.35	78 0.44	79 0.44	
		80 0.44	81 0.44	82 0.44	83 0.35	84 0.44	85 0.44	86 0.44		
				87 0.44	88 0.44	89 0.44				

Legend

Cell ID Heat Load, kW

Figure 2.3-13
HI-STORM UMAX MPC-89 Permissible Threshold Heat Load for VDS High Burnup Fuel in Table 3-1 of Appendix A and Helium Backfill Option 2 in Table 3-2 of Appendix A

Note that this figure shows the per cell heat load limit for storage. The total permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-1 for corresponding permissible aggregate heat load.

3.0 DESIGN FEATURES

3.1 Site

3.1.1 Site Location

The HI-STORM UMAX Canister Storage System is authorized for general use by 10 CFR Part 50 license holders at various site locations under the provisions of 10 CFR 72, Subpart K.

3.2 Design Features Important for Criticality Control

3.2.1 MPC-37

1. Basket cell ID: 8.92 in. (min. nominal)
2. Basket cell wall thickness: 0.57 in. (min.nominal)
3. B_4C in the Metamic-HT: 10.0 wt % (min. nominal)

3.2.2 MPC-89

1. Basket cell ID: 5.99 in. (min.nominal)
2. Basket cell wall thickness: 0.38 in. (min.nominal)
3. B_4C in the Metamic-HT: 10.0 wt % (min. nominal)

3.2.3 Metamic-HT Test Requirements

1. The weight percentage of the boron carbide must be confirmed to be greater than or equal to 10% in each lot of Al/ B4C powder.

2. The areal density of the B-10 isotope corresponding to the 10% min. weight density in the manufactured Metamic HT panels shall be independently confirmed by the neutron attenuation test method by testing at least one coupon from a randomly selected panel in each lot.

3. If the B- 10 areal density criterion in the tested panel fails to meet the specified minimum, then the manufacturer has the option to reject the entire lot or to test a statistically significant number of panels and perform statistical analysis to show that the minimum areal density in the panels (that comprise the lot) is satisfied with 95% confidence.

4. All test procedures used in demonstrating compliance with the above requirements shall conform to the cask designer's QA program which has been approved by the USNRC under docket number 71-0784.

3.3 Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 2007, is the governing Code for the HI-STORM UMAX system MPC as

clarified in Specification 3.3.1 below, except for Code Sections V and IX. However, the HI-STORM UMAX VVM is structurally qualified per the newer 2010 ASME code. The ASME Code paragraphs applicable to the manufacturing of HI-STORM UMAX VVM and transfer cask are listed in Table 3-2. The latest effective editions of ASME Code Sections V and IX, including addenda, may be used for activities governed by those sections, provided a written reconciliation of the later edition against the applicable edition (including addenda) specified above, is performed by the certificate holder. American Concrete Institute ACI-318 (2005) is the governing Code for both plain concrete and reinforced concrete as clarified in Chapter 3 of the Final Safety Analysis Report for the HI-STORM 100 UMAX System.

3.3.1 Alternatives to Codes, Standards, and Criteria

Table 3-1 lists approved alternatives to the ASME Code for the design of the MPCs of the HI-STORM UMAX Canister Storage System.

3.3.2 Construction/Fabrication Alternatives to Codes, Standards, and Criteria

Proposed alternatives to the ASME Code, Section III, 2007 Edition, including modifications to the alternatives allowed by Specification 3.3.1 may be used on a case-specific basis when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The request for such alternative should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of the ASME Code, Section III, 2007 Edition, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for alternatives shall be submitted in accordance with 10 CFR 72.4.

(continued)

3.0 DESIGN FEATURES (continued)

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC Enclosure Vessel	Subsection NCA	General Requirements. Requires preparation of a Design Specification, Design Report, Overpressure Protection Report, Certification of Construction Report, Data Report, and other administrative controls for an ASME Code stamped vessel.	Because the MPC is not an ASME Code stamped vessel, none of the specifications, reports, certificates, or other general requirements specified by NCA are required. In lieu of a Design Specification and Design Report, the HI-STORM FSAR includes the design criteria, service conditions, and load combinations for the design and operation of the MPCs as well as the results of the stress analyses to demonstrate that applicable Code stress limits are met. Additionally, the fabricator is not required to have an ASME-certified QA program. All important-to-safety activities are governed by the NRC-approved Holtec QA program. Because the cask components are not certified to the Code, the terms “Certificate Holder” and “Inspector” are not germane to the manufacturing of NRC-certified cask components. To eliminate ambiguity, the responsibilities assigned to the Certificate Holder in the Code, as applicable, shall be interpreted to apply to the NRC Certificate of Compliance (CoC) holder (and by extension, to the component fabricator) if the requirement must be fulfilled. The Code term “Inspector” means the QA/QC personnel of the CoC holder and its vendors assigned to oversee and inspect the manufacturing process.
MPC Enclosure Vessel	NB-1100	Statement of requirements for Code stamping of components.	MPC Enclosure Vessel is designed and will be fabricated in accordance with ASME Code, Section III, Subsection NB to the maximum practical extent, but Code stamping is not required.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC basket supports and lift lugs	NB-1130	NB-1132.2(d) requires that the first connecting weld of a non-pressure retaining structural attachment to a component shall be considered part of the component unless the weld is more than 2t from the pressure retaining portion of the component, where t is the nominal thickness of the pressure retaining material. NB-1132.2(e) requires that the first connecting weld of a welded nonstructural attachment to a component shall conform to NB-4430 if the connecting weld is within 2t from the pressure retaining portion of the component.	The lugs that are used exclusively for lifting an empty MPC are welded to the inside of the pressure-retaining MPC shell, but are not designed in accordance with Subsection NB. The lug-to-Enclosure Vessel Weld is required to meet the stress limits of Reg. Guide 3.61 in lieu of Subsection NB of the Code.
MPC Enclosure Vessel	NB-2000	Requires materials to be supplied by ASME-approved material supplier.	Materials will be supplied by Holtec approved suppliers with Certified Material Test Reports (CMTRs) in accordance with NB-2000 requirements.
MPC Enclosure Vessel	NB-3100 NF-3100	Provides requirements for determining design loading conditions, such as pressure, temperature, and mechanical loads.	These requirements are subsumed by the HI-STORM FW FSAR, serving as the Design Specification, which establishes the service conditions and load combinations for the storage system.
MPC Enclosure Vessel	NB-4120	NB-4121.2 and NF-4121.2 provide requirements for repetition of tensile or impact tests for material subjected to heat treatment during fabrication or installation.	In-shop operations of short duration that apply heat to a component, such as plasma cutting of plate stock, welding, machining, and coating are not, unless explicitly stated by the Code, defined as heat treatment operations.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC Enclosure Vessel	NB-4220	Requires certain forming tolerances to be met for cylindrical, conical, or spherical shells of a vessel.	The cylindricity measurements on the rolled shells are not specifically recorded in the shop travelers, as would be the case for a Code-stamped pressure vessel. Rather, the requirements on inter-component clearances (such as the MPC-to-transfer cask) are guaranteed through fixture-controlled manufacturing. The fabrication specification and shop procedures ensure that all dimensional design objectives, including inter-component annular clearances are satisfied. The dimensions required to be met in fabrication are chosen to meet the functional requirements of the dry storage components. Thus, although the post-forming Code cylindricity requirements are not evaluated for compliance directly, they are indirectly satisfied (actually exceeded) in the final manufactured components.
MPC Enclosure Vessel	NB-4122	Implies that with the exception of studs, bolts, nuts and heat exchanger tubes, CMTRs must be traceable to a specific piece of material in a component.	MPCs are built in lots. Material traceability on raw materials to a heat number and corresponding CMTR is maintained by Holtec through markings on the raw material. Where material is cut or processed, markings are transferred accordingly to assure traceability. As materials are assembled into the lot of MPCs being manufactured, documentation is maintained to identify the heat numbers of materials being used for that item in the multiple MPCs being manufactured under that lot. A specific item within a specific MPC will have a number of heat numbers identified as possibly being used for the item in that particular MPC of which one or more of those heat numbers (and corresponding CMTRS) will have actually been used. All of the heat numbers identified will comply with the requirements for the particular item.
MPC Lid and Closure Ring Welds	NB-4243	Full penetration welds required for Category C Joints (flat head to main shell per NB-3352.3)	MPC lid and closure ring are not full penetration welds. They are welded independently to provide a redundant seal.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC Closure Ring, Vent and Drain Cover Plate Welds	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Root (if more than one weld pass is required) and final liquid penetrant examination to be performed in accordance with NB-5245. The closure ring provides independent redundant closure for vent and drain cover plates. Vent and drain port cover plate welds are helium leakage tested.
MPC Lid to Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Only progressive liquid penetrant (PT) examination is permitted. PT examination will include the root and final weld layers and each approx. 3/8" of weld depth.
MPC Enclosure Vessel and Lid	NB-6111	All completed pressure retaining systems shall be pressure tested.	The MPC vessel is welded in the field following fuel assembly loading. After the lid to shell weld is completed, the MPC shall then be pressure tested as defined in Chapter 10. Accessibility for leakage inspections precludes a Code compliant pressure test. Since the shell welds of the MPC cannot be checked for leakage during this pressure test, the shop leakage test to 10^{-7} ref cc/sec provides reasonable assurance as to its leak tightness. All MPC enclosure vessel welds (except closure ring and vent/drain cover plate) are inspected by volumetric examination. The MPC lid-to-shell weld shall be verified by progressive PT examination. PT must include the root and final layers and each approximately 3/8 inch of weld depth. The inspection results, including relevant findings (indications) shall be made a permanent part of the user's records by video, photographic, of other means which provide an equivalent record of weld integrity. The video or photographic records should be taken during the final interpretation period described in ASME Section V, Article 6, T-676. The vent/drain cover plate and the closure ring welds are confirmed by liquid penetrant examination. The inspection of the weld must be performed by qualified personnel and shall meet the acceptance requirements of ASME Code Section III, NB-5350.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC Enclosure Vessel	NB-7000	Vessels are required to have overpressure protection.	No overpressure protection is provided. Function of MPC enclosure vessel is to contain radioactive contents under normal, off-normal, and accident conditions of storage. MPC vessel is designed to withstand maximum internal pressure considering 100% fuel rod failure and maximum accident temperatures.
MPC Enclosure Vessel	NB-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The HI-STORM UMAX system is to be marked and identified in accordance with 10CFR71 and 10CFR72 requirements. Code stamping is not required. QA data package to be in accordance with Holtec approved QA program.

Table 3-2
REFERENCE ASME CODE PARAGRAPHS FOR VVM PRIMARY LOAD BEARING PARTS

	Item	**Code Paragraph [2.6.1]**	**Explanation and Applicability**
1.	Definition of primary and secondary members	NF-1215	-
2.	Jurisdictional boundary	NF-1133	The VVM's jurisdictional boundary is defined by the bottom surface of the SFP, the top surface of the ISFSI pad and the SES side surfaces.
3.	Certification of material(structural)	NF-2130(b) and (c)	Materials shall be certified to the applicable Section II of the ASME Code or equivalent ASTM Specification.
4.	Heat treatment of material	NF-2170 and NF-2180	-
5.	Storage of welding material	NF-2400	-
6.	Welding procedure	Section IX	-
7.	Welding material	Section II	-
8.	Loading conditions	NF-3111	-
9.	Allowable stress values	NF-3112.3	-
10.	Rolling and sliding supports	NF-3424	-
11.	Differential thermal expansion	NF-3127	-
12.	Stress analysis	NF-3143 NF-3380 NF-3522 NF-3523	Provisions for stress analysis for Class 3 plate and shell supports and for linear supports are applicable for Closure Lid and Container Shell, respectively.
13.	Cutting of plate stock	NF-4211 NF-4211.1	-
14.	Forming	NF-4212	-
15.	Forming tolerance	NF-4221	Applies to the Container Shell
16.	Fitting and Aligning Tack Welds	NF-4231 NF-4231.1	-
17.	Alignment	NF-4232	-
18.	Storage of Welding Materials	NF-4411	-
19.	Cleanliness of Weld Surfaces	NF-4412	Applies to structural and non-structural welds
20.	Backing Strips, Peening	NF-4421	Applies to structural and non-

Table 3-2
REFERENCE ASME CODE PARAGRAPHS FOR VVM PRIMARY LOAD BEARING PARTS

	Item	**Code Paragraph [2.6.1]**	**Explanation and Applicability**
		NF-4422	structural welds
21.	Pre-heating and Interpass Temperature	NF-4611 NF-4612 NF-4613	Applies to structural and non-structural welds
22.	Non-Destructive Examination	NF-5360	Invokes Section V
23.	NDE Personnel Certification	NF-5522 NF-5523 NF-5530	-

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3.0 DESIGN FEATURES (continued)

3.4 Site-Specific Parameters and Analyses

Site-specific parameters and analyses that will require verification by the system user are, as a minimum, as follows:

1. The temperature of 80° F is the maximum average yearly temperature.
2. The allowed temperature extremes, averaged over a 3-day period, shall be greater than -40° F and less than 125° F.
3. The resultant zero period acceleration at the top of the grade and at the elevation of the Support Foundation Pad (SFP) at the host site (computed by the Newmark's rule as the sum of A+0.4*B+0.4*C, where A, B, C denote the free field ZPA's in the three orthogonal directions in decreasing magnitude, i.e., A ≥ B ≥ C) shall be less than or equal to 1.3 and 1.214, respectively.
4. The analyzed flood condition of 15 fps water velocity and a height of 125 feet of water (full submergence of the loaded cask) are not exceeded.
5. The potential for fire and explosion shall be based on site-specific considerations. The user shall demonstrate that the site-specific potential for fire is bounded by the fire conditions analyzed by the Certificate Holder, or an analysis of the site-specific fire considerations shall be performed.
6. The moment and shear capacities of the ISFSI Structures shall meet the structural requirements under the load combinations in Table 3.4-1.
7. Radiation Protection Space (RPS) as defined in Subsection 5.3.9 of Appendix A, is intended to ensure that the subgrade material in and around the lateral space occupied by the VVMs remains essentially intact under all service conditions including during an excavation activity adjacent to the RPS.
8. The SFP for a VVM array established in any one construction campaign shall be of monolithic construction, to the extent practicable, to maximize the physical stability of the underground installation.
9. Excavation activities contiguous to a loaded UMAX ISFSI on the side facing the excavation can occur down to the depth of the bottom surface of the SFP of the loaded ISFSI (i.e. within the area labeled "Space B" in Figure 3-1) considering that there may be minor variations in the depth due to normal construction practices. For excavation activities which are contiguous to the loaded ISFSI (within a distance "W," see Figure 3-1) and below the depth of the bottom surface of the SFP (i.e. within the area labeled "Space D" in Figure 3-1), a site-specific seismic analysis will be performed to demonstrate the stability of the RPS boundary and structural integrity of the ISFSI structure. This analysis shall be submitted to Holtec International to be incorporated in an amendment request for NRC review and approval prior to any excavation taking place.

10. In cases where engineered features (i.e., berms and shield walls) are used to ensure that the requirements of 10CFR72.104(a) are met, such features are to be considered important-to-safety and must be evaluated to determine the applicable quality assurance category.

11. LOADING OPERATIONS, TRANSPORT OPERATIONS, and UNLOADING OPERATIONS shall only be conducted with working area Ambient Temperature $\geq 0^{o}$ F.

12. For those users whose site-specific design basis includes an event or events (e.g., flood) that result in the blockage of any VVM inlet or outlet air ducts for an extended period of time (i.e., longer than the total Completion Time of LCO 3.1.2), an analysis or evaluation may be performed to demonstrate adequate heat removal is available for the duration of the event. Adequate heat removal is defined as fuel cladding temperatures remaining below the short term temperature limit. If the analysis or evaluation is not performed, or if fuel cladding temperature limits are unable to be demonstrated by analysis or evaluation to remain below the short term temperature limit for the duration of the event, provisions shall be established to provide alternate means of cooling to accomplish this objective.

13. Users shall establish procedural and/or mechanical barriers to ensure that during LOADING OPERATIONS and UNLOADING OPERATIONS, either the fuel cladding is covered by water, or the MPC is filled with an inert gas.

14. The entire haul route shall be evaluated to ensure that the route can support the weight of the loaded transfer cask and its conveyance.

15. The loaded transfer cask and its conveyance shall be evaluated to ensure, under the site specific Design Basis Earthquake, that the cask and its conveyance does not tipover or slide off the haul route.

(continued)

DESIGN FEATURES (continued)

Table 3-3
LOAD COMBINATIONS FOR THE TOP SURFACE PAD, ISFSI PAD, AND SUPPORT FOUNDATION PAD PER ACI-318 (2005)

Load Combination Case	Load Combination
LC-1	1.4D
LC-2	1.2D + 1.6L
LC-3	1.2D + E + L

where:
D: Dead Load including long-term differential settlement effects.
L: Live Load
E: DBE for the Site

DESIGN FEATURES (continued)

Table 3-4
Values of Principal Design Parameters for the Underground ISFSI

Thickness of the Support Foundation Pad, inch (nominal)	≥33
Thickness of the ISFSI Pad, inch (nominal)	≥34
Thickness of the Top Surface Pad, inch (nominal)	≥30
Rebar Size* (min.) and Layout* (max)	#11 @ 9" each face, each direction
Rebar Concrete Cover (top and bottom)*, inch	per 7.7.1 of ACI-318 (2005)
Compressive Strength of Concrete at ≤28 days*, psi	≥4500
Compressive Strength of Self-hardening Engineered Subgrade (SES), psi	≥1,000
Lower Bound Shear Wave Velocity in the Subgrade lateral to the VVM (Figure 3-1 Space A), fps**	≥1,300
Depth Averaged Density of subgrade in Space A. (Figure 3-1)[1]	120
Depth Averaged Density of subgrade in Space B. (Figure 3-1)[1]	110
Depth Averaged Density of subgrade in Space C. (Figure 3-1)[2]	120
Depth Averaged Density of subgrade in Space D. (Figure 3-1)[3]	120
Lower Bound Shear Wave Velocity in the Subgrade below the Support Foundation Pad (Figure 3-1 Space C & D), fps**	≥485
Lower Bound Shear Wave Velocity in the Subgrade laterally surrounding the ISFSI (Figure 3-1 Space B), fps**	≥450

* Applies to Support Foundation Pad and ISFSI Pad.

** Strain compatible effective shear wave velocities shall be computed using the guidance provided in Section 16 of the International Building Code, 2009 Edition. Users must account for potential variability in the subgrade shear wave velocity in accordance with Section 3.7.2 of NUREG-0800.

Notes:

1. A lower average density value may be used in shielding analysis per FSAR Chapter 5 for conservatism.

2. Not required for shielding.

3. This space will typically contain native soil. Not required for shielding.

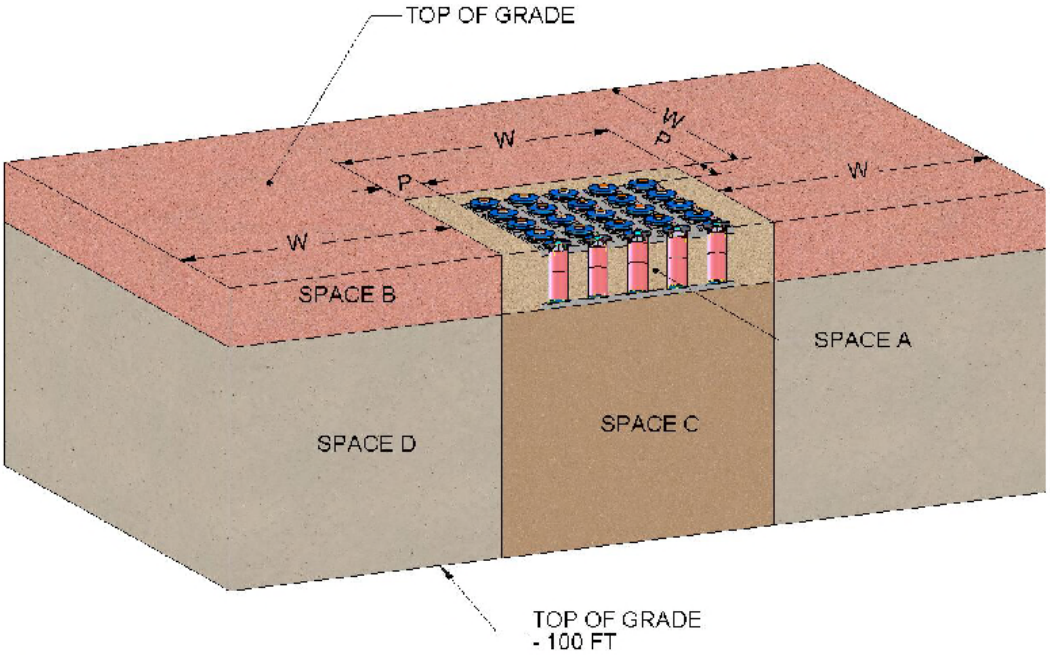

Figure 3-1 - SUBGRADE AND UNDERGRADE SPACE NOMENCLATURE

3.0 DESIGN FEATURES (continued)

3.5 Combustible Gas Monitoring During MPC Lid Welding and Cutting

During MPC lid-to-shell welding and cutting operations, combustible gas monitoring of the space under the MPC lid is required, to ensure that there is no combustible mixture present.

3.6 Periodic Corrosion Inspections for Underground Systems

HI-STORM UMAX VVM ISFSIs not employing an impressed current cathodic protection system shall be subject to visual and UT inspection of at least one representative VVM to check for significant corrosion of the CEC Container Shell and Bottom Plate at an interval not to exceed 20 years. The VVM chosen for inspection is not required to be in use or to have previously contained a loaded MPC. The VVM considered to be most vulnerable to corrosion degradation shall be selected for inspection. If significant corrosion is identified, either an evaluation to demonstrate sufficient continued structural integrity (sufficient for at least the remainder of the licensing period) shall be performed or the affected VVM shall be promptly scheduled for repair or decommissioning. Through wall corrosion shall not be permitted without promptly scheduling for repair or decommissioning. Promptness of repair or decommissioning shall be commensurate with the extent of degradation of the VVM but shall not exceed 3 years from the date of inspection.

If the representative VVM is determined to require repair or decommissioning, the next most vulnerable VVM shall be selected for inspection. This inspection process shall conclude when a VVM is found that does not require repair or decommissioning. Since the last VVM inspected is considered more prone to corrosion than the remaining un-inspected VVMs, the last VVM inspected becomes the representative VVM for the remaining VVMs.

Inspections

Visual Inspection: Visual inspection of the inner surfaces of the CEC Container Shell and Bottom Plate for indications of significant or through wall corrosion (i.e., holes).

UT Inspection: The UT inspection or an equivalent method shall be used to measure CEC shell wall thickness to determine the extent of metal loss from corrosion. A minimum of 16 data points shall be obtained, 4 near the top, 4 near the mid-height and 4 near the bottom of the CEC Container Shell all approximately 0, 90, 180, and 270 degrees apart; and 4 on the CEC Bottom Plate near the CEC Container Shell approximately 0, 90, 180, and 270 degrees apart. Locations where visual inspection has identified potentially significant corrosion shall also receive UT inspection. Locations suspected of significant corrosion may receive further UT inspection to determine the extent of corrosion.

Inspection Criteria

General wall thinning exceeding 1/8” in depth and local pitting exceeding 1/4" in depth are conditions of significant corrosion.

NRC FORM 651
(10-2004)
10 CFR 72

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS

The U.S. Nuclear Regulatory Commission is issuing this Certificate of Compliance pursuant to Title 10 of the *Code of Federal Regulations*, Part 72, "Licensing Requirements for Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste" (10 CFR Part 72). This certificate is issued in accordance with 10 CFR 72.238, certifying that the storage design and contents described below meet the applicable safety standards set forth in 10 CFR Part 72, Subpart L, and on the basis of the Final Safety Analysis Report (FSAR) of the cask design. This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Certificate No.	Effective Date	Expiration Date	Docket No.	Amendment No.	Amendment Effective Date	Package Identification No.
1014	05/31/00	05/31/20	72-1014	1~~0~~1	TBD	USA/72-1014

Issued To: (Name/Address)

Holtec International
Holtec Center
~~555 Lincoln~~One Holtec Drive~~ West~~
Marlton, NJ 08053

Safety Analysis Report Title

Holtec International Inc.,
Final Safety Analysis Report for the
HI-STORM 100 Cask System

CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features) for aboveground systems or the attached Appendix A-100U (Technical Specifications) and Appendix B-100U (Approved Contents and Design Features) for underground systems, and the conditions specified below:

1. CASK

   a. Model No.: HI-STORM 100 Cask System

   The HI-STORM 100 Cask System (the cask) consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC), which contains the MPC during loading, unloading and transfer operations. The cask stores up to 32 pressurized water reactor fuel assemblies or 68 boiling water reactor fuel assemblies.

   b. Description

   The HI-STORM 100 Cask System is certified as described in the Final Safety Analysis Report (FSAR) and in the U.S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance (CoC). The cask comprises three discrete components: the MPC, the HI-TRAC transfer cask, and the HI-STORM storage overpack.

   The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys such as the neutron absorbers. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel. The honeycombed basket, which contains neutron absorbing material, provides criticality control.

NRC FORM 651 (3-1999) 10 CFR 72

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS
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1. b. Description (continued)

There are nine types of MPCs: the MPC-24, MPC-24E, MPC-24EF, MPC-32, MPC-32F, MPC-68, MPC-68F, MPC-68FF, and MPC-68M. The number suffix indicates the maximum number of fuel assemblies permitted to be loaded in the MPC. All nine MPC models have the same external diameter.

The HI-TRAC transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the spent fuel pool to the storage overpack. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a neutron shield jacket attached to the exterior. Two sizes of HI-TRAC transfer casks are available: the 125 ton HI-TRAC and the 100 ton HI-TRAC. The weight designation indicates the approximate weight of a loaded transfer cask during any loading, unloading, or transfer operation. Both transfer cask sizes have identical cavity diameters. The 125 ton HI-TRAC transfer cask has thicker shielding and larger outer dimensions than the 100 ton HI-TRAC transfer cask.

Above Ground Systems

The HI-STORM 100 or 100S storage overpack provides shielding and structural protection of the MPC during storage. The HI-STORM 100S is a variation of the HI-STORM 100 overpack design that includes a modified lid which incorporates the air outlet ducts into the lid, allowing the overpack body to be shortened. The overpack is a heavy-walled steel and concrete, cylindrical vessel. Its side wall consists of plain (un-reinforced) concrete that is enclosed between inner and outer carbon steel shells. The overpack has four air inlets at the bottom and four air outlets at the top to allow air to circulate naturally through the cavity to cool the MPC inside. The inner shell has supports attached to its interior surface to guide the MPC during insertion and removal, provide a medium to absorb impact loads, and allow cooling air to circulate through the overpack. A loaded MPC is stored within the HI-STORM 100 or 100S storage overpack in a vertical orientation. The HI-STORM 100A and 100SA are variants of the HI-STORM 100 family and are outfitted with an extended baseplate and gussets to enable the overpack to be anchored to the concrete storage pad in high seismic applications.

Underground Systems

The HI-STORM 100U System is an underground storage system identified with the HI-STORM 100 Cask System. The HI-STORM 100U storage Vertical Ventilated Module (VVM) utilizes a storage design identified as an air-cooled vault or caisson. The HI-STORM 100U storage VVM relies on vertical ventilation instead of conduction through the soil, as it is essentially a below-grade storage cavity. Air inlets and outlets allow air to circulate naturally through the cavity to cool the MPC inside. The subterranean steel structure is seal welded to prevent ingress of any groundwater from the surrounding subgrade, and it is mounted on a stiff foundation. The surrounding subgrade and a top surface pad provide significant radiation shielding. A loaded MPC is stored within the HI-STORM 100U storage VVM in the vertical orientation.

2. OPERATING PROCEDURES

Written operating procedures shall be prepared for cask handling, loading, movement, surveillance, and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 8 of the FSAR.

3. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

Written cask acceptance tests and maintenance program shall be prepared consistent with the technical basis described in Chapter 9 of the FSAR. At completion of welding the MPC shell to baseplate, an MPC confinement weld helium leak test shall be performed using a helium mass spectrometer. This test shall include the base metals of the MPC shell and baseplate. A helium leak test shall also be performed on the base metal of the fabricated MPC lid. In the field, a helium leak test shall be performed on the vent and drain port confinement welds and cover plate base metal. The confinement boundary leakage rate tests shall be performed in accordance with ANSI N14.5 to "leaktight" criteria. If a leakage rate exceeding the acceptance criteria is detected, then the area of leakage shall be determined and the area repaired per ASME Code Section III, Subsection NB requirements. Re-testing shall be performed until the leakage rate acceptance criterion is met.

NRC FORM 651
(3-1999)
10 CFR 72

CERTIFICATE OF COMPLIANCE
FOR SPENT FUEL STORAGE CASKS
Supplemental Sheet

U.S. NUCLEAR REGULATORY COMMISSION
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4. QUALITY ASSURANCE

Activities in the areas of design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems and components, and decommissioning that are important to safety shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 72, Subpart G, and which is established, maintained, and executed with regard to the cask system.

5. HEAVY LOADS REQUIREMENTS

Each lift of an MPC, a HI-TRAC transfer cask, or any HI-STORM overpack must be made in accordance to the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant-specific review (under 10 CFR 50.59 or 10 CFR 72.48, if applicable) is required to show operational compliance with existing plant specific heavy loads requirements. Lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Section 5.5 of Appendix A and Sections 3.4.6 and 3.5 (if applicable) of Appendix B, for above ground systems, section 5.5 of Appendix A-100U for the underground systems.

6. APPROVED CONTENTS

Contents of the HI-STORM 100 Cask System must meet the fuel specifications given in Appendices B for aboveground systems or B-100U for underground systems to this certificate.

7. DESIGN FEATURES

Features or characteristics for the site, cask or ancillary equipment must be in accordance with Appendices B for aboveground systems or B-100U for underground systems to this certificate.

8. CHANGES TO THE CERTIFICATE OF COMPLIANCE

The holder of this certificate who desires to make changes to the certificate, which includes Appendices A and A-100U (Technical Specifications) and Appendices B and B-100U (Approved Contents and Design Features), shall submit an application for amendment of the certificate.

9. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE

a. For the storage configuration, each user of a HI-STORM 100 Cask and HI-STORM 100U Cask with a heat load equal to or greater than 20 kW shall perform a thermal validation test in which the user measures the total air mass flow rate through the cask system using direct measurements of air velocity in the inlet vents. The user shall then perform an analysis of the cask with the taken measurements to demonstrate that the measurements validate the analytic methods described in Chapter 4 of the FSAR. The thermal validation test and analysis results shall be submitted in a letter report to the NRC pursuant to 10 CFR 72.4 within 180 days of the user's loading of the first cask with heat load equal to or greater than 20 kW. To satisfy condition 9(a) for casks of the same system type (i.e., HI-STORM 100 casks, HI-STORM 100U casks), in lieu of additional submittals pursuant to 10 CFR 72.4, users may document in their 72.212 report a previously performed test and analysis submitted by letter report to the NRC that demonstrates validation of the analytic methods described in Chapter 4 of the FSAR.

b. For transfer configuration, each user of the HI-STORM 100 Cask and HI-STORM 100U Cask shall procure, if necessary, a Supplemental Cooling System (SCS) capable of providing the thermal-hydraulic characteristics (coolant temperature at the annulus inlet, coolant temperature located at the annulus outlet, and coolant flow rate) that will ensure that thermal limits (described in Appendix 2.C of the FSAR) are not exceeded during transfer operations. The thermal-hydraulic characteristics of the SCS shall be determined using the analytical methods described in Chapter 4 for the transfer configuration. For the transfer configuration, each first time user shall measure the SCS thermal-hydraulic characteristics to validate the performance of the SCS. The SCS analysis and validation shall be documented in an update to the 72.212 report within 180 days of the user's first transfer operation with the SCS. Condition 9(b) does not apply to the MPC-68M.

NRC FORM 651 (3-1999) 10 CFR 72

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS
Supplemental Sheet

Certificate No. 1014
Amendment No. 11~~0~~
Page 4 of 5

10. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE

A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM 100 Cask System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:

a. Moving the MPC and the transfer cask into the spent fuel pool or cask loading pool.

b. Preparation of the HI-STORM 100 Cask System for fuel loading.

c. Selection and verification of specific fuel assemblies to ensure type conformance.

d. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.

e. Remote installation of the MPC lid and removal of the MPC and transfer cask from the spent fuel pool or cask loading pool.

f. MPC welding, NDE inspections, pressure testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), and helium backfilling. (A mockup may be used for this dry-run exercise.)

g. Operation of the HI-STORM 100 SCS or equivalent system, if applicable.

h. Transfer cask upending/downending on the horizontal transfer trailer or other transfer device, as applicable to the site's cask handling arrangement.

i. Transfer of the MPC from the transfer cask to the overpack/VVM.

j. Placement of the HI-STORM 100 Cask System at the ISFSI, for aboveground systems only.

k. HI-STORM 100 Cask System unloading, including flooding MPC cavity, removing MPC lid welds. (A mockup may be used for this dry-run exercise.)

11. The NRC has approved an exemption request by the CoC applicant from the requirements of 10 CFR 72.236(f), to allow a Supplemental Cooling System to provide for decay heat removal in accordance with Section 3.1.4 of Appendices A and A-100U.

NRC FORM 651 (3-1999) 10 CFR 72

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS
Supplemental Sheet

Certificate No. 1014
Amendment No. 11~~0~~
Page 5 of 5

12. AUTHORIZATION

The HI-STORM 100 Cask System, which is authorized by this certificate, is hereby approved for general use by holders of 10 CFR Part 50 licenses for nuclear reactors at reactor sites under the general license issued pursuant to 10 CFR 72.210, subject to the conditions specified by 10 CFR 72.212, this certificate, and the attached Appendices A, B, A-100U, and B-100U, as applicable. The HI-STORM 100 Cask System may be fabricated and used in accordance with any approved amendment to CoC No. 1014 listed in 10 CFR 72.214. Each of the licensed HI-STORM 100 System components (i.e., the MPC, overpack, and transfer cask), if fabricated in accordance with any of the approved CoC Amendments, may be used with one another provided an assessment is performed by the CoC holder that demonstrates design compatibility.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

TBD, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards
Washington, DC 20555

Dated TBD

Attachments:
1. Appendix A
2. Appendix B
3. Appendix A-100U
4. Appendix B-100U

EXHIBIT 9

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 17, 2015

Mr. Thomas J. Palmisano
Vice President and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENT FOR PERMANENTLY SHUTDOWN AND DEFUELED OPERATING LICENSE AND TECHNICAL SPECIFICATIONS (TAC NOS. MF3774 AND MF3775)

Dear Mr. Palmisano:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 230 to Facility Operating License No. NPF-10, and Amendment No. 223 to Facility Operating License No. NPF-15, for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively. The amendments consist of changes to the SONGS facility operating licenses and the Technical Specifications (TSs) in response to your application dated March 21, 2014, as supplemented by letters dated October 1, 2014; and February 23, February 25, and March 18, 2015.

The proposed amendments revise the operating licenses and associated TSs to reflect the permanent cessation of reactor operations and the permanently defueled condition of the reactor vessels at SONGS Units 2 and 3. In general, the changes eliminate those TSs applicable in operating MODES; MODES where fuel is emplaced in the reactor vessel, and certain TSs required for movement of irradiated fuel assemblies. Changes were also made to the TS definitions, administrative controls, and related to programs and procedures. The proposed amendments also revise the facility operating licenses to clarify or remove certain conditions no longer relevant and add conditions consistent with other permanently shutdown and defueled reactors. Related Amendment Nos. 227 and 220 for SONGS Units 2 and 3, respectively, were issued on September 30, 2014, to revise and remove certain requirements from Section 5.0, "Administrative Controls," of the SONGS Units 2 and 3 TSs to reflect the permanently shutdown and defueled staffing and training requirements for SONGS Units 2 and 3 operations staff.

T. Palmisano

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Thomas J. Wengert, Senior Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosures:
1. Amendment No. 230 to NPF-10
2. Amendment No. 223 to NPF-15
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 230
License No. NPF-10

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated March 21, 2014, as supplemented by letters dated October 1, 2014; and February 23, February 25, and March 18, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

Enclosure 1

2. Accordingly, Facility Operating License No. NPF-10 is hereby amended to read, as follows, as indicated in the attachment to this license amendment.

Paragraph 2.B.(2) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities", to possess and use the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license;

Paragraph 2.B.(3) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

Paragraph 2.B.(4) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

Paragraph 2.C.(1) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(1) Deleted

Paragraph 2.C.(2) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 230, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Paragraph 2.C.(14) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(14) Deleted

Paragraph 2.C.(27) of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

(27) Deleted

New License Condition 2.C.(28) of Facility Operating License No. NPF-10 is hereby added to read, as follows:

(28) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 2 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 2 until such time that all spent fuel has been removed from the Unit 2 spent fuel pool.

Paragraph 2.J of Facility Operating License No. NPF-10 is hereby amended to read, as follows:

J. Deleted

New License Condition 3 of Facility Operating License No. NPF-10 is hereby added to read, as follows:

3. On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 2 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On July 22, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 2 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Meena K. Khanna, Chief
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility
Operating License No. NPF-10
and Technical Specifications

Date of Issuance: July 17, 2015

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 223
License No. NPF-15

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated March 21, 2014, as supplemented by letters dated October 1, 2014; and February 23, February 25, and March 18, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

Enclosure 2

2. Accordingly, Facility Operating License No. NPF-15 is hereby amended to read, as follows, as indicated in the attachment to this license amendment.

Paragraph 2.B.(2) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities", to possess and use the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license;

Paragraph 2.B.(3) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

Paragraph 2.B.(4) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

Paragraph 2.C.(1) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(1) Deleted

Paragraph 2.C.(2) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 223, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Paragraph 2.C.(12) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(12) Deleted

Paragraph 2.C.(28) of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

(28) Deleted

New License Condition 2.C.(29) of Facility Operating License No. NPF-15 is hereby added to read, as follows:

(29) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 3 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 3 until such time that all spent fuel has been removed from the Unit 3 spent fuel pool.

Paragraph 2.J of Facility Operating License No. NPF-15 is hereby amended to read, as follows:

J. Deleted

New License Condition 3 of Facility Operating License No. NPF-15 is hereby added to read, as follows:

3. On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 3 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On June 28, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 3 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Meena K. Khanna, Chief
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility
Operating License No. NPF-15
and Technical Specifications

Date of Issuance: July 17, 2015

ATTACHMENT TO LICENSE AMENDMENT NO. 230

TO FACILITY OPERATING LICENSE NO. NPF-10

AND LICENSE AMENDMENT NO. 223

TO FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NOS. 50-361 AND 50-362

Replace the following pages of the Facility Operating License Nos. NPF-10 and NPF-15, and Appendix A Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License No. NPF-10

Remove	Insert
-2-	-2-
-3-	-3-
-5-	-5-
-8-	-8-
-9-	-9-
---	-10-

Facility Operating License No. NPF-15

Remove	Insert
-2-	-2-
-3-	-3-
-4-	-4-
-5-	-5-
-7-	-7-
-9-	-9-

Technical Specifications

Remove	Insert
All pages	All pages

Facility Operating License No. NPF-10

Revised License Pages

G. The licensees have satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;

H. The issuance of this license will not be inimical to the common defense and security or to the health and safety of the public;

I. After weighing the environmental, economic, technical, and other benefits of the facility against environmental and other costs and considering available alternatives, the issuance of Facility Operating License No. NPF-10, subject to the condition for protection of the environment set forth herein, is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and

J. The receipt, possession, and use of source, byproduct, and special nuclear material as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30, 40 and 70.

2. Based on the foregoing findings and the Partial Initial Decision issued by the Atomic Safety and Licensing Board on January 11, 1982, regarding this facility, Facility Operating License No. NPF-10 is hereby issued to the Southern California Edison Company, the San Diego Gas and Electric Company, the City of Riverside, California, and the City of Anaheim, California[1] to read as follows:

A. This license applies to the San Onofre Nuclear Generating Station, Unit 2, a pressurized water nuclear reactor and associated equipment (the facility), owned by the licensees. The facility is located in San Diego County, California, and is described in the Final Safety Analysis Report as supplemented and amended, and the Environmental Report, as supplemented and amended.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses:

(1) Southern California Edison Company, San Diego Gas and Electric Company, the City of Riverside, California, and the City of Anaheim, California[1] to possess the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license;

(2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess and use the facility at the designated location in San Diego County, California in accordance with the procedures and limitations set forth in this license;

---

[1]The City of Anaheim has transferred its ownership interests in the facility, and entitlement to facility output, to Southern California Edison Company, except that it retains its ownership interests in its spent nuclear fuel and the facility's independent spent fuel storage installation located on the facility's site. In addition, the City of Anaheim retains financial responsibility for its spent fuel and for a portion of the facility's decommissioning costs. The City of Anaheim remains a licensee for purposes of its retained interests and liabilities.

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 2 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Deleted

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 230, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(14) Deleted

(15) Turbine Disc Inspection (Section 10.2.2, SER)

Deleted by Amendment No. 185

(16) Radioactive Waste System (Section 11.1, SER, SSER #5)

Deleted by Amendment No. 185

(17) Purge System Monitors (Section 11.3, SER, SSER #5)

Deleted by Amendment No. 185

(18) Initial Test Program (Section 14, SER)

Deleted by Amendment No. 185

(19) NUREG-0737 Conditions (Section 22)

a. Shift Technical Advisor (I.A.1.1, SSER #1)
Deleted by Amendment No. 185

b. Shift Manning (I.A.1.3. SSER #1, SSER #5)
Deleted by Amendment No. 147

c. Independent Safety Engineering Group (1.B.1.2. SSER #1)

Deleted by Amendment No. 185

d. Procedures for Transients and Accidents (I.C.1, SSER #1, SSER #2, SSER #5)

Deleted by Amendment No. 185

6. Training on integrated fire response strategy
7. Spent fuel pool mitigation measures

(c) Actions to minimize release to include consideration of:
1. Water spray scrubbing
2. Dose to onsite responders

(27) Deleted

(28) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 2 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 2 until such time that all spent fuel has been removed from the Unit 2 spent fuel pool.

D. Exemptions to certain requirements of Appendices G, H and J to 10 CFR Part 50 are described in the Office of Nuclear Reactor Regulation's Safety Evaluation Report. These exemptions are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. Therefore, these exemptions are hereby granted. The facility will operate, to the extent authorized herein, in conformity with the application, as amended, the provisions of the Act, and the regulations of the Commission.

E. SCE shall fully implement and maintain in effect all provisions of the Commission- approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contain Safeguards Information protected under 10 CFR 73.21 is entitled: "San Onofre Nuclear Generating Station Security, Training and Qualification, and Safeguards Contingency Plan, Revision 2" submitted by letter dated May 15, 2006. SCE shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The SONGS CSP was approved by License Amendment No. 225.

F. This license is subject to the following additional condition for the protection of the environment:

Before engaging in activities that may result in a significant adverse environmental impact that was not evaluated or that is significantly greater than that evaluated in the Final Environmental Statement, SCE shall provide a written notification of such activities to the NRC Office of Nuclear Reactor Regulation and receive written approval from that office before proceeding with such activities.

G. DELETED

H. SCE shall notify the Commission, as soon as possible but not later than one hour, of any accident at this facility which could result in an unplanned release of quantities of fission products in excess of allowable limits for normal operation established by the Commission.

I. SCE shall have and maintain financial protection of such type and in such amounts as the Commission shall require in accordance with Section 170 of the Atomic Energy Act of 1954, as amended, to cover public liability claims.

J. Deleted

*On September 29, 1983, the Safeguards Contingency Plan was made a separate, companion document to the Physical Security Plan pursuant to the authority of 10 CFR 50.54.

3. On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 2 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On July 22, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

   This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 2 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

   A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

   B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed by
Harold R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures:
1. Appendix A (Technical Specifications)
2. Appendix B (Environmental Protection Plan)
3. Appendix C (Antitrust Conditions)

Date of Issuance: FEB 16 1982

Facility Operating License No. NPF-15

Revised License Pages

F. The licensees have satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;

G. The issuance of this license will not be inimical to the common defense and security or to the health and safety of the public;

H. After weighing the environmental, economic, technical, and other benefits of the facility against environmental and other costs and considering available alternatives, the issuance of Facility Operating License No. NPF-15, subject to the condition for protection of the environment set forth herein, is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and

I. The receipt, possession, and use of source, byproduct, and special nuclear material as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30, 40 and 70.

2. Based on the foregoing findings and the Partial Initial Decision issued by the Atomic Safety and Licensing Board on January 11, 1982, and the Initial Decision issued by the Atomic Safety and Licensing Board on May 14, 1982 regarding this facility, Facility Operating License No. NPF-15 is hereby issued to the Southern California Edison Company, the San Diego Gas and Electric Company, the City of Riverside, California, and the City of Anaheim, California[1] to read as follows:

A. This license applies to the San Onofre Nuclear Generating Station, Unit 3, a pressurized water nuclear reactor and associated equipment (the facility), owned by the licensees. The facility is located in San Diego County, California, and is described in the Final Safety Analysis Report, as amended, through Amendment 30, and the Environmental Report, as amended, through Amendment 6.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses:

(1) Southern California Edison Company, San Diego Gas and Electric Company, the City of Riverside, California, and the City of Anaheim, California[1] to possess the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license;

(2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess and use the facility at the designated location in San Diego County, California in accordance with the procedures and limitations set forth in this license;

[1]The City of Anaheim has transferred its ownership interests in the facility, and entitlement to facility output, to Southern California Edison Company, except that it retains its ownership interests in its spent nuclear fuel and the facility's independent spent fuel storage installation located on the facility's site. In addition, the City of Anaheim retains financial responsibility for its spent fuel and for a portion of the facility's decommissioning costs. The City of Anaheim remains a licensee for purposes of its retained interests and liabilities.

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 3 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Deleted

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 223, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

SCE shall comply with the antitrust conditions delineated in Appendix C to this license.

(4) Containment Tendon Surveillance (Section *3.8.1, SER, SSER #5)

Deleted by Amendment No. 26

(5) Environmental Qualification (Section 3.11, SER, SSER #3, SSER #4)

Deleted by Amendment No. 49

(6) High Burnup Fission Gas Release (Section 4.2.2.2, SER)

Deleted by Amendment No. 176

(7) Low Temperature Overpressurization Protection (Section 5.2.2.2, SER)

Deleted by Amendment No. 176

(8) Volume Control Tank Control Logic (Section 7.3.5, SSER #4)

Deleted by Amendment No. 176

(9) Compliance with Regulatory Guide 1.97 (Section 7.5.1, SER, SSER #5)

Deleted by Amendment No. 176

(10) Control System Failures (Section 7.7, SER, SSER #4)

Deleted by Amendment No. 176

(11) Diesel Generator Modifications (Section 8.3.1, SER)

Deleted by Amendment No. 176

(12) Deleted

*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

(13) Turbine Disc Inspection (Section 10.2.2, SER)

Deleted by Amendment No. 176

(14) Radioactive Waste System (Section 11.1, SER, SSER #5)

Deleted by Amendment No. 176

(15) Purge System Monitors (Section 11.3, SER, SSER #5)

Deleted by Amendment No. 176

(16) Initial Test Program (Section 14, SER)

Deleted by Amendment No. 176

(17) NUREG-0737 Conditions (Section 22)

Deleted by Amendment No. 176

a. Procedures for Transients and Accidents (I.C.1, SSER #1, SSER #2, SSER #5)

Deleted by Amendment No. 176

b. Procedures for Verifying Correct Performance of Operating Activities (I.C.6, SSER #1)

Deleted by Amendment No. 176

c. Control Room Design Review (I.D.1, SSER #1)

Deleted by Amendment No. 176

d. Post Accident Sampling System (NUREG-0737 Item II.B.3)

Deleted by Amendment No. 169

e. Direct Indication of Safety Valve Position (II.D.3, SSER #1)

Deleted by Amendment No. 176

f. AFW Pump 48-hour Endurance Test (II.E.1.1, SSER #11)

Deleted by Amendment No. 176

g. Emergency Power Supply for Pressurizer Heaters (II.E.3.1, SSER #1, SSER #5)

Deleted by Amendment No. 176

h. ICC Instrumentation (II.F.2, SSER #1, SSER #2, SSER #4)

Deleted by Amendment No. 176

(27) Mitigation Strategy License Condition

Develop and maintain strategies for addressing large fires and explosions and that include the following key areas:

(a) Fire fighting response strategy with the following elements:
1. Pre-defined coordinated fire response strategy and guidance
2. Assessment of mutual aid fire fighting assets
3. Designated staging areas for equipment and materials
4. Command and control
5. Training of response personnel

(b) Operations to mitigate fuel damage considering the following:
1. Protection and use of personnel assets
2. Communications
3. Minimizing fire spread
4. Procedures for implementing integrated fire response strategy
5. Identification of readily-available pre-staged equipment
6. Training on integrated fire response strategy
7. Spent fuel pool mitigation measures

(c) Actions to minimize release to include consideration of:
1. Water spray scrubbing
2. Dose to onsite responders

(28) Deleted

(29) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 3 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 3 until such time that all spent fuel has been removed from the Unit 3 spent fuel pool.

D. Exemptions to certain requirements of Appendices G, H and J to 10 CFR Part 50 are described in the Office of Nuclear Reactor Regulation's Safety Evaluation

J. Deleted

K. Deleted by Amendment No. 176

3. On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 3 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On June 28, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 3 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed by
Harold R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Attachments:
1. Attachment 1 - Deleted by Amendment No. 176
2. Appendix A (Technical Specifications)
3. Appendix B (Environmental Protection Plan)
4. Appendix C (Antitrust Conditions)

Date of Issuance: NOV 15 1982

APPENDIX A

TO THE

FACILITY OPERATING LICENSE NPF-10

AND

FACILITY OPERATING LICENSE NPF-15

TECHNICAL SPECIFICATIONS FOR

SAN ONOFRE NUCLEAR GENERATING STATION UNIT 2 AND UNIT 3

TABLE OF CONTENTS

1.0 USE AND APPLICATION

1.1 Definitions

----------NOTE----------
The defined terms of this section appear in capitalized type and are applicable throughout these Technical Specifications and Bases.

Term	Definition
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
CERTIFIED FUEL HANDLER	A CERTIFIED FUEL HANDLER is an individual who complies with provisions of the CERTIFIED FUEL HANDLER training program required by TS 5.3.2.
OPERABLE–OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).

1.0 USE AND APPLICATION

1.2 Logical Connectors

PURPOSE

The purpose of this section is to explain the meaning of logical connectors.

Logical connectors are used in Technical Specifications (TS) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TS are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

BACKGROUND

Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors.

When logical connectors are used to state a Condition, Completion Time, Surveillance, or Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance, or Frequency.

EXAMPLE

The following example illustrates the use of logical connectors.

EXAMPLE 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Verify . . . AND A.2 Restore . . .	

In this example the logical connector AND is used to indicate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.
BACKGROUND	Limiting Condition for Operation (LCOs) specify minimum requirements for ensuring safe storage of fuel assemblies. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).
DESCRIPTION	The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the facility is in a specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the facility is not within the LCO Applicability.
EXAMPLE	The following example illustrates the use of Completion Times.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Verify . . . AND B.2 Restore . . .	6 hours 36 hours

Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to perform the verification within 6 hours AND perform the restoration within 36 hours. A total of 6 hours is allowed for performing the verification and a total of 36 hours (not 42 hours) is allowed for performing the restoration from the time that Condition B was entered. If verification is performed within 3 hours, the

1.3 Completion Times

EXAMPLE (continued)	
	time allowed for performing the restoration is the next 33 hours because the total time allowed for performing the restoration is 36 hours.
IMMEDIATE COMPLETION TIME	When "Immediately" is used as a Completion Time, the Required Action should be pursued without delay and in a controlled manner.

1.0 USE AND APPLICATION

1.4 Frequency

PURPOSE	The purpose of this section is to define the proper use and application of Frequency requirements.
DESCRIPTION	Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated LCO. An understanding of the correct application of the specified Frequency is necessary for compliance with the SR. The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Surveillance Requirement (SR) Applicability. The "specified Frequency" consists of the requirements of the Frequency column of each SR, as well as certain Notes in the Surveillance column that modify performance requirements.
EXAMPLES	The following examples illustrate the various ways that Frequencies are specified. In these examples, the Applicability of the LCO (LCO not shown) occurs whenever any fuel assembly is stored in the fuel storage pool.

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify . . .	7 days

Example 1.4-1 contains the type of SR most often encountered in the Technical Specifications (TS). The Frequency specifies an interval (7 days) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 7 days, an extension of the time interval to 1.25 times the stated Frequency is allowed by SR 3.0.2 for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1 (such as when the equipment is inoperable, a variable is outside specified limits, or the facility is outside the Applicability of the LCO). If the interval specified by SR 3.0.2 is exceeded while the facility is in a specified condition in the Applicability of the LCO, then SR 3.0.3 becomes applicable.

1.4 Frequency

EXAMPLES (continued)

If the interval as specified by SR 3.0.2 is exceeded while the facility is not in a specified condition in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2 prior to entry into the specified condition. Failure to do so would result in a violation of SR 3.0.4.

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify . . .	Prior to moving a fuel assembly . . .

Example 1.4-2 illustrates a one time performance Frequency.

This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2.

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1	LCOs shall be met during the specified conditions in the Applicability, except as provided in LCO 3.0.2.
LCO 3.0.2	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during the specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.
SR 3.0.2	The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.
SR 3.0.3	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed. If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered. The Completion Times of the Required Actions begin immediately upon expiration of the delay period. When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered. The Completion Times of the Required Actions begin immediately upon failure to meet the Surveillance.
SR 3.0.4	Entry into a specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into specified conditions in the Applicability that are required to comply with ACTIONS.

3.1 PLANT SYSTEMS

3.1.1 Fuel Storage Pool Water Level

LCO 3.1.1 The fuel storage pool water level shall be ≥ 23 ft over the top of irradiated fuel assemblies seated in the storage racks.

APPLICABILITY: During movement of fuel assemblies in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel storage pool water level not within limit.	A.1 Suspend movement of fuel assemblies in fuel storage pool.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify the fuel storage pool water level is ≥ 23 ft above the top of irradiated fuel assemblies seated in the storage racks.	7 days

3.1 PLANT SYSTEMS

3.1.2 Fuel Storage Pool Boron Concentration

LCO 3.1.2 The fuel storage pool boron concentration shall be ≥ 2000 ppm.

APPLICABILITY: Whenever any fuel assembly is stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Fuel storage pool boron concentration not within limit.	A.1	Suspend movement of fuel assemblies in the fuel storage pool.	Immediately
	AND		
	A.2	Initiate action to restore fuel storage pool boron concentration to within limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify the fuel storage pool boron concentration is within limit.	7 days

3.1 PLANT SYSTEMS

3.1.3 Spent Fuel Assembly Storage

LCO 3.1.3 The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region I shall be within the acceptable burnup domain of Figure 3.1.3-1 or Figure 3.1.3-2 or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region II shall be within the acceptable burnup domain of Figure 3.1.3-3 or Figure 3.1.3-4, or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Technical Specification 4.3.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Requirements of the LCO not met.	A.1	Initiate action to bring the noncomplying fuel assembly into compliance.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify by administrative means the initial enrichment, burnup, and cooling time of the fuel assembly are in accordance with LCO 3.1.3, or Design Features 4.3.1.1, or Licensee Controlled Specification (LCS) 4.0.100. Rev 2, dated 09/27/07.	Prior to moving a fuel assembly to any spent fuel pool storage location.

FIGURE 3.1.3-1

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION I RACKS

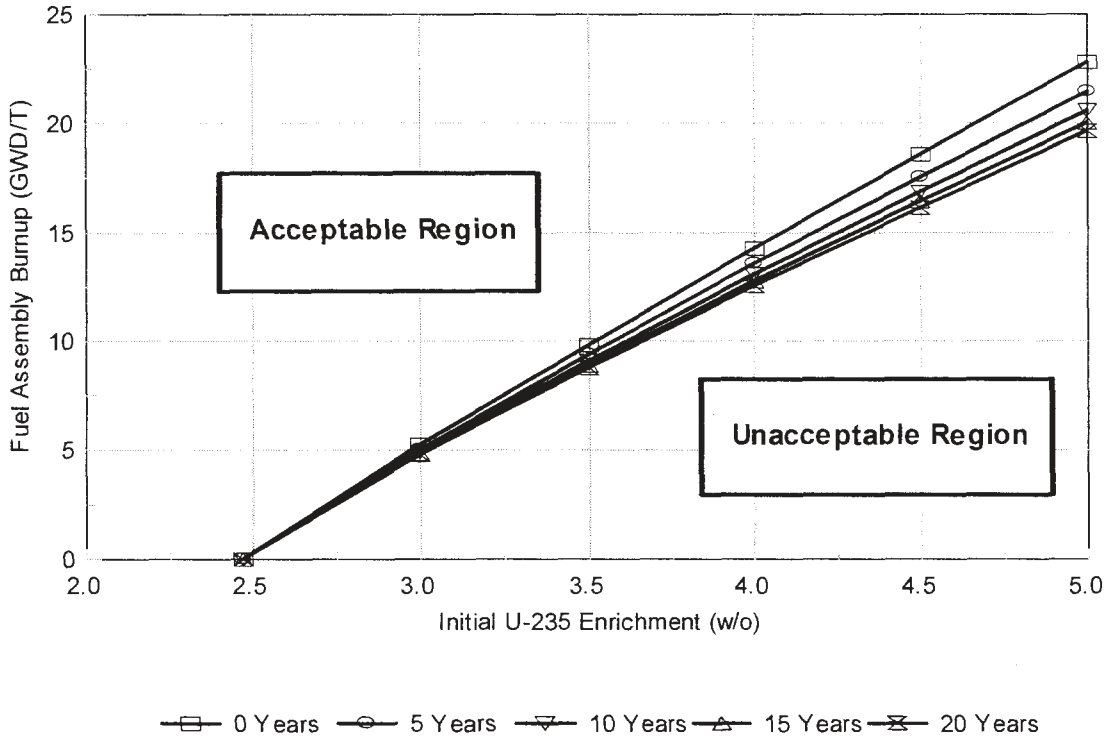


FIGURE 3.1.3-2

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION I RACKS

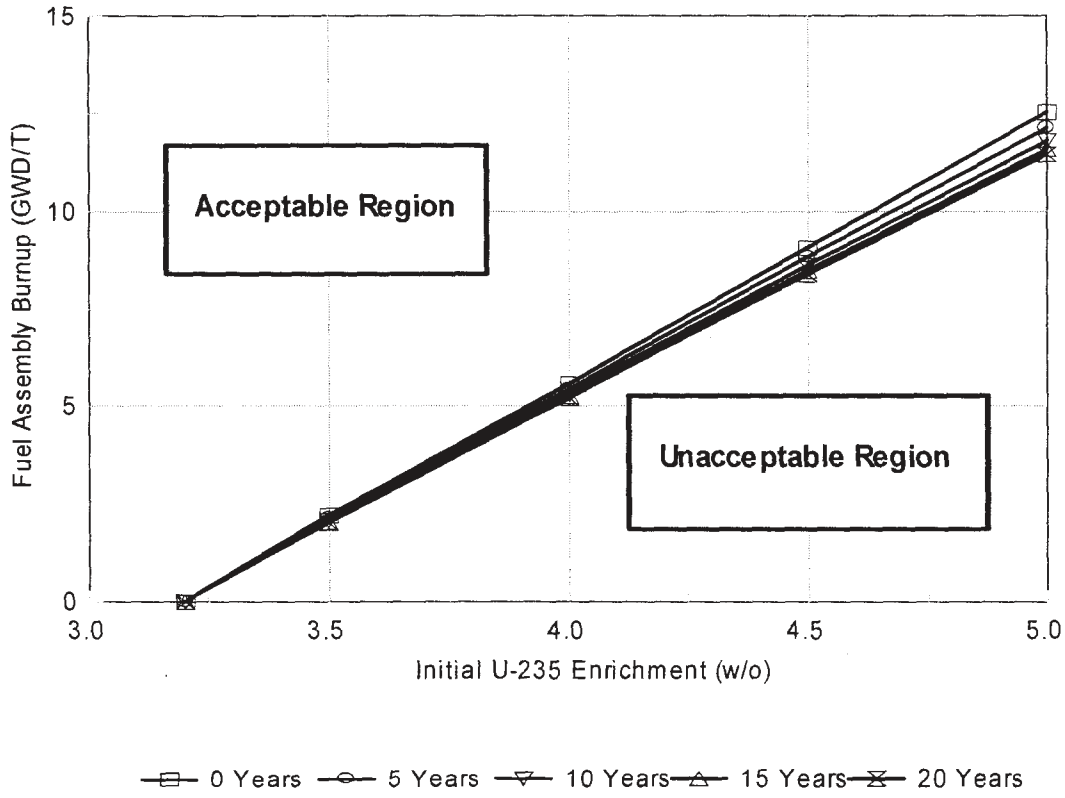


FIGURE 3.1.3-3

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION II RACKS

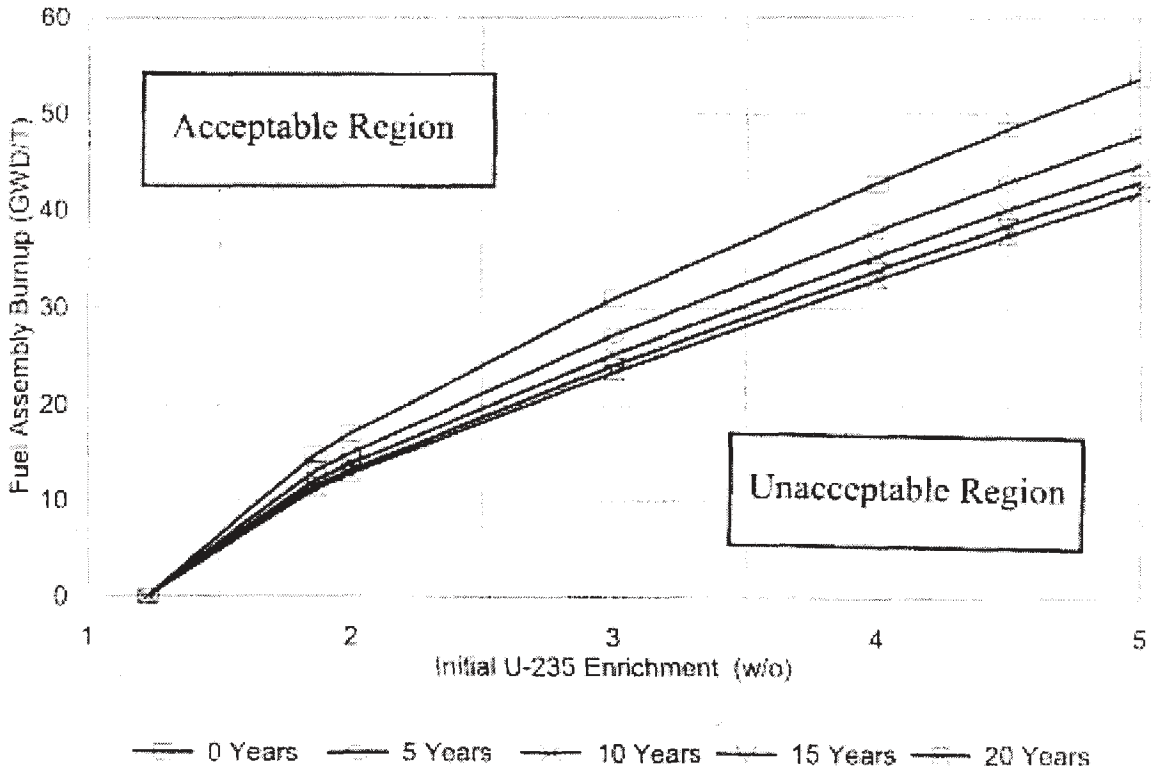
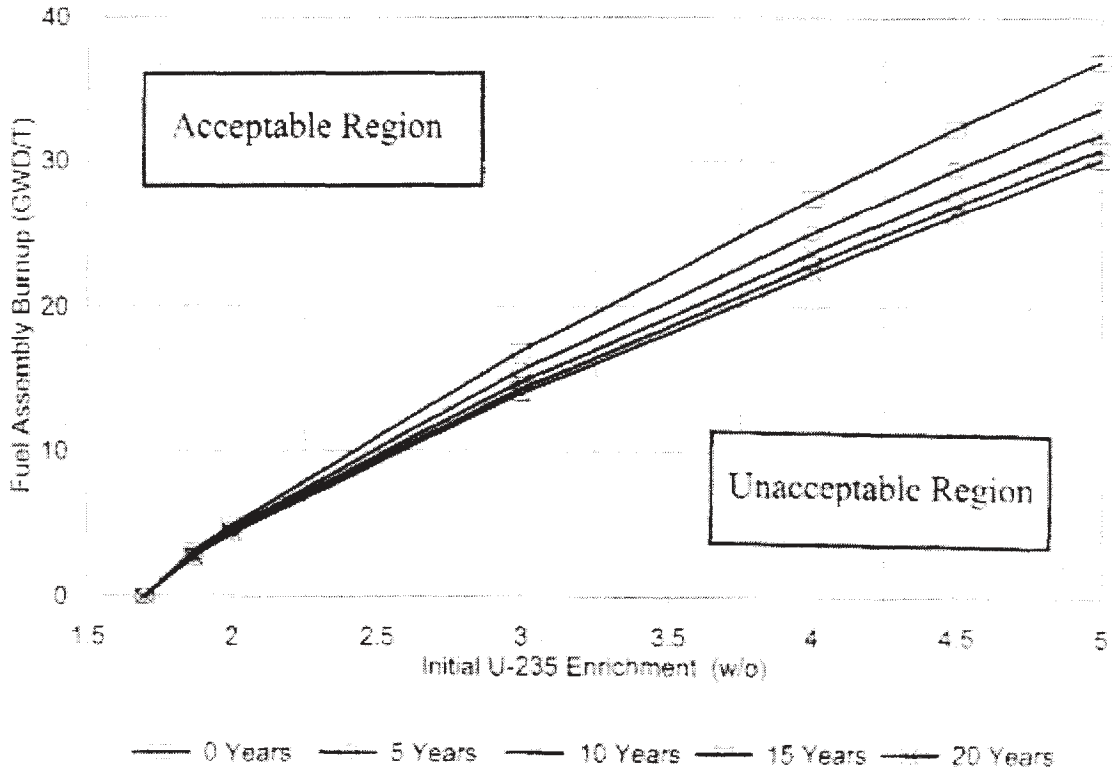


FIGURE 3.1.3-4

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION II RACKS



4.0 DESIGN FEATURES

4.1 Site

4.1.1 Exclusion Area Boundary

The exclusion area boundary shall be as shown in Figure 4.1-1.

4.1.2 Low Population Zone (LPZ)

The LPZ shall be as shown in Figure 4.1-2.

4.2 Deleted.

4.0 DESIGN FEATURES (continued)

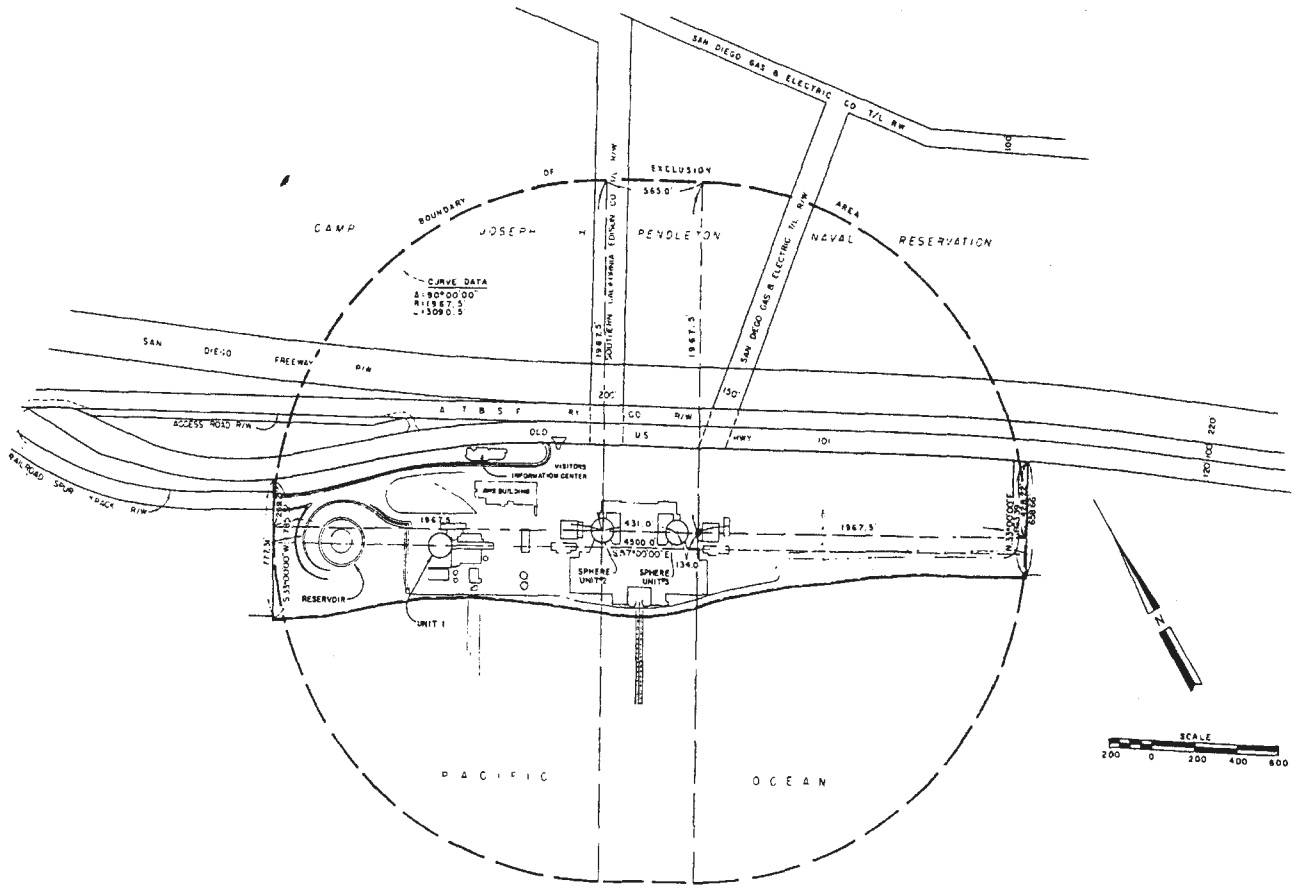


Figure 4.1-1 (page 1 of 1)
Exclusion Area Boundary

4.0 DESIGN FEATURES (continued)

Figure 4.1-2 (page 1 of 1)
Low Population Zone

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. K_{eff} < 1.0 if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. K_{eff} ≤ 0.95 if fully flooded with water borated to 1700 ppm, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

d. Three or five Borated stainless steel guide tube inserts (GT-Insert) may be used. When three borated stainless steel guide tube inserts are used, they will be installed in an assembly's center guide tube, the guide tube associated with the serial number, and the diagonally opposite guide tube. Fuel containing GT-Inserts may be placed in either Region I or Region II. However, credit for GT-Inserts is only taken for Region II storage.

A five-finger CEA may be installed in an assembly. Fuel containing a five-finger CEA may be placed in either Region I or Region II. Credit for inserted 5-finger CEAs is taken for both Region I and Region II.

e. A nominal 8.85 inch center to center distance between fuel assemblies placed in Region II;

f. A nominal 10.40 inch center to center distance between fuel assemblies placed in Region I;

g. Prior to using the storage criteria of LCO 3.1.3 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

h. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.1.3-1 are allowed unrestricted storage in Region I;

i. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.1.3-2 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region I;

j. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.1.3-3 are allowed unrestricted storage in Region II;

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.1.3-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

l. Units 2 and 3 fuel assemblies with a burnup in the "unacceptable range" of Figure 3.1.3-1, Figure 3.1.3-2, Figure 3.1.3-3, and Figure 3.1.3-4 will be stored in compliance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 9/27/07; and

m. Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 9/27/07.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below Technical Specification 3.1.1 value (23 feet above the top of irradiated fuel assemblies seated in the storage racks).

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1542 fuel assemblies.

5.0 ADMINISTRATIVE CONTROLS

5.1 Responsibility

5.1.1	The corporate officer with direct responsibility for the plant shall be responsible for overall management of the San Onofre Nuclear Generating Station, and all site support functions. He shall delegate in writing the succession to this responsibility during his absence.
5.1.2	The Shift Manager shall be responsible for the ultimate command decision authority for all unit activities which affect the safety of the plant, site personnel, and/or the general public.

5.0 ADMINISTRATIVE CONTROLS

5.2 Organization

5.2.1 Onsite and Offsite Organizations

Onsite and offsite organizations shall be established for plant operation and corporate management, respectively. The onsite and offsite organizations shall include the positions for activities affecting the safety of the nuclear fuel.

a. Lines of authority, responsibility, and communication shall be established and defined for the highest management levels through intermediate levels to and including all operating organization positions. These relationships shall be documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation. These relationships, including the plant-specific titles of those personnel fulfilling the responsibilities for the positions delineated in these Technical Specifications, are documented in the UFSAR.

b. The corporate officer with direct responsibility for the plant shall be responsible for overall safe handling and storage of nuclear fuel and shall have control over those onsite activities necessary for safe handling and storage of the nuclear fuel.

c. A specified corporate officer (or officers) shall have corporate responsibility for overall plant nuclear safety and shall take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to ensure safe management of nuclear fuel.

d. The individuals who train CERTIFIED FUEL HANDLERS, and those who carry out radiation protection and quality assurance functions may report to the appropriate onsite manager; however, they shall have sufficient organizational freedom to ensure their ability to perform their assigned functions.

5.2.2 FACILITY STAFF

The facility staff organization shall include the following:

a. Each on duty shift shall be composed of at least the minimum shift crew composition shown in Table 5.2.2-1.

b. At least one person qualified as Emergency Coordinator/Emergency Director shall be in the Control Room when nuclear fuel is stored in the spent fuel pools.

5.2 Organization

5.2.2 FACILITY STAFF (continued)

c. Shift crew composition may be less than the minimum requirement of Table 5.2.2-1 for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements. During such absences, no fuel movement or movement of heavy loads over storage racks containing fuel is permitted.

d. Oversight of fuel handling operations shall be provided by a CERTIFIED FUEL HANDLER.

e. The Shift Manager shall be a CERTIFIED FUEL HANDLER.

f. An individual qualified in radiation protection procedures shall be on site during fuel handling operations or movement of loads over the storage racks containing fuel.

5.2 Organization (continued)

Table 5.2.2-1
Minimum Shift Crew Composition

POSITION	MINIMUM STAFFING
CERTIFIED FUEL HANDLER	1*
Certified Operator	1

Note: The Certified Operator position may be filled by a CERTIFIED FUEL HANDLER.
* May be shared between Units 2 and 3.

5.0 ADMINISTRATIVE CONTROLS

5.3 Facility Staff Qualifications

5.3.1	Each member of the facility staff shall meet or exceed the minimum qualifications of ANSI N18.1-1971 for comparable positions, except: a) the radiation protection manager who shall meet or exceed the qualifications of Regulatory Guide 1.8, September 1975.
5.3.2	An NRC approved training and retraining program for the CERTIFIED FUEL HANDLERS shall be maintained.

5.0 ADMINISTRATIVE CONTROLS

5.4 Technical Specifications (TS) Bases Control

5.4.1 Changes to the Bases of the TS shall be made under appropriate administrative controls.

5.4.2 Changes to the Bases may be made without prior NRC approval provided the changes do not require either of the following:

a. A change in the TS incorporated in the license; or

b. A change to the updated UFSAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

5.4.3 The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the UFSAR.

5.4.4 Proposed changes that meet the criteria of (a) or (b) above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC every 24 months.

5.0 ADMINISTRATIVE CONTROLS

5.5 Procedures, Programs, and Manuals

5.5.1 Procedures

5.5.1.1 Scope

Written procedures shall be established, implemented, and maintained covering the following activities:

a. The applicable procedures recommended in Regulatory guide 1.33, Revision 2, Appendix A, February 1978;

b. Deleted.

c. Quality assurance for effluent and environmental monitoring using the guidance in Regulatory Guide 4.15, Revision 1, 1979;

d. Fire Protection Program implementation; and

e. Programs, as specified in Specification 5.5.2.

5.5.2 Programs and Manuals

The following programs and manuals shall be established, implemented, and maintained.

5.5.2.1 Offsite Dose Calculation Manual (ODCM)

a. The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the Radiological Environmental Monitoring Program;

b. The ODCM shall also contain the Radioactive Effluent Controls required by Specification 5.5.2.3 and Radiological Environmental Monitoring programs required by the LCS, and descriptions of the information that should be included in the Annual Radiological Environmental Operating Report and the Radioactive Effluent Release Report required by Specification 5.7.1.2 and Specification 5.7.1.3.

5.5.2.1.1 Licensee-initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

5.5 Procedures, Programs, and Manuals

5.5.2.1.1 Licensee-initiated changes to the ODCM (continued):

1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s);

2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.106, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

3. Documentation of the fact that the change has been reviewed and found acceptable.

b. Shall become effective upon review and approval by the corporate officer with direct responsibility for the plant or designee.

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented.

5.5.2.2 Deleted

5.5.2.3 Radioactive Effluent Controls Program

This program conforming to 10 CFR 50.36a provides for the control of radioactive effluents and for maintaining the doses to members of the public from radioactive effluents as low as reasonably achievable. The program shall be contained in the ODCM, shall be implemented by operating procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

a. Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

b. Limitations on the concentrations of radioactive material released in liquid effluents to unrestricted areas, conforming to 10 CFR 20, Appendix B, Table II, Column 2;

c. Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.106 and with the methodology and parameters in the ODCM;

5.5 Procedures, Programs, and Manuals

5.5.2.3 Radioactive Effluent Controls Program (continued)

d. Limitations on the annual and quarterly doses or dose commitment to a member of the public from radioactive materials in liquid effluents released from each unit to unrestricted areas, conforming to 10 CFR 50, Appendix I;

e. Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

f. Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2 percent of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

g. Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas beyond the site boundary conforming to the dose associated with 10 CFR 20, Appendix B, Table II, Column 1;

h. Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

i. Limitations on the annual and quarterly doses to a member of the public from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

j. Limitations on the annual dose or dose commitment to any member of the public due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

5.5.2.4 Deleted

5.5.2.5 Deleted

5.5.2.6 Deleted

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.7 Storage Tank Radioactivity Monitoring Program

This program provides controls for the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

The program shall include a surveillance program to ensure that the quantity of radioactivity contained in all outdoor liquid radwaste tanks that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents and that do not have tank overflows and surrounding area drains connected to the Liquid Waste Management System is less than the amount that would result in concentrations less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Storage Tank Radioactivity Monitoring Program surveillance frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.6 Deleted

5.0 ADMINISTRATIVE CONTROLS

5.7 Reporting Requirements

5.7.1 Routine Reports

In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted in accordance with 10 CFR 50.4. The reports shall be addressed to the U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, Washington, D.C., with a copy to the Regional Administrator of the Regional Office of the NRC, unless otherwise noted.

5.7.1.1 Deleted

5.7.1.2 Annual Radiological Environmental Operating Report

The Annual Radiological Environmental Operating Report covering the operation of the facility during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. The report shall identify the thermoluminescent dosimeter (TLD) results that represent collocated dosimeters in relation to the NRC TLD program and the exposure period associated with each result. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.7 Reporting Requirements (continued)

5.7.1.3 Radiological Effluent Release Report

The Radioactive Effluent Release Report covering the operation of the facility during the previous calendar year shall be submitted before May 1 of each year. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents released from the facility. The report shall also include a summary of the quantities of solid radioactive waste shipped from the facility directly to the disposal site and quantities of solid radioactive waste shipped from the facility's intermediary processor to the disposal site. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program (PCP) and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

5.0 ADMINISTRATIVE CONTROLS

5.8 High Radiation Area

5.8.1 Each high radiation area as defined 10 CFR 20 shall be barricaded and conspicuously posted as a high radiation area, and entrance thereto shall be controlled by requiring issuance of a Radiation Exposure Permit (REP).

Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

a. A radiation monitoring device that continuously indicates the radiation dose rate in the area,

b. A radiation monitoring device that continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rates in the area have been determined and personnel have been made knowledgeable of them,

c. An individual qualified in radiation protection procedures with a radiation dose rate monitoring device. This individual is responsible for providing positive radiation protection control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified in the radiation protection procedures or the applicable REP.

5.8.2 In addition, areas that are accessible to personnel and that have radiation levels greater than 1.0 rem (but less than 500 rads at 1 meter) in 1 hour at 30 cm from the radiation source, or from any surface penetrated by the radiation, shall be provided with locked doors to prevent unauthorized entry, and the keys shall be maintained under the administrative control of the shift manager on duty or radiation protection supervisor. Doors shall remain locked except during periods of access by personnel under an approved REP that specifies the dose rates in the immediate work areas and the maximum allowable stay time for individuals in that area. In lieu of a stay time specification on the REP, direct or remote continuous surveillance (such as closed circuit TV cameras) may be made by personnel qualified in radiation protection procedures to provide positive exposure control over the activities being performed within the area.

5.8.3 Individual high radiation areas that are accessible to personnel, that could result in radiation doses greater than 1.0 rem in 1 hour, and that are within large areas where no enclosure exists to enable locking and where no enclosure can be reasonably constructed around the individual area shall be barricaded and conspicuously posted. A flashing light shall be activated as a warning device whenever the dose rate in such an area exceeds or is expected to exceed 1.0 rem in 1 hour at 30 cm from the radiation source or from any surface penetrated by the radiation.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 230 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated June 12, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML131640201), Southern California Edison (SCE, the licensee) submitted a certification to the U.S. Nuclear Regulatory Commission (NRC) indicating its intention to permanently cease power operations at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 as of June 7, 2013, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.82(a)(1)(i). By letters dated June 28, 2013 (ADAMS Accession No. ML13183A391), and July 22, 2013 (ADAMS Accession No. ML13204A304), SCE submitted certifications of permanent removal of fuel from the Unit 3 and Unit 2 reactor vessels as of October 5, 2012, and July 18, 2013, respectively, pursuant to 10 CFR 50.82(a)(1)(ii). Upon docketing of these certifications, and pursuant to 10 CFR 50.82(a)(2), the SONGS Units 2 and 3 facility operating licenses no longer authorize operation of the reactors or emplacement or retention of fuel into the reactor vessels. Spent fuel is currently stored onsite in the spent fuel pools (SFPs) and in the onsite independent spent fuel storage installation (ISFSI).

By letter dated March 21, 2014 (ADAMS Accession No. ML14085A141), as supplemented by letters dated October 1, 2014; and February 23, February 25, and March 18, 2015 (ADAMS Accession Nos. ML14280A264, ML15058A030, ML15058A033, and ML15082A017, respectively), SCE submitted a license amendment request consisting of amendment applications to Facility Operating License Nos. NPF-10 and NPF-15 for SONGS Units 2 and 3, respectively. The proposed amendments would revise the facility operating licenses and revise the associated technical specifications (TSs) to reflect the permanent cessation of operations of SONGS Units 2 and 3.

The supplemental letters dated October 1, 2014; and February 23, February 25, and March 18, 2015, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no

significant hazards consideration determination as published in the *Federal Register* on September 16, 2014 (79 FR 55513).

As stated above, pursuant to 10 CFR 50.82(a)(2), the 10 CFR Part 50 licenses for SONGS Units 2 and 3 no longer authorize operation of the reactors or emplacement or retention of fuel in the reactor vessels. SONGS Units 2 and 3 have been shut down since January 2012. At the time of the licensee's submittal, the fission product inventory of all spent fuel that is stored in the SONGS Units 2 and 3 spent fuel pools had decayed more than two years since last irradiated in the reactor core. SONGS Unit 1 was permanently shut down in 1993 and is already in the decommissioning phase where above ground structures have been dismantled and the spent fuel is stored in either the SONGS ISFSI or in the GE-Hitachi Morris facility.

The existing SONGS TSs contain limiting conditions for operation (LCOs) that provide for appropriate functional capability of equipment required for safe operation of the facility, including the plant being in a defueled condition. Since the safety function related to safe storage and management of irradiated fuel at an operating plant is similar to the corresponding function at a permanently defueled facility, the existing TSs provide an appropriate level of control. However, the majority of the existing TSs are only applicable when the reactor is in an operational MODE. Since the SONGS Units 2 and 3, Part 50 licenses no longer authorize emplacement or retention of fuel in the reactor vessels, the LCOs (and associated surveillance requirements (SRs)) that do not apply in a defueled condition are being proposed for deletion. The proposed amendments revise the operating licenses and associated TSs to reflect the permanent cessation of reactor operations and the permanently defueled condition of the reactor vessels at SONGS Units 2 and 3. In general, the changes eliminate those TSs applicable in operating MODES; MODES where fuel is emplaced in the reactor vessel, and certain TSs required for movement of irradiated fuel assemblies. Changes were also proposed to TS definitions, administrative controls, and related to programs and procedures. The proposed amendments also revise the facility operating licenses to clarify or remove certain conditions no longer relevant and add conditions consistent with other permanently shutdown and defueled reactors.

Amendment Nos. 227 and 220 for SONGS Units 2 and 3, respectively, were issued by the NRC on September 30, 2014 (ADAMS Accession No. ML14183B240), to revise certain requirements in the permanently shutdown and defueled facility's TSs, Section 5.0, "Administrative Controls," related to responsibilities, organization, and facility staff qualifications that reflect new staffing and training requirements for operating staff. Issuance of the enclosed amendments, in conjunction with the previously issued TS administrative control amendments, completes the revision to the SONGS permanently shutdown and defueled technical specifications. The TSs being proposed for revision by SCE for incorporation into the SONGS Units 2 and 3 facility operating licenses, referred to by SCE as the Permanently Defueled Technical Specifications (PDTS), have been combined into a single TS that applies to both units. The licensee states that the changes to the facility operating licenses and TSs provide an appropriate level of safety, considering the reduced risk of an offsite radiological release from the remaining postulated design-basis accidents (DBAs) associated with a defueled plant, as described in this safety analysis.

2.0 REGULATORY EVALUATION

2.1 Technical Specifications

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the application. The NRC's regulatory requirements related to the content of the TSs are contained in 10 CFR 50.36, "Technical specifications." Pursuant to 10 CFR 50.36, each operating license issued by the Commission includes TSs and includes items in the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) LCOs, (3) SRs, (4) design features, (5) administrative controls, (6) decommissioning, (7) initial notification, and (8) written reports.

Section 50.36 of 10 CFR states, in part, that "safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity... Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions."

Section 50.36 of 10 CFR provides four criteria to define the scope of equipment and parameters to be included in the TS LCOs. These criteria were developed for licenses authorizing operation (i.e., operating reactors) and focused on instrumentation to detect degradation of the reactor coolant system (RCS) pressure boundary, process variables and equipment, design features, or operating restrictions that affect the integrity of fission product barriers during DBAs or transients. A fourth criterion refers to the use of operating experience and probabilistic risk assessment to identify and include in the TSs those structures, systems, and components (SSCs) shown to be significant to public health and safety.

SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCO will be met.

Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs 50.36(c)(1), (2), and (3).

Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility is in a safe manner.

The regulations in 10 CFR 50.36 further state that TSs involving safety limits, limiting safety system settings, and limiting control system settings; LCOs; SRs; design features; and administrative controls for decommissioning facilities will be developed on a case-by-case basis.

A general discussion of the criteria that were used by the NRC staff in its evaluation to ensure that the TS LCOs proposed for deletion are no longer required to be included in the TSs is

provided below. These criteria were also used in the evaluation of the proposed changes to the existing TSs and the proposed new TSs.

Criterion 1 of 10 CFR 50.36(c)(2)(ii)(A) states that TS LCOs must be established for "installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary [RCPB]." Since no fuel is present in the reactor, maintenance of the RCS pressure boundary as a fission product barrier is no longer relevant at the SONGS Units 2 and 3 facility, and therefore, this criterion is not applicable.

Criterion 2 of 10 CFR 50.36(c)(2)(ii)(B) states that TS LCOs must be established for a "process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." The purpose of this criterion is to capture those process variables that have initial values assumed in the DBA and transient analyses, and which are monitored and controlled during power operation. The scope of DBAs applicable to a reactor permanently shutdown and defueled is reduced from those postulated for an operating reactor, and most TSs satisfying Criterion 2 are no longer applicable. The scope of applicable DBAs that apply to SONGS Units 2 and 3 are discussed in more detail in Sections 3.1 through 3.6 of this safety evaluation (SE). There are no transients that continue to apply to the permanently shutdown and defueled reactors.

Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) states that TS LCOs must be established for a SSC "that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." The intent of this criterion is to capture into TSs those SSCs that are part of the primary success path of a safety sequence analysis. Also captured by this criterion are those support and actuation systems that are necessary for items in the primary success path to successfully function. The primary success path of a safety sequence analysis consists of the combination and sequences of equipment needed to operate (including consideration of the single failure criterion), so that the plant response to DBAs and transients limits the consequences of these events to within the appropriate acceptance criteria. The scope of applicable DBAs that apply to SONGS Units 2 and 3 are discussed in more detail in Sections 3.1 through 3.6 of this SE. There are no transients that continue to apply to the permanently shutdown and defueled reactors.

Criterion 4 of 10 CFR 50.36(c)(2)(ii)(D) states that TS LCOs must be established for SSCs "which operating experience or probabilistic risk assessment has shown to be significant to public health and safety." The intent of this criterion is that risk insights and operating experience be factored into the establishment of TS LCOs. There are no longer any DBAs at SONGS Units 2 and 3 that can result in a significant offsite radiological risk to public health and safety.

The NRC staff notes that in the course of this evaluation, information contained in DRAFT NUREG-1625, "Proposed Standard Technical Specifications for Permanently Defueled Westinghouse Plants," March 1998 (ADAMS Accession No. ML082330233), was also considered. This draft NUREG provides examples of decommissioning TSs for Westinghouse

pressurized water reactors that the staff has previously found acceptable during TS reviews for permanently shutdown and defueled reactors.

2.2 Radiological Consequences from Design-Basis Accidents

During normal power reactor operations, the forced flow of water through the RCS removes the heat generated by the reactor. The RCS, operating at high temperatures and pressures, transfers this heat through the steam generator (SG) tubes to the secondary system. The most severe postulated accidents for nuclear power plants involve damage to the nuclear reactor core and the release of large quantities of fission products to the RCS and subsequent release of some fission products to the environment. Many of the accident scenarios postulated in the facility safety analysis report involve failures or malfunctions of systems that could affect the reactor core. With the termination of reactor operations and the permanent removal of the fuel from the reactor core, such accidents are no longer possible. Therefore, the postulated accidents involving failure or malfunction of the reactor, RCS, or secondary system are no longer applicable. Postulated accidents that could potentially apply to a permanently shutdown and defueled facility include a fuel handling accident (FHA), an accidental release of waste liquid, an accidental release of waste gas, a spent fuel cask drop accident, and a spent fuel pool boiling event. The potential offsite consequences of these events are affected by the time available for decay of fission products in the fuel and, possibly, the availability of engineered safety features, such as ventilation systems to filter fission products from the accident area atmosphere before they are released outside the facility.

The regulations in 10 CFR 50.67, "Accident source term" state, in part, that:

> (i) An individual located at any point on the boundary of the exclusion area for any 2-hour period following the onset of the postulated fission product release, would not receive a radiation dose in excess of 0.25 Sv [Sievert] (25 rem) total effective dose equivalent (TEDE), (ii) An individual located at any point on the outer boundary of the low population zone, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage), would not receive a radiation dose in excess of 0.25 Sv (25 rem) total effective dose equivalent (TEDE), and (iii) Adequate radiation protection is provided to permit access to and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 0.05 Sv (5 rem) total effective dose equivalent (TEDE) for the duration of the accident.

Appendix A to 10 CFR Part 50, "General Design Criteria (GDC)," Criterion 19--Control room, states, in part:

> A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving

> radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.

Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Revision 0, July 2000 (ADAMS Accession No. ML003716792), provides the methodology for analyzing the radiological consequences of several DBAs to show compliance with 10 CFR 50.67 - Accident source term. Regulatory Guide 1.183 provides guidance to licensees on acceptable application of alternate source term (AST) submittals, including acceptable radiological analysis assumptions for use in conjunction with the AST.

NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition," SRP, Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," Revision 0, July 2000 (ADAMS Accession No. ML003734190), provides review guidance to the NRC staff for the review of alternative source term amendment requests. SRP Section 15.0.1 states that the NRC reviewer should evaluate the proposed change against the guidance in RG 1.183. As provided in RG 1.183, the dose acceptance criteria for an FHA are a TEDE of 6.3 rem at the exclusion area boundary (EAB) for the worst 2 hours, 6.3 rem at the outer boundary of the low population zone (LPZ), and 5 rem in the control room (CR) for the duration of the accident.

SRP 11.0, Branch Technical Position 11-5, "Postulated Radioactive Release Due to a Waste Gas System Leak or Failure," provides guidance to the NRC staff in assessing the analysis of an accidental release from the waste gas system.

The NRC approved implementation of the AST methodology at SONGS Units 2 and 3, by Amendment Nos. 210 and 202, "San Onofre Nuclear Generating Station, Units 2 and 3 – Issuances of Amendments Re: Full-Scope Implementation of an Alternative Source Term (TAC Nos. MC5495 and MC5496)," dated December 29, 2006 (ADAMS Accession No. ML063400359). These license amendments represent full scope implementation of the AST, as described in RG 1.183.

NRC Regulatory Issue Summary (RIS) 2006-04, "Experience with Implementation of Alternative Source Terms," dated March 7, 2006 (ADAMS Accession No. ML053460347), discusses experiences with analyzing an accident involving a release from off-gas or waste systems. As part of full AST implementation, some licensees have included an accident involving a release from their off-gas or waste system. For this type of accident, licensees have proposed acceptance criteria of 500 millirem (mrem) TEDE. The acceptance criterion for this event is that associated with the dose to an individual member of the public, as described in 10 CFR Part 20, "Standards for Protection Against Radiation." When the NRC revised 10 CFR Part 20 to incorporate a TEDE dose, the offsite dose to an individual member of the public was changed

from 500 mrem whole body to 100 mrem TEDE. Therefore, a licensee who chooses to implement AST for an off-gas or waste gas system release, as did SCE, should base its acceptance criteria on 100 mrem TEDE. Licensees may also choose not to implement AST for this accident and continue with their existing analysis and acceptance criteria of 500 mrem whole body.

The U.S. Environmental Protection Agency's (EPA's) "Protective Action Guide (PAG) and Planning Guidance for Radiological Incidents," Draft for Interim Use and Public Comment, issued March 2013 (PAG Manual), provides radiological protection criteria for application to all incidents that would require consideration of protective actions, with the exception of nuclear war. This manual provides recommended numerical PAGs for the principal protective actions available to public officials during a radiological incident.

The Nuclear Energy Institute (NEI) document NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors," Revision 6, dated November 2012 (ADAMS Accession No. ML12326A805), provides guidance for the development of emergency action levels (EALs) for reactors in a permanently defueled condition. NEI 99-01, Revision 6, was endorsed by the NRC in a letter dated March 28, 2013 (ADAMS Accession No. ML12346A463). NEI 99-01 states that the accident analysis necessary to adopt the permanently defueled EAL scheme must confirm that the source terms and release motive forces are not sufficient to warrant classification of a site area emergency (SAE) or General Emergency, resulting in the maximum classification level of an Alert during an accident. An SAE would be declared for any event where exposure levels beyond the EAB are expected to exceed 10 percent of the EPA PAGs, which are a projected dose of 1 to 5 rem TEDE in four days for sheltering or evacuation of the public, and a projected dose of 5 rem child thyroid dose from radioactive iodine for administration of prophylactic drugs (potassium iodide). Correspondingly, NEI 99-01 established the SAE classification threshold as 100 mrem TEDE or 500 mrem thyroid committed dose equivalent.

3.0 TECHNICAL EVALUATION

3.1 Design-Basis Accident Analysis

SCE described that, with the permanent cessation of reactor operations and permanent removal of fuel from the reactor vessels for SONGS Units 2 and 3, most of the initial conditions, and most of the accident and transient analyses, that were included in Chapter 15 of the SONGS Updated Final Safety Analysis Report (UFSAR) when Units 2 and 3 were authorized to operate, are no longer possible. Therefore, SCE has updated the SONGS UFSAR to reflect that accidents and transients involving the failure or malfunction of fuel within primary containment, the RCS, or the secondary system are no longer applicable. The only DBA scenarios with the potential to result in a radiological release, as described in the UFSAR that are applicable to the permanently shutdown and defueled SONGS Units 2 and 3, are an FHA in the fuel handling building (FHB), a spent fuel cask drop accident, a SFP boiling accident, a liquid radioactive waste system leak or failure, a radioactive release due to liquid tank failures, and an accidental release of waste gas. Because the waste gas decay tanks have been purged of their contents and analyses of liquid tank failures in SONGS UFSAR Section 15.7.3.3.5 describe that no credible liquid release would exceed 10 CFR Part 20 limits, an accidental release of waste gas

and a liquid tank failure are not relevant at SONGS. The licensee determined that the remaining DBAs would be within relevant regulatory limits, assuming the fuel activity calculated as of August 2013 and without credit for dose consequence mitigation by engineered safety feature (ESF) systems. The NRC staff's technical evaluation of the licensee's analysis of the remaining DBAs at SONGS is provided in Sections 3.2 through 3.6, below.

3.2 Fuel Handling Accident Inside Fuel Building

A revision to the FHA accident analysis was incorporated into the SONGS UFSAR, Section 15.7.3.4, under the provisions of 10 CFR 50.59, "Changes, tests, and experiments," to address the permanently defueled condition. The analysis determined a reasonable time, post-cessation of operations, for movement of fuel from the SFP during which, if an FHA occurs, dose consequences would be within 10 CFR 50.67 and RG 1.183 dose limits. The licensee evaluated the maximum 2-hour TEDE to an individual located at the EAB, and the 30-day TEDE to an individual at the outer boundary of the LPZ and in the CR. The resulting doses in SCE's analyses are less than the RG 1.183 and SRP 15.0.1 dose acceptance criteria, the 10 CFR 50.67 limits, and the EPA PAG levels recommended for protection of the public.

The FHA inside the FHB (FHA-FHB) involves the inadvertent dropping of a fuel assembly during fuel handling operations, and the subsequent rupture of fuel pins in the dropped assembly and any stationary assembly impacted by the dropped assembly. A maximum of 472 fuel rods are assumed to fail, as a result of the drop of a fuel assembly onto the fuel assemblies stored in SFP fuel racks. The fission product inventory in the fuel rod gap of the damaged rods is assumed to be released instantaneously into the SFP. The FHA-FHB dose analysis models 17 months (12,240 hours) of radioactive decay prior to the event. The NRC staff finds that the decay time assumed by the licensee is consistent with RG 1.183, Regulatory Position 3.1, "Fission Product Inventory," which provides that, "For events postulated to occur while the facility is shutdown, e.g., a fuel handling accident, radioactive decay from the time of shutdown may be modeled."

The SFP water level is controlled by current SONGS Units 2 and 3 TS LCO 3.7.16 (renumbered to TS 3.1.1 in the proposed permanently defueled TSs), which limits the movement of irradiated fuel assemblies in the SFP, unless the water level is at least 23 feet over the top of the irradiated fuel assemblies, seated in the storage racks. As such, the licensee assumes that the SFP water level is at least 23 feet over the top of the irradiated fuel assemblies, seated in the storage racks, at the commencement of an FHA-FHB.

Should an FHA occur, fission products released from the damaged fuel are decontaminated by passage through the pool water, with the degree of decontamination dependent upon their physical and chemical forms. The licensee assumed no decontamination for noble gases, a decontamination factor of 200 for radioiodine, and retention of all aerosol and particulate fission products. This is consistent with RG 1.183, Appendix B, Section 2, "Water Depth," which provides that, "If the depth of water above the damaged fuel is 23 feet or greater, the decontamination factors for the elemental and organic species are 500 and 1, respectively, giving an overall effective decontamination factor of 200..."

The radioactive material that escapes from the SFP to the FHB is assumed to be released to the environment over a 2-hour time period. The FHA-FHB dose analysis does not credit the generation of an engineered safety feature actuation system (ESFAS) fuel handling building isolation signal (FHIS). The FHB normal ventilation exhaust is assumed to remain operational throughout the FHA-FHB event. The FHA-FHB AST dose analysis does not model a reduction in the amount of radioactive material available for release from the FHB by the fuel handling building Post-Accident Cleanup Unit (PACU) filter system. Therefore, the licensee assumes the release to the environment is an unfiltered release via the FHB normal ventilation exhaust system through the main plant vent, or as leakage through FHB penetrations. This is consistent with RG 1.183, Appendix B, Section 4.1, which states, "The radioactive material that escapes from the fuel pool to the fuel building is assumed to be released to the environment over a 2-hour time period."

Activity released during the FHA-FHB event is transported by atmospheric dispersion to the CR heating, ventilation and air conditioning (HVAC) intake and to the offsite EAB and LPZ dose receptors. Consistent with RG 1.183, Regulatory Position 5.3, "Meteorology Assumptions," the atmospheric dispersion factor values for the EAB and the LPZ, which were approved by the NRC during initial facility licensing were used by the licensee in performing the AST radiological analyses. The NRC had also approved the use of these meteorology atmospheric dispersion values by Amendment Nos. 210 and 202, dated December 29, 2006 (for SONGS Units 2 and 3, respectively). Consistent with RG 1.183, Regulatory Position 4.1.7, no correction is made for depletion of the effluent plume by deposition on the ground.

The CR dose during a design-basis FHA-FHB, following permanent shutdown of SONGS Units 2 and 3, was based on no credit for the Control Room Emergency Air Cleanup System (CREACUS) and Control Room Isolation Signal (CRIS) and no gamma radiation shine from CREACUS charcoal and high-efficiency particulate air (HEPA) filters. Control room doses are evaluated at various CR unfiltered inflow (including in leakage) flow rates. The flow rates were varied from 500 cubic feet per minute (cfm) to 15,000 cfm, but only the bounding CR dose is reported. The SONGS site-specific 95th percentile meteorology atmospheric dispersion factors for the CR were used.

The licensee concluded that the radiological consequences at the EAB and LPZ and in the CR are within the dose criteria for DBAs specified in 10 CFR 50.67 and SRP Section 15.0.1. The licensee also concluded that the radiological consequences are less than the dose criteria specified in the EPA PAG Manual. The NRC staff reviewed the licensee's evaluation and performed confirmatory calculations. In performing this review, the NRC staff relied upon information provided by the licensee, as well as, NRC staff experience in performing similar reviews. The NRC staff reviewed the methods, parameters, and assumptions that the licensee used in its radiological dose consequence analyses and concludes that they are acceptable because they are consistent with the guidance provided in RG 1.183. Using the FHA-FHB analyses assumptions described above, the NRC staff's confirmatory analyses of the licensee's FHA-FHB yield results for the CR, EAB, and LPZ that are less than the RG 1.183 and SRP 15.0.1 dose acceptance criteria and would not exceed the EPA PAG recommendations at the EAB.

3.3 Spent Fuel Cask Drop Accident

A re-analysis of the spent fuel cask drop accidents specified in the UFSAR, Section 15.7.3.5, was performed with a cask load of up to 32 fuel assemblies and a minimum of 17 months of decay. The spent fuel cask drop event is evaluated based on the potential of the cask drop to cause a release of radioactive material. This includes consideration of the allowed travel paths of the casks, their lift heights, and the items onto which they can be dropped. Even though single-failure-proof cranes are used at SONGS Units 2 and 3 to lift a spent fuel transfer cask out of a cask pool, a drop can be postulated when the cask is placed on the upper shelf (i.e., step) of a cask pool when performing a yoke-lift change-out, prior to the transfer cask being welded closed. The spent fuel cask drop accident considered to bound the radiological consequences of a spent fuel transfer cask drop (due to a seismic event) is from the upper shelf in the cask pool back into the lower portion of the cask pool. During this postulated accident, the transfer cask is not restrained and could fall back into the lower portion of the cask pool if an earthquake occurs. The fuel rods from all 32 fuel assemblies present in a transfer cask are conservatively assumed to rupture on impact with the bottom of the cask pool. All of the radioactive iodine and noble gases present in the gap volumes of the spent fuel rods are assumed to be released from the unwelded transfer cask. As required by the AST Amendment Nos. 210 and 202, dated December 29, 2006 (for SONGS Units 2 and 3, respectively), the new analysis was performed by the licensee using the AST methodology, including TEDE criteria. The NRC staff concludes that the licensee's modelling of decay time is consistent with RG 1.183, Regulatory Position 3.1.

Other than the number of fuel assemblies considered to fail, the radiological consequence analysis model is identical to that of the FHA in the FHA-FHB (see Section 3.2 of this SE). The fission product inventory in the fuel rod gap of the damaged rods is assumed to be released instantaneously into the SFP. The SFP water level is required to be at least 23 feet over the top of the irradiated fuel assemblies seated in the storage racks, as controlled by TSs. Consistent with RG 1.183, Appendix B, Regulatory Position 4.1, the radioactive material that escapes from the SFP to the FHB is released to the environment over a 2-hour time period, ensuring that at least 99.9 percent of the gaseous activity will be released to the environment. Consistent with RG 1.183, Regulatory Position 5.3, the atmospheric dispersion factor values for the EAB and the LPZ that were approved by the NRC during initial facility licensing are used in performing the AST radiological analyses. The NRC had also approved use of these meteorology atmospheric dispersion values by Amendment Nos. 210 and 202 for SONGS Units 2 and 3, respectively. Consistent with RG 1.183, Regulatory Position 4.1.7, no correction is made for depletion of the effluent plume by deposition on the ground.

The licensee concluded that the radiological consequences at the EAB and LPZ and in the CR are within the dose criteria for the DBAs, as specified in 10 CFR 50.67. The licensee also concluded that the radiological consequences are less than the dose criteria specified in the EPA PAG Manual. The NRC staff reviewed the licensee's evaluation and performed confirmatory calculations. In performing this review, the NRC staff relied upon information provided by the licensee and NRC staff experience in performing similar reviews. The NRC staff reviewed the methods, parameters, and assumptions that the licensee used in its radiological dose consequence analyses and concludes that they are acceptable because they are consistent with the guidance provided in RG 1.183. Using the analyses assumptions

described above, the NRC staff's confirmatory analyses yielded results for the CR, EAB, and LPZ that were less than the RG 1.183 dose acceptance criteria and would not have exceeded the EPA PAG recommendations at the EAB.

3.4 Spent Fuel Pool Boiling Accident

The postulated loss of all SFP cooling is assumed to result in SFP boiling and release of a portion of the radionuclide inventory contained in the stored spent fuel assemblies and the SFP water. The re-evaluation of the radiological consequences for the SFP boiling event assumes a minimum of 17 months since the shutdown of SONGS Units 2 and 3. The licensee used the AST methodology in performing this evaluation. The NRC staff concludes that the licensee's modelling of decay time is consistent with RG 1.183, Regulatory Position 3.1.

The radiological consequence analysis does not differentiate between the activity release rates before and after the onset of SFP boiling. Noble gas, iodine and tritium activity present in the failed fuel rod gap spaces of fuel rods, stored within the SFP, is released to the SFP water at the noble gas, iodine, and tritium escape rate coefficients, with the added conservatism of an assumed spiking factor of 100. The noble gas and iodine fuel rod gap fractions are consistent with the AST methodology. The tritium fuel rod gap fraction is assumed to be the same as that for the majority of noble gas and iodine isotopes. Tritium activity present in the SFP water prior to the loss of SFP cooling, is assumed to be released at the SFP boiling rate for the duration of the event. Both before and after the onset of SFP boiling spent fuel noble gases, iodine and tritium gas escaping from the failed fuel rod gap spaces are assumed to be instantaneously released with no hold up or iodine partitioning in the SFP water. The SFP boiling rate is a function of the decay heat load and the heat of vaporization of water.

Following a loss of SFP cooling, activity releases from the spent fuel due to evaporation and boiling disperse to the CR, EAB, and LPZ locations. No credit is taken for activity retention within the FHB. No credit is taken for FHIS or filtration by the FHB PACUs. All activity escaping from the SFP is assumed to be instantaneously released to the environment and atmospherically dispersed to the CR and offsite dose receptors. No credit is taken for CRIS or CREACUS.

The SFP boiling accident consequence analysis uses the identical model used for the FHA-FHB (see Section 3.2 of this SE). Consistent with RG 1.183, Appendix B, Section 4.1, the radioactive material that escapes from the SFP to the FHB is released to the environment over a 2-hour time period, ensuring that at least 99.9 percent of the gaseous activity will be released to the environment. For conservatism, the CR dose is calculated for an individual at the CR outside air intake location.

Consistent with RG 1.183, Regulatory Position 5.3, the atmospheric dispersion factor values for the EAB and the LPZ, which were approved by the NRC during initial facility licensing, are used in performing the AST radiological analyses. The NRC staff had also approved the use of these meteorology atmospheric dispersion values by Amendment Nos. 210 and 202, dated December 29, 2006 (for SONGS Units 2 and 3, respectively). Consistent with RG 1.183,

Regulatory Position 4.1.7, no correction is made for depletion of the effluent plume by deposition on the ground.

The licensee concluded that the radiological consequences at the EAB, LPZ, and CR are within the dose criteria for DBAs, as specified in 10 CFR 50.67. The licensee also concluded that the radiological consequences are less than the dose criteria specified in the EPA PAG Manual. The NRC staff reviewed the licensee's evaluation and performed confirmatory calculations. In performing this review, the NRC staff relied upon information provided by the licensee, as well as NRC staff experience in performing similar reviews. The NRC staff reviewed the methods, parameters, and assumptions that the licensee used in its radiological dose consequence analyses and finds that they are acceptable because they are consistent with the guidance provided in RG 1.183. Using the analyses assumptions described above, the NRC staff's confirmatory analyses yielded results for the CR, EAB, and LPZ that are less than the RG 1.183 dose acceptance criteria and would not exceed the EPA PAG recommendations at the EAB.

3.5 Radioactive Waste System Leak or Failure (Release to Atmosphere) Accident

The radioactive waste system leak or failure (with release to atmosphere) accident analysis (UFSAR Section 15.7.3.2) was revised to calculate the EAB and LPZ doses using the AST methodology. As required by the AST Amendment Nos. 210 and 202 for SONGS Units 2 and 3, respectively, the evaluation includes TEDE dose criteria, and a revised offsite dose acceptance criterion of 100 mrem TEDE, as addressed in NRC RIS 2006-04. The evaluation does not assume any post-shutdown decay time.

Releases from the Liquid Radioactive Waste System considered rupture of: radwaste tanks, refueling water storage tanks, primary ion-exchangers, and the blowdown demineralizer neutralization sump line. The most limiting of these is defined as an unexpected and uncontrolled release of the radioactive liquid stored in a radwaste secondary tank. The radwaste secondary tanks are Seismic Category II, Quality Class III tanks at atmospheric pressure. Rupture of these tanks is considered a limiting fault. A radwaste secondary tank rupture would release the liquid contents into the auxiliary building (radwaste area). It is assumed that all of the radioactive fission gases and iodines are released to the outside atmosphere within 2 hours.

The dose analysis for persons located at the EAB and the LPZ considers the dose consequences of inhalation and submersion in a radioactive cloud, as described in RG 1.183. Activity released during the event is transported by atmospheric dispersion to the offsite EAB and LPZ dose receptors. Consistent with RG 1.183, Regulatory Position 5.3, the atmospheric dispersion factor values for the EAB and the LPZ, which were approved by the NRC during initial facility licensing, are used in performing the AST radiological analyses. The NRC staff had also approved use of these meteorology atmospheric dispersion values by Amendment Nos. 210 and 202 for SONGS Units 2 and 3, respectively. Consistent with RG 1.183, Regulatory Position 4.1.7, no correction is made for depletion of the effluent plume by deposition on the ground.

The licensee concluded that the radiological consequences are less than 100 mrem TEDE offsite dose criterion per RIS 2006-04. The licensee also concluded that the radiological consequences are less than the dose criteria specified in the EPA PAG Manual. The NRC staff reviewed the licensee's evaluation and performed confirmatory calculations. In performing this review, the NRC staff relied upon information provided by the licensee, as well as NRC staff experience in performing similar reviews. The NRC staff reviewed the methods, parameters, and assumptions that the licensee used in its radiological dose consequence analyses and concludes that they are acceptable because they are consistent with the guidance provided in RG 1.183. Using the analyses assumptions described above, the NRC staff's confirmatory analyses yielded results for the EAB, LPZ, and CR that are less than RG 1.183 dose acceptance criteria and are also less than the offisite dose criteria per RIS 2006-04 and would not exceed the EPA PAG recommendations at the EAB.

3.6 Accident Analysis Conclusions

The NRC staff reviewed the assumptions, inputs, and methods used by the licensee to assess the radiological impacts of the proposed changes. The NRC staff finds that the licensee's analyses are acceptable because their analysis methods and assumptions are consistent with the guidance of RG 1.183. The NRC staff compared the doses estimated by the licensee to the applicable criteria and to the results of confirmatory analyses by the staff. The NRC staff finds, with reasonable assurance, that the licensee's estimates of the EAB, LPZ, and CR doses due to postulated DBAs at SONGS will comply with the requirements of 10 CFR 50.67 and the guidance of RG 1.183, and 10 CFR Part 20, as addressed in NRC RIS 2006-04. The NRC staff finds, with respect to the consequences of the remaining DBAs at SONGS, that no CR dose limits will be exceeded and that any offsite radiological release will not exceed the EPA PAGs at the EAB.

3.7 Proposed TS Changes

3.7.1 Section 1.1, Definitions

The licensee proposed deleting the following definitions because they pertain to an operating reactor. Since SONGS Units 2 and 3 are permanently shut down and defueled, the definitions have no relevance and no longer apply:

> AXIAL SHAPE INDEX (ASI) – ASI shall be the power generated in the lower half of the core less the power generated in the upper half of the core, divided by the sum of the power generated in the lower and upper halves of the core.
>
> $$\mathrm{ASI} = \frac{\mathrm{lower-upper}}{\mathrm{lower+upper}}$$
>
> AZIMUTHAL POWER TILT (T_q) - AZIMUTHAL POWER TILT shall be the power asymmetry between azimuthally symmetric fuel assemblies.
>
> CHANNEL CALIBRATION – A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds within the

necessary range and accuracy to known values of the parameter that the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel, including the required sensor, alarm, display, and trip functions, and shall include the CHANNEL FUNCTIONAL TEST. Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace cross calibration of the sensing elements and normal calibration of the remaining adjustable devices in the channel. Whenever a sensing element is replaced, the next required inplace cross calibration consists of comparing the other sensing elements with the recently installed sensing element.

The CHANNEL CALIBRATION may be performed by means of any series of sequential, overlapping, or total channel steps so that the entire channel is calibrated.

CHANNEL CHECK – A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.

CHANNEL FUNCTIONAL TEST - A CHANNEL FUNCTIONAL TEST shall be:

a. Analog channels - the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY, including required alarms, interlocks, display and trip functions;

b. Bistable channels (e.g., pressure switches and switch contacts) - the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY, including required alarm and trip functions; or

c. Digital computer channels - the use of diagnostic programs to test digital computer hardware and the injection of simulated process data into the channel to verify OPERABILITY, including alarm and trip functions.

The CHANNEL FUNCTIONAL TEST may be performed by means of any series of sequential, overlapping, or total channel steps so that the entire channel is tested.

CORE ALTERATION - CORE ALTERATION shall be the movement or manipulation of any fuel, sources, reactivity control components, or other components, excluding control element assemblies (CEAs) withdrawn into the upper guide structure, affecting reactivity, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE

ALTERATIONS shall not preclude completion of movement of a component to a safe position.

CORE OPERATING LIMITS REPORT (COLR) - The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.7.1.5. Plant operation within these limits is addressed in individual Specifications.

DOSE EQUIVALENT I-131 - DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of 1-131, 1-132, 1-133, 1-134, and 1-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in ICRP-30, Supplement to Part 1, page 192-212, Table titled, "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity."

Ē- AVERAGE DISINTEGRATION ENERGY - Ē shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV) for isotopes, other than iodines, with half lives > 15 minutes, making up at least 95% of the total noniodine activity in the coolant.

ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME - The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC.

LEAKAGE – LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) leakoff), that is captured and conducted to collection systems or a sump or collecting tank;

2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the

operation of leakage detection systems or not to be pressure boundary LEAKAGE; or

3. Reactor Coolant System (RCS) LEAKAGE through a steam generator to the Secondary System (primary to secondary LEAKAGE).

b. Unidentified LEAKAGE

All LEAKAGE that is not identified LEAKAGE.

c. Pressure Boundary LEAKAGE

LEAKAGE (except primary to secondary LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall.

MODE – A MODE shall correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.

PHYSICS TESTS – PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation. These tests are:

a. Described in Chapter 14, "Initial Test Program of the SONGS Units 2 and 3 UFSAR;

b. Authorized under the provisions of 10 CFR 50.59; or

c. Otherwise approved by the Nuclear Regulatory Commission.

RCS PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR) - The PTLR is the unit specific document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.7.1.6.

RATED THERMAL POWER (RTP) – RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3438 MWt.

REACTOR PROTECTION SYSTEM (RPS) RESPONSE TIME - The RPS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RPS trip setpoint at the channel sensor until electrical power to the CEAs drive mechanism is interrupted. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire

response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC.

SHUTDOWN MARGIN (SDM) – SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming:

a. All full length CEAs (shutdown and regulating) are fully inserted except for the single CEA of highest reactivity worth, which is assumed to be fully withdrawn. However, with all CEAs verified fully inserted by two independent means, it is not necessary to account for a stuck CEA in the SDM calculation. With any CEAs not capable of being fully inserted, the reactivity worth of these CEAs must be accounted for in the determination of SDM, and

b. There is no change in part length CEA position.

STAGGERED TEST BASIS - A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.

THERMAL POWER – THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

In conjunction with deletion of the term "MODE," TS Table 1.1-1, "MODES," is also being deleted.

The NRC staff examined the TS definitions proposed for deletion and concluded that all the terms listed above are only meaningful to a reactor authorized to operate. Since SONGS Units 2 and 3 are permanently shut down and defueled, the NRC staff finds that the licensee's proposed change to delete these definitions from the TSs is acceptable.

In addition, the licensee proposed adding a definition for CERTIFIED FUEL HANDLER. The licensee proposed to define a certified fuel handler as:

CERTIFIED FUEL HANDLER – A CERTIFIED FUEL HANDLER is an individual who complies with provisions of the CERTIFIED FUEL HANDLER training program required by TS 5.3.2.

TS 5.3.2 states, "An NRC approved training and retraining program for the Certified Fuel Handlers shall be maintained." The NRC staff finds the definition of a Certified Fuel Handler

conforms to the usage contained in the Administrative Controls section of the SONGS Units 2 and 3 permanently defueled TSs and is consistent with the definition in 10 CFR Part 50 and is, therefore, acceptable.

3.7.2 Section 1.2, Logical Connectors

Section 1.2, "Logical Connectors," of the SONGS TSs provides an explanation of the use of logical connectors. Logical connectors are used in TSs to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TSs are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

The licensee proposed deleting Example 1.2-2 in this section of the SONGS Units 2 and 3 defueled TSs. Example 1.2-2 explains the use of multiple logical connectors and nested connectors in the Required Action section. The licensee states that Example 1.2-1 adequately explains the use of the logical connectors that remain in the proposed defueled TS.

The only logical connector retained in the defueled TS is contained in the Required Action section for renumbered LCO 3.1.2. This use of logical connectors is fully illustrated by Example 1.2-1 in Section 1.2. Therefore, the NRC staff finds that the licensee's proposed change to delete Example 1.2-2 from TS Section 1.2 is acceptable.

3.7.3 Section 1.3, Completion Times

Section 1.3, "Completion Times," of the SONGS TSs establishes the completion time convention throughout the TSs and provides guidance for its use. The licensee has proposed to replace each reference to "operation of the unit" and "unit" with the new terminology, "storage of fuel assemblies" and "facility," respectively, since operation of the unit is no longer permitted and safe storage of fuel assemblies is the primary objective of the permanently defueled TSs. In its February 23, 2015, response to the NRC staff's request for additional information (RAI), the licensee stated that the requirements in the defueled TSs are applicable to the storage of any fuel assembly, and are not limited to the safe storage of irradiated fuel assemblies. In addition, the licensee proposed to delete references to "MODE" to be consistent with the removal of these definitions from TSs and because this term is no longer used in the Required Actions of the subsequent remaining LCOs in the proposed SONGS Units 2 and 3 defueled TSs. The licensee also proposed to delete Examples 1.3-2 through 1.3-7 because these examples refer to activities that no longer pertain to a permanently defueled condition.

The proposed change is shown below, with a strikethrough of the current wording and highlighting of the proposed changes:

> BACKGROUND
>
> Limiting Condition [sic] for Operation (LCOs) specify minimum requirements for ensuring safe ~~operation of the unit~~ storage of fuel assemblies. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which

the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).

DESCRIPTION

The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the ~~unit~~ facility is in a ~~MODE or~~ specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the ~~unit~~ facility is not within the LCO Applicability. ...

The licensee proposed to delete several paragraphs of the Description Section that discuss entry into multiple Conditions, subsequent discovery of additional inoperable equipment, and the effects on the total Completion Times.

The licensee proposed to modify the Example, as follows:

EXAMPLE~~S~~ The following example~~s~~ illustrates the use of Completion Times ~~with different types of Conditions and changing Conditions~~.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 ~~Be in MODE 3~~ Verify...	6 hours
	AND	
	B.2 ~~Be in MODE 5~~ Restore...	36 hours

Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

> The Required Actions of Condition B are to ~~be in MODE 3~~ perform the verification within 6 hours AND perform the restoration ~~in MODE 5~~ within 36 hours. A total of 6 hours is allowed for performing the verification ~~reaching MODE 3~~ and a total of 36 hours (not 42 hours) is allowed for performing the restoration ~~reaching MODE 5~~ from the time that Condition B was entered. If verification is performed ~~MODE 3 is reached~~ within 3 hours, the time allowed for ~~reaching MODE 5~~ performing the restoration is the next 33 hours because the total time allowed for performing the restoration ~~reaching MODE 5~~ is 36 hours.

The NRC staff has reviewed the proposed wording changes to the TS 1.3 Completion Times guidance and has determined that they are consistent with the transition from an operating reactor to a permanently shutdown and defueled facility with a primary safety focus of storage of fuel assemblies. The proposed changes also remove references to operating MODES that are no longer permitted following the licensee's submittal of certifications in accordance with 10 CFR 50.82(a)(2).

Examples 1.3-2 through 1.3-7, which are proposed to be deleted, provide an explanation of the time requirements for transitioning into a MODE in which the requirements are not applicable associated with entry in TS 3.0.3, or provide an explanation of more complex arrangements of Required Actions and Completion Times beyond those retained in the defueled TSs. TS 3.0.3 is being deleted as discussed in Section 3.7.6 of this safety evaluation. The NRC staff finds that these examples are no longer necessary to understand and properly implement the remaining Required Actions and Completion Times.

For the reasons discussed above, the NRC staff has determined that the revision to Example 1.3-1 and the deletion of the remaining examples are appropriate. Therefore, the NRC staff finds that the licensee's proposed changes to TS Section 1.3 are acceptable.

3.7.4 Section 1.4, Frequency

Section 1.4, "Frequency," of the SONGS TSs, defines the proper use and application of Frequency requirements throughout the TSs. In this section, the licensee has proposed to delete the final paragraph in the description section. The final paragraph of the TS 1.4 description section discusses notes that modify the frequency of performance of some surveillances and the applicability of operating MODE entry restrictions of SR 3.0.4. None of the surveillances in the proposed TSs contain notes that modify the frequency of performance or the conditions during which the acceptance criteria must be satisfied. Therefore, this paragraph is not applicable to the proposed TS LCOs or SRs and may be deleted. Specifically, the following is being deleted:

> Situations where a Surveillance could be required (i.e., its Frequency could expire), but where it is not possible or not desired that it be performed until sometime after the associated LCO is within its Applicability, represent potential

SR 3.0.4 conflicts. To avoid these conflicts, the SR (i.e., the Surveillance or the Frequency) is stated such that it is only "required" when it can be and should be performed. With an SR satisfied, SR 3.0.4 imposes no restriction.

The licensee proposed replacing the statement introducing the examples from "In these examples, the Applicability of the LCO ...is MODES 1, 2, and 3" with the statement "In these examples, the Applicability of the LCO...occurs whenever any fuel assembly is stored in the fuel storage pool." The reference to MODEs 1, 2, and 3 is no longer meaningful to the permanently shutdown and defueled condition at SONGS Units 2 and 3.

The licensee proposed to modify Examples 1.4-1 and 1.4-2 to be applicable to a facility that is permanently shutdown and defueled and proposed to delete Example 1.4-3, in its entirety.

A summary of the proposed changes is shown below, with a strikethrough of the current wording and highlighting of the proposed changes:

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
~~Perform CHANNEL CHECK~~. Verify. . .	~~12 hours~~ 7days

The licensee proposed to modify the discussion of Example 1.4-1 to reflect the 7 day frequency chosen for the example; to replace the word "unit" with the word "facility"; to delete the reference to MODEs; and to delete the reference to Example 1.4-3, which is also being deleted.

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
~~Verify flow is within limits.~~ Verify...	Prior to moving a fuel assembly. . . ~~Once within 12 hours after~~

SURVEILLANCE	FREQUENCY
	~~≥ 25% RTP~~ ~~AND~~ ~~24 hours thereafter~~

The licensee proposed to revise the discussion of Example 1.4-2, as follows:

> Example 1.4-2 illustrates ~~has two Frequencies. The first is~~ a one time performance Frequency. ~~and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicates that both Frequency requirements must be met. Each time reactor power is increased from a power level < 25% RTP to ≥ 25% RTP, the Surveillance must be performed within 12 hours.~~
>
> ~~The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND").~~ This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2. ~~"Thereafter" indicates future performances must be established per SR 3.0.2, but only after a specified condition is first met (i.e., the "once" performance in this example). If reactor power decreases to < 25% RTP, the measurement of both intervals stops. New intervals start upon reactor power reaching 25% RTP~~.

The licensee also proposed to delete Example 1.4-3 because it is not needed in a permanently defueled condition. The example used a reference to operating reactor MODES that are no longer permitted at SONGS Units 2 and 3. Specifically, Example 1.4-3 refers to surveillances to be performed after power is greater than or equal to (≥) 25 percent rated thermal power (% RTP) and discusses MODE entry restrictions.

The licensee stated that the remaining Examples 1.4-1 and 1.4-2 (as revised) are sufficient to explain the application of TS frequency requirements for the permanently defueled SONGS Units 2 and 3, TSs.

The NRC staff has reviewed the proposed changes to TS Section 1.4 and has determined that they are appropriate for a permanently shutdown and defueled reactor. The proposed changes remove references to operating MODES or rated thermal power that are no longer permitted, following certification under the provisions of 10 CFR 50.82(a)(2). The deletion of the surveillance note referring to MODE entry restrictions of SR 3.0.4 is also appropriate since none of the surveillances in the proposed remaining defueled TSs contain notes that modify the

frequency of performance or the conditions during which the acceptance criteria must be satisfied. Therefore, the NRC staff finds that the licensee's proposed changes to TS Section 1.4 are acceptable.

3.7.5 Section 2.0, Safety Limits

Section 2.0, "Safety Limits," of the SONGS TSs, establishes safety limits (SLs), which are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. SLs ensure that specified acceptable fuel design limits are not exceeded during steady state operation, normal operation transients, and anticipated operational occurrences (AOOs). The SL on RCS pressure protects the integrity of the RCS against overpressurization. In the event of fuel cladding failure, fission products are released into the reactor coolant. The RCS then serves as the primary barrier in preventing the release of fission products into the atmosphere.

TS 2.1, "Safety Limits" (SLs), contains two separate specifications:

- TS 2.1.1, Reactor Core SLs; and
- TS 2.1.2, Reactor Coolant System Pressure SL

TS 2.2, "SL Violations," direct actions to be taken if an SL specified in TS 2.1 is violated.

The restrictions of the SLs defined in TS 2.1.1 prevent overheating of the fuel cladding, and possible cladding perforation, which could result in the release of fission products to the reactor coolant. TS 2.1.1 is applicable in MODES 1 and 2. TS 2.1.2 defines requirements on parameters to protect the integrity of the RCS against overpressure. TS 2.1.2 is applicable in MODES 1, 2, 3, 4, and 5.

The licensee proposed to delete the SLs specified in Section 2.0, because they are not applicable to the permanently shutdown and defueled status of the plant. The licensee stated that the SL TSs limit important process variables that are necessary to reasonably protect the integrity of certain physical barriers required for safe operation of the reactor in MODES 1 through 5. However, 10 CFR 50.82(a)(2) prohibits operation of the reactor or placing fuel in the reactor vessel. Therefore, the SL TSs only address specific process variables that are no longer applicable to SONGS Units 2 and 3.

The NRC staff examined the SLs and their TS Bases. There are three SLs in Section 2.0: a minimum limit on the departure from nucleate boiling ratio (DNBR); a maximum limit on the peak fuel centerline temperature to ensure fuel and cladding integrity; and a maximum RCS pressure to ensure RCS integrity. As stated in the "Bases for DNBR," a limit is placed on the DNBR, such that, no fuel clad damage would occur as a result of normal operation and AOOs. A limit is placed on peak fuel centerline temperature, such that, a hot fuel pellet in the core will not experience centerline fuel melting. The TS Bases for the maximum RCS pressure state that RCS integrity is an important barrier in the prevention of an uncontrolled release of fission products. Because SONGS Units 2 and 3 have permanently shut down and defueled, and the

licensee has submitted certifications under the provisions of 10 CFR 50.82(a)(2), placing fuel in the reactor vessel and resuming power operations are no longer authorized, therefore, SLs associated with the RCS are no longer applicable. In this condition, there will be no DNBR or peak fuel centerline temperature to be monitored. Based on these findings, the NRC staff concludes the SLs no longer apply. Since the SLs are no longer applicable, TS 2.2, which specifies the actions to be taken if a SL is violated, is no longer necessary. Therefore, the NRC staff finds the licensee's proposed changes to delete TSs 2.1 and 2.2 is acceptable.

3.7.6 Section 3.0, Limiting Condition for Operation and Surveillance Requirement Applicability

Section 3.0, "Limiting Condition for Operation (LCO) Applicability," and "Surveillance Requirement (SR) Applicability," of the SONGS TSs, contains the general requirements applicable to all LCOs and SRs and applies at all times unless otherwise stated in TSs.

LCO 3.0.1, establishes the applicability statement within each individual TS as the requirement for when the LCO shall be met. The licensee proposed to delete the reference to "MODES" and the reference to LCO 3.0.7. The licensee stated that reference to MODES is no longer relevant since SONGS Units 2 and 3 are permanently shut down and defueled. In addition, the deletion of reference to LCO 3.0.7 conforms to the request to delete this LCO from the SONGS Units 2 and 3 TSs, as discussed below.

LCO 3.0.2 establishes that upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met. The licensee proposed to delete the references to LCO 3.0.5 and 3.0.6 to conform to the request to delete TS LCO 3.0.5 and 3.0.6 from the SONGS Units 2 and 3 TSs, as discussed below.

LCO 3.0.3 establishes the Actions that must be implemented when an LCO is not met and the associated Actions are not met, or an associated Action is not provided. LCO 3.0.3 requires placing the unit in a MODE or other specified condition in which the LCO does not apply. The licensee proposed to delete LCO 3.0.3, in its entirety, since it no longer applies. The regulations prohibit operation of the plant or placing fuel in the reactor vessel and references to operating MODES is no longer relevant.

LCO 3.0.4 establishes limitations on changing MODES or other specified conditions in the applicability when an LCO is not met. The licensee proposed to delete LCO 3.0.4 since SONGS Units 2 and 3 are permanently shut down and defueled and references to operating MODES are no longer relevant.

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with Actions. The licensee proposed to delete LCO 3.0.5, in its entirety. The licensee stated that LCO 3.0.5 is no longer necessary because the proposed defueled TSs do not contain requirements for declaring equipment inoperable or removing equipment from service.

LCO 3.0.6 establishes an exception to LCO 3.0.2 to allow the use of the Safety Function Determination Program. The licensee has proposed to delete that the Safety Function Determination Program, described in TS 5.5.13. The deletion of the Safety Function Determination Program is discussed in Section 3.7.17.4 of this SE. Consequently, the licensee has proposed to delete LCO 3.0.6, in its entirety, to conform the TSs to the proposed deletion of the Safety Function Determination Program.

LCO 3.0.7 pertains to certain reactor physics special tests and operations required to be performed at various times over the life of the unit. The licensee proposed to delete LCO 3.0.7, in its entirety, since reactor physics testing is no longer relevant to a permanently shutdown and defueled facility.

SR 3.0.1 establishes the requirement that SRs must be met during the MODES or other specified conditions in the applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This specification ensures that surveillances are performed to verify the operability of systems and components, and that variables are within specified limits. The licensee proposed to revise SR 3.0.1 to delete the reference to "MODES" since the reference to "MODES" is no longer relevant for the permanently shutdown and defueled condition at SONGS Units 2 and 3.

SR 3.0.2 permits a 25 percent extension of the interval specified in the Frequency, and establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per..." interval. The licensee proposed to delete the statements that pertain to Frequencies specified as "once" or "once per" and to delete the statement that "[e]xceptions to this Specification are stated in the individual Specifications." The licensee stated that the proposed defueled TSs no longer contain this type of Frequency or Completion Time.

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability. The licensee proposed to delete the reference to "MODE" since SONGS Units 2 and 3 is permanently shut down and defueled and operating MODES are no longer relevant.

The NRC staff has reviewed the proposed changes to TS LCO 3.0.1, SR 3.0.1, and SR 3.0.4 and determined that the changes acceptably removes the reference to "MODE," which is no longer applicable to a permanently shutdown and defueled facility. The staff has also reviewed the change to LCO 3.0.2 and determined that the change acceptably removes the reference to other TS requirements that are being deleted. Therefore, the NRC staff finds that the licensee's proposed changes to these LCOs and SRs are acceptable.

The NRC staff has reviewed the proposed deletion of TS LCOs 3.0.3 and LCO 3.0.4, and has determined that, consistent with the transition to a permanently shutdown and defueled facility, these LCOs are no relevant. Since 10 CFR 50.82(a)(2) prohibits the licensee from operating the plant or placing fuel in the reactor vessel, the references to "MODE," and the discussions about shutting down the unit, are no longer applicable. The NRC staff finds the licensee's

proposed changes to delete these LCOs, reflect the current SONGS Units 2 and 3 plant status, and, therefore, are acceptable.

The NRC staff has reviewed the proposed deletion of TS LCO 3.0.5. The NRC staff agrees that this specification is no longer necessary because the defueled TSs do not contain requirements to declare equipment inoperable or to remove equipment from service. Since LCO 3.0.5 is being deleted, the deletion of reference to LCO 3.0.5 in LCO 3.0.2 is also appropriate. The NRC staff finds this change appropriately reflects the requirements in the defueled TSs.

The NRC staff has reviewed the proposed deletion of TS LCO 3.0.6. The NRC staff agrees that there will not be any systems in the permanently defueled TSs that are interrelated with other systems that have TS LCOs (support and supported systems). As a result, the conditions of LCO 3.0.6 no longer apply. Therefore, the staff finds that it is appropriate to delete LCO 3.0.6. Since LCO 3.0.6 is being deleted, the deletion of reference to LCO 3.0.6 in LCO 3.0.2 is also acceptable.

The NRC staff has reviewed the proposed deletion of TS LCO 3.0.7. The facility operating licenses no longer permit emplacement of fuel in the reactor vessels or operation of the facility, and therefore, no physics testing will be performed in the future. Therefore, the provisions of LCO 3.0.7 are no longer necessary. The NRC staff finds that the deletion of LCO 3.0.7 appropriately reflects the permanently shutdown and defueled status of the facility.

The NRC staff has reviewed the proposed changes to TS SR 3.0.2. The NRC staff agrees that the statements to be deleted are no longer necessary because the defueled TSs do not contain Frequencies and Completion Times of the type described in the statements being deleted. Therefore, the NRC staff finds the proposed changes acceptable.

Based on the above, the NRC staff finds that the licensee's proposed changes to LCO 3.0.1, LCO 3.0.2, LCO 3.0.3, LCO 3.0.4, LCO 3.0.5, LCO 3.0.6, LCO 3.0.7, SR 3.0.1, SR 3.0.2, and SR 3.0.4 are acceptable.

3.7.7 Section 3.1, Reactivity Control Systems

Section 3.1, "Reactivity Control Systems," of SONGS Units 2 and 3 TSs, contain LCOs, Actions, and SRs that provide for appropriate control of process variables, design features, or operating restrictions that are required to protect the integrity of a fission product barrier. The following TSs for SONGS Units 2 and 3 are being proposed for deletion.

TS 3.1.1, "SHUTDOWN MARGIN (SDM) – T_{avg} > 200 °F [degrees Fahrenheit]," specifies the requirements to provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for normal shut down and AOOs assuming the highest reactivity worth CEA remains fully withdrawn. TS 3.1.1 is applicable in "MODES 3 and 4."

TS 3.1.2, "SHUTDOWN MARGIN (SDM) - T_{avg} ≤ 200 °F," specifies the requirements to provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for

normal shut down and AOOs assuming the highest reactivity worth CEA remains fully withdrawn. TS 3.1.2 is applicable in "MODE 5."

TS 3.1.3, "Reactivity Balance," specifies the requirements for the comparison of the predicted versus measured core reactivity during power operation. The periodic confirmation of core reactivity is necessary to ensure that DBAs and transient safety analyses remain valid. TS 3.1.3 is applicable in "MODES 1 and 2."

TS 3.1.4, "Moderator Temperature Coefficient (MTC)," specifies the requirements to ensure that core overheating and overcooling accidents will not violate the accident analysis assumptions. TS 3.1.4 is applicable in "MODES 1 and 2 with k_{eff} [effective multiplication factor] ≥ 1.0."

TS 3.1.5, "Control Element Assembly (CEA) Alignment," specifies the limits on shutdown and regulating CEA alignments to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved. TS 3.1.5 is applicable in "MODES 1 and 2."

TS 3.1.6, "Shutdown Control Element Assembly (CEA) Insertion Limits," specifies the limits on shutdown CEA insertion to ensure that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required shutdown margin following a reactor trip. TS 3.1.6 is applicable in "MODE 1, MODE 2 with any regulating CEA not fully inserted."

TS 3.1.7, "Regulating CEA Insertion Limits," specifies the limits on regulating CEA sequence and physical insertion for the function of preserving power distribution, ensuring that the SDM is maintained, ensuring that ejected CEA worth is maintained, and ensuring adequate negative reactivity insertion is available on trip. The overlap between regulating banks provides more uniform rates of reactivity insertion. TS 3.1.7 is applicable in "MODES 1 and 2."

TS 3.1.8, "Part Length Control Element Assembly (CEA) Insertion Limits," specifies the limits on part length CEA insertion for the function of preserving power distribution and ensuring that ejected CEA worth is maintained within limits. TS 3.1.8 is applicable in "MODE 1 > 20% RTP."

TS 3.1.9, "Boration Systems - Operating," establishes the requirements for borated water sources and flow paths to the RCS to ensure that sufficient borated water is available to maintain the reactor subcritical and provide makeup water to account for RCS shrinkage during cooldown to cold shutdown conditions. TS 3.1.9 is applicable in "MODES 1, 2, 3, and 4."

TS 3.1.10, "Boration Systems – Shutdown," establishes the requirements for borated water sources and flow paths to the RCS to ensure that sufficient borated water is available to maintain the reactor subcritical. TS 3.1.10 is applicable in "MODES 5 and 6."

TS 3.1.12, "Special Test Exception (STE) - Low Power Physics Testing," permits the relaxation of existing TS LCOs to allow the performance of PHYSICS TESTS. TS 3.1.12 is applicable in "MODES 2 and 3 during PHYSICS TESTS."

TS 3.1.13, "Special Test Exception (STE) - At Power Physics Testing," permits relaxation of existing TS LCOs to allow the performance of PHYSICS TESTS. TS 3.1.13 is applicable in "MODE 1 during PHYSICS TESTS."

TS 3.1.14, "Special Test Exceptions (STE) - Reactivity Coefficient Testing," permits relaxation of existing TS LCOs to allow the performance of PHYSICS TESTS. TS 3.1.14 is applicable in "MODE 1."

The NRC staff has reviewed the licensee's proposed change to delete the reactivity control system TSs for SONGS Units 2 and 3, and has determined that these TSs are only needed to provide the LCOs and SRs necessary to maintain reactivity parameters of fuel loaded into a reactor vessel within the margins of conditions encountered during normal operations, anticipated occurrences, and for DBAs. The reactivity control systems TSs are only important for a reactor authorized to operate or retain irradiated fuel in the reactor vessel. However, because 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactors or placing fuel in the reactor vessels at SONGS Units 2 and 3, there is no reactor core and the reactivity control systems are no longer relevant.

The NRC staff has also reviewed Section 3.1, the reactivity control systems TSs proposed for deletion (TS 3.1.1, TS 3.1.2, TS 3.1.3, TS 3.1.4, TS 3.1.5, TS 3.1.6, TS 3.1.7, TS 3.1.8, TS 3.1.9, TS 3.1.10, TS 3.1.12, TS 3.1.13, and TS 3.1.14), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. These TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 3.1, Reactivity Control Systems, is acceptable.

3.7.8 Section 3.2, Power Distribution Limits

Section 3.2, "Power Distribution Limits," of the SONGS Units 2 and 3 TSs, contains LCOs, Required Actions, and SRs that provide for appropriate control of process variables, design features, or operating restrictions that are required to control power distribution in the reactor, and in turn, protect the integrity of a fission product barrier. The following TSs are being proposed for deletion.

TS 3.2.1, "Linear Heat Rate (LHR)," specifies the limits based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNBR operating limits. The limitation on LHR ensures that in the event of a loss-of-coolant accident (LOCA) the peak

temperature of the fuel cladding does not exceed 2200 °F. TS 3.2.1 is applicable in MODE 1 with THERMAL POWER > [greater than] 20% RTP.

TS 3.2.2, "Planar Radial Peaking Factors (F_{xy})," specifies the limits based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNBR operating limits. Limiting of the calculated Planar Radial Peaking Factors to values equal to or greater than the measured Planar Radial Peaking Factors ensures that the calculated limits remain valid. TS 3.2.2 is applicable in "MODE 1 with THERMAL POWER > 20 % RTP."

TS 3.2.3, "AZIMUTHAL POWER TILT (Tq)," specifies the limits based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNBR operating limits. The limitations on the Tq are provided to ensure that design operating margins are maintained. TS 3.2.3 is applicable in "MODE 1 with THERMAL POWER > 20% RTP."

TS 3.2.4, "Departure from Nucleate Boiling Ratio (DNBR)," specifies the limits based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNBR operating limits. Operation of the core with a DNBR at, or above, this limit ensures that an acceptable minimum DNBR is maintained in the event of a loss of flow transient. TS 3.2.4 is applicable in "MODE 1 with THERMAL POWER > 20% RTP."

TS 3.2.5, "AXIAL SHAPE INDEX (ASI)," specifies the limits based on correlations between power peaking and certain measured variables used as inputs to the LHR and DNBR operating limits. The limitation on ASI ensures that the actual ASI value is maintained within the range of values used in the accident analysis. The ASI limits ensure that with T_q at its maximum upper limit, the DNBR does not drop below the DNBR safety limit for AOOs. TS 3.2.5 is applicable in "MODE 1 with THERMAL POWER > 20% RTP."

The NRC staff has reviewed the proposed deletion of the power distribution limits TSs and has determined that these TSs are only needed to provide the LCOs and SRs necessary to maintain reactor power and heat generation within the margins of conditions encountered during normal operation, anticipated occurrences, and for DBAs. The power distribution limits TSs are only important for a reactor authorized to operate. Because 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactors or placing fuel in the reactor vessels at SONGS Units 2 and 3, there is no reactor core generating power and the power distribution limits are no longer relevant.

The NRC staff has also reviewed Section 3.2, power distribution limits TSs proposed for deletion (TS 3.2.1, TS 3.2.2, TS 3.2.3, TS 3.2.4, and TS 3.2.5), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. These TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Unit 2 and Unit 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the

reactors or placing fuel in the reactor vessels and SONGS Unit 2 and Unit 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 3.2, Power Distribution Limits, is acceptable.

3.7.9 Section 3.3, Instrumentation

Section 3.3, "Instrumentation," of the SONGS Units 2 and 3 TSs, contains the LCOs, Actions, and SRs that provide for appropriate functional capability of sensing and control instrumentation required for the appropriate functional capability of plant equipment, and control of process variables, design features, or operating restrictions required for safe operation of the facility. The following TSs are being proposed for deletion.

TS 3.3.1, "Reactor Protective System (RPS) Instrumentation-Operating," specifies the requirements for the RPS instrumentation system to maintain the SLs during AOOs, and mitigates the consequences of DBAs in MODE 1 and MODE 2 (startup).

TS 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown," specifies the requirements for the RPS instrumentation system to maintain the SLs during all AOOs, and mitigates the consequences of DBAs in MODE 3 (hot standby), MODE 4 (hot shutdown), and MODE 5, when the reactor trip circuit breakers (RTCBs) are closed and the CEA drive system is capable of CEA withdrawal.

TS 3.3.3, Control Element Assembly Calculators (CEACs)," specifies the requirements to ensure the core protection calculators (CPCs) are either informed of individual CEA position within each subgroup, using one or other CEACs, or that appropriate conservatism is included in the CPC calculations to account for anticipated CEA deviations in MODES 1 and 2.

TS 3.3.4, "Reactor Protective System (RPS) Logic and Trip Initiation," specifies the requirements for RPS matrix logic, RPS initiation logic, RTBCs, and manual trip channels to effect automatic trip signals received from RPS instruments and to provide a means to manually trip the reactor in MODES 1 and 2, and in MODES 3, 4, and 5, when the RTCBs are closed and the CEA drive system is capable of CEA withdrawal.

TS 3.3.5, "Engineered Safety Features Actuation System (EFSAS) Instrumentation," specifies the requirements for the ESFAS Instrumentation to ensure ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the RCPB during AOOs and ensures acceptable consequences during accidents.

TS 3.3.6, "Engineered Safety Features Actuation System (EFSAS) Logic and Manual Trip," specifies the requirements for ESFAS Matrix Logic, ESFAS Initiation Logic, and Manual Trip channels to effect automatic ESFAS initiation received from ESFAS instruments and to provide a means to manually actuate an ESF system in MODES 1, 2, 3, and 4.

TS 3.3.11, "Post Accident Monitoring Instrumentation (PAMI)," is applicable in MODES 1, 2, and 3, and provides the operability requirements for accident monitoring instruments, which provides information required by the control room operators. The operability of the PAMI ensures there is sufficient information available on selected unit parameters to monitor and assess unit status following an accident.

TS 3.3.12, "Remote Shutdown System," is applicable in MODES 1, 2, and 3, and provides the operability requirements for instrumentation and controls necessary to place and maintain the unit in MODE 3 from a location other than the control room.

TS 3.3.13, "Source Range Monitoring Channels," is applicable in MODES 3, 4, and 5, and provides the operability requirements for source range monitoring instrumentation for indication, alarms, and reactor trips.

The NRC staff has reviewed the proposed deletion of the instrumentation TSs above. TS 3.3.1, TS 3.3.2, TS 3.3.3 and TS 3.3.4, are only necessary to maintain the ability of the RPS to automatically initiate a reactor scram to preserve the integrity of the fuel cladding, preserve the integrity of the primary system barrier, and minimize the energy which must be absorbed, and prevent criticality following a LOCA. TS 3.3.5 and TS 3.3.6 only concern instrumentation designed to mitigate accidents related to reactor operation. TS 3.3.11 and TS 3.3.12 only concern instrumentation to ensure there is sufficient information available on selected unit parameters to monitor and assess unit status following an accident, and allow operators to take manual actions specified in the emergency operating procedures or to remotely shut down the reactor from a location other than the control room. TS 3.3.13 requires monitoring source range count rate level and detects a loss of SDM caused by a boron dilution event (detected as an increase in neutron flux). None of the instrumentation addressed by these TSs is needed by a reactor that has permanently shut down and defueled in accordance with 10 CFR 50.82(a)(2).

The NRC staff also has reviewed the above Section 3.3 instrumentation TSs that are proposed for deletion (TS 3.3.1, TS 3.3.2, TS 3.3.3, TS 3.3.4, TS 3.3.5, TS 3.3.6, TS 3.3.11, TS 3.3.12, and TS 3.3.13), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. These TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Unit 2 and Unit 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, the NRC staff finds that the licensee's proposed change to delete Section 3.3, instrumentation TS 3.3.1, TS 3.3.2, TS 3.3.3, TS 3.3.4, TS 3.3.5, TS 3.3.6, TS 3.3.11, TS 3.3.12, and TS 3.3.13 is acceptable.

TS 3.3.7, "Diesel Generator (DG) – Undervoltage Start," specifies the loss of voltage start (LOVS) instrumentation functions be operable in MODES 1, 2, 3, 4, and when the associated DG is required to be operable by LCO 3.8.2, AC Sources – Shutdown. TS 3.3.7 is proposed for deletion by the licensee.

TS 3.3.7 provides the LCO and SRs to ensure availability of backup safety-related alternating current (AC) power to the SSCs used to prevent or mitigate postulated accidents resulting in an uncontrolled release of radioactivity of DBAs as analyzed in the SONGS Unit 2 and 3 UFSARs. This TS LCO ensures the operability of instrumentation designed to detect an undervoltage on the safety-related AC electrical busses upon a loss of offsite power and start the emergency diesel generators (EDGs) to supply backup power to the AC busses. Since SONGS Units 2 and 3 are permanently shut down and defueled, SCE has analyzed the remaining DBAs at SONGS Units 2 and 3, and given the significant fuel decay period, found that the radiological consequences will not exceed the EPA's PAGs at the site boundary. The licensee's analysis also demonstrates that the dose consequences, within the CR, of any DBAs are acceptable without relying on SSCs remaining functional for accident mitigation except the passive fuel storage pool structure which will be maintained as a TS for SONGS.) SCE calculated the DBA radiological consequences assuming no credit for control room isolation or recirculation filtration and no credit for any accident mitigation by the auxiliary building ventilation system. Calculated doses at the EAB, LPZ, and CR are within 10 CFR 50.67 and RG 1.183 dose limits. Since the bounding accident analysis for the permanently defueled condition assumed no credit for control room post-accident recirculation system emergency ventilation or filtration for mitigation of radiological releases, the CREACUS is not required (see evaluation of TS 3.7.11 in Section 3.7.13 of this SE). Because CREACUS is not required to function to mitigate a DBA, backup electrical power required to support operation of CREACUS upon a loss of offsite power is unnecessary. Therefore the EDG loss of offsite power start instrumentation is also unnecessary for all postulated DBAs.

The NRC staff determined in Section 3.1 through 3.6 of this SE that with SONGS Units 2 and 3 permanently shut down and defueled and the irradiated fuel having decayed for a significant period, CREACUS is no longer needed or credited in the primary success path of a safety sequence analysis related the remaining DBAs at SONGS Units 2 and 3. Consequently, neither primary nor backup power to support operation of CREACUS is needed. Therefore, actuation instrumentation to start the backup power EDGs is no longer required to satisfy TS Criterion 3 for inclusion in TSs as a support or actuation system that is necessary for items in the primary success path to successfully function. The NRC staff has confirmed that there are no other DBAs analyzed in the SONGS Units 2 and 3 UFSAR that rely on this instrumentation system. Based on the above, the NRC staff finds that the licensee's proposed change to delete TS 3.3.7 is acceptable.

TS 3.3.8, "Containment Purge Isolation Signal (CPIS)," specifies the requirements for instrumentation designed to close the containment purge isolation valves upon a detection of high gaseous radiation in containment. This action isolates the containment atmosphere from the environment to minimize releases of radioactivity in the event of an accident. TS 3.3.8 is applicable in MODES 1, 2, 3, and 4, during core alterations, and during movement of fuel assemblies within containment. TS 3.3.8 is proposed for deletion by the licensee.

This TS indicates MODES for which the TS is applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Unit 2 and Unit 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply. The staff also reviewed the non-MODE dependent applicability during core alterations, and during movement of fuel assemblies in containment. Because 10 CFR 50.82(a)(2) prohibits operation of the plant or placing fuel in the reactor vessel, the prohibition on placing fuel in the reactor vessel, it also precludes core alterations and the movement of fuel assemblies within containment.

The NRC staff also evaluated the proposed deletion of TS 3.3.8, to ensure that the LCO no longer satisfies the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff has determined that TS 3.3.8 only addresses specific plant systems, control of process variables, design features, or operating restrictions associated with the containment and are no longer needed or credited in the primary success path of a safety sequence analysis related the remaining DBAs at SONGS Units 2 and 3. Based on the above, the NRC staff finds that the licensee's proposed change to delete TS 3.3.8 is acceptable.

TS 3.3.9, "Control Room Isolation Signal (CRIS)," specifies the requirements to ensure instrumentation (actuation logic, manual trip, and gaseous radiation monitors) necessary to initiate CREACUS is operable. The CRIS terminates the normal supply of outside air to the CR and initiates actuation of the CREACUS to minimize operator radiation exposure. The radiation monitor actuation of the CREACUS in MODES 5 and 6 and during movement of fuel assemblies is the primary means to ensure control room habitability in the event of an FHA. TS 3.3.9 is applicable in MODES 1, 2, 3, 4, 5, 6, and during movement of fuel assemblies within containment and in the fuel storage pool. TS 3.3.9 is proposed for deletion by the licensee.

This TS indicates MODES for which the TS is applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

The NRC staff evaluated the proposed deletion of TS 3.3.9 to ensure that the LCO no longer satisfies the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The NRC staff also reviewed the non-MODE dependent applicability during movement of fuel assemblies within containment and in the fuel storage pool. As detailed in Sections 3.1 through 3.6 of this SE, the remaining accident analyses applicable to the permanently shutdown and defueled reactors of SONGS Units 2 and 3 show that the dose

consequences within the control room are acceptable. Furthermore, the analyses do not rely on the functioning of any SSCs to mitigate the postulated DBAs with the exception of the passive fuel storage pool structure.

The NRC staff evaluated the remaining DBAs that credited the CREACUS, and its support systems, that were previously relied upon to mitigate the CR, EAB or LPZ dose consequences during reactor operation. This includes the FHIS, the FHB PACU filtration system, and the CRIS. As discussed in the basis for deleting CREACUS TS 3.7.11, (see Section 3.7.13 of this SE), the CRIS is no longer required for providing airborne radiological protection for the control room operators in the event of a DBA. Since TS 3.3.9 exists solely to support CREACUS Operability, the elimination of the need for the CREACUS also obviates the need for its support systems. The deletion of the CREACUS TS 3.7.11 eliminates the need for the CRIS TS 3.3.9. Therefore, the NRC staff finds the CRIS isolation signal is no longer required and that the licensee's proposed change to delete TS 3.3.9 is acceptable.

3.7.10 Section 3.4, Reactor Coolant System

The RCS TSs of Section 3.4, "Reactor Coolant System (RCS)," for SONGS Units 2 and 3 contain the LCOs, Actions, and SRs that provides for appropriate control of process variables, design features, or operating restrictions needed for appropriate functional capability of RCS equipment required for safe operation of the facility. The following TSs are being proposed for deletion.

TS 3.4.1, "RCS DNB [Departure from Nucleate Boiling] (Pressure, Temperature, and Flow) Limits," specifies the process variables requirements for maintaining RCS pressure, temperature, and flow rate within limits assumed in the safety analyses. The limits placed on RCS pressure, temperature, and flow rate ensure that the minimum DNBR will be met for each of the analyzed transients. TS 3.4.1 is applicable in MODE 1.

TS 3.4.2, "RCS Minimum Temperature for Criticality," specifies the requirements for RCS loop cold leg temperature (T_c) before the reactor can be made critical and while the reactor is critical. Compliance with the LCO ensures that the reactor will not be made or maintained critical ($k_{eff} > 1.0$) outside a temperature operating range of 522 °F to 558 °F, and to prevent operation in an unanalyzed condition. TS 3.4.2 is applicable in "MODE 1, THERMAL POWER ≤ 30% RTP and $T_c < 535$ °F, and in MODE 2, $K_{eff} \geq 1.0$ and $T_c < 535$ °F."

TS 3.4.3, "RCS Pressure and Temperature (P/T) Limits," specifies that the RCS pressure, RCS temperature and RCS heatup and cooldown rates shall be maintained within the limits as specified in the Pressure - Temperature Limits Report (PTLR). The LCO establishes operating limits that provide a margin to brittle failure of the reactor vessel and piping of the RCPB. TS 3.4.3 is applicable at all times. The purpose for TS LCO 3.4.3 during normal operation of the RCS is to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause nonductile failure of the RCPB, an unanalyzed condition. The RCS P/T limits in LCO 3.4.3 provide a definition of acceptable operation for prevention of nonductile failure in accordance with 10 CFR Part 50, Appendix G. Although the P/T limits were developed to provide guidance for operation during heatup, or

cooldown, or inservice leak and hydrostatic testing, the applicability of these limits is at all times in keeping with the concern for nonductile failure.

TS 3.4.3.1, "Pressurizer Heatup and Cooldown Limits," requires that the pressurizer heatup and cooldown rates shall be maintained within the specified limits. The pressurizer is designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, and startup and shutdown operations. During startup and shutdown, the rates of temperature and pressure changes are limited so that the maximum specified heatup and cooldown rates are consistent with the design assumptions and satisfy the stress limits for cyclic operation. Therefore, TS 3.4.3.1 is applicable at all times.

TS 3.4.4, "RCS Loops - MODES 1 and 2," specifies the requirements to ensure heat removal capability of the RCS loops with the reactor in MODES 1 and 2. The primary function of the RCS is removal of the heat generated in the fuel due to the fission process, and transfer of this heat, via the steam generators (SGs), to the secondary plant. The important aspect for this LCO is the reactor coolant forced flow rate, which is represented by the number of RCS loops in service. TS 3.4.4 is applicable in MODES 1 and 2.

TS 3.4.5, "RCS Loops - MODE 3," specifies the requirements to ensure heat removal capability of the RCS loops with the reactor in MODE 3. In MODE 3, the primary function of the reactor coolant is removal of decay heat and transfer of this heat, via the SGs, to the secondary plant fluid. TS 3.4.5 is applicable in MODE 3.

TS 3.4.6, "RCS Loops - MODE 4," specifies the requirements to ensure heat removal capability of the RCS loops with the reactor in MODE 4. In MODE 4, the primary function of the reactor coolant is the removal of decay heat and the transfer of this heat to the SGs or shutdown cooling (SDC) heat exchangers. TS 3.4.6 is applicable in MODE 4.

TS 3.4.7, "RCS Loops - MODE 5, Loops Filled," specifies the requirements to ensure heat removal capability of the RCS loops with the reactor in MODE 5 with the RCS loops filled with coolant. In MODE 5 with the RCS loops filled, the primary function of the reactor coolant is the removal of decay heat and transfer of this heat to the SGs or SDC heat exchangers. While the principal means for decay heat removal is via the SDC heat exchangers, the SGs are specified as a backup means for redundancy. TS 3.4.7 is applicable in MODE 5 with the RCS loops filled.

TS 3.4.8, "RCS Loops - MODE 5, Loops Not Filled," specifies the requirements to ensure heat removal capability of the RCS loops with the reactor in MODE 5 with the RCS loops not filled with reactor coolant. In MODE 5 with the RCS loops not filled, the primary function of the reactor coolant is the removal of decay heat and transfer of this heat to the SDC heat exchangers. The SGs are not available as a heat sink when the loops are not filled. TS 3.4.8 is applicable in MODE 5 with the RCS loops not filled.

TS 3.4.9, "Pressurizer," specifies the OPERABILITY requirements for the RCS pressurizer. The pressurizer provides a point in the RCS where liquid and vapor are maintained in equilibrium

under saturated conditions for pressure control purposes to prevent bulk boiling in the remainder of the RCS. In MODES 1, 2, and 3, the LCO requirement for a steam bubble is reflected implicitly in the accident analyses. All analyses performed from a critical reactor condition assume the existence of a steam bubble and saturated conditions in the pressurizer. TS 3.4.9 is applicable in MODES 1, 2, and 3.

TS 3.4.10, "Pressurizer Safety Valves," specifies the OPERABILITY and lift setpoint parameters for the pressurizer safety valves. The pressurizer safety valves provide, in conjunction with the reactor protection system, overpressure protection for the RCS. The pressurizer safety valves are designed to prevent the RCS from exceeding the system safety limit of 2750 pounds per square inch absolute (psia) in MODES 1, 2, and 3. In MODES 4, 5, and MODE 6 with the reactor vessel head on, overpressure protection is provided by operating procedures and by meeting the requirements of LCO 3.4.12, Low Temperature Overpressure Protection (LTOP) System. TS 3.4.10 is applicable in MODES 1, 2, and 3.

TS 3.4.12.1, "Low Temperature Overpressure Protection (LTOP) System, RCS Temperature ≤ PTLR Limit," specifies the requirements for controlling RCS pressure at low temperatures so the integrity of the RCPB is not compromised by violating the P/T limits of 10 CFR Part 50, Appendix G. TS LCO 3.4.12.1 provides RCS overpressure protection by minimizing coolant input capability and having adequate pressure relief capacity. In MODES 1, 2, and 3, the pressurizer safety valves will prevent RCS pressure from exceeding limits. In MODE 4 when the temperature of any RCS cold leg is less than or equal to the enable temperature specified in the PTLR, MODE 5, and MODE 6 when the reactor vessel head is on and the RCS is not vented, overpressure prevention falls to the OPERABLE SDC system relief valve or to a depressurized RCS and a sufficient sized RCS vent. When the reactor vessel head is off, overpressurization cannot occur.

TS 3.4.12.2, "Low Temperature Overpressure Protection (LTOP) System, RCS Temperature ≥ PTLR Limit," specifies requirements for controlling RCS pressure at low temperatures so the integrity of the RCPB is not compromised by violating the P/T limits of 10 CFR Part 50, Appendix G. TS LCO 3.4.12.2 provides RCS overpressure protection by having adequate pressure relief capacity. In MODES 1, 2, and 3 the pressurizer safety valves will prevent RCS pressure from exceeding limits. In MODE 4 when the temperature of all RCS cold legs are greater than the enable temperature specified in the PTLR, overpressure prevention falls to the OPERABLE SDC system relief valve or to an OPERABLE pressurizer code safety valve.

TS 3.4.13, "RCS Operational LEAKAGE," specifies the process variable limits and operating restrictions for RCS pressure boundary leakage, unidentified RCS leakage, identified RCS leakage, and primary to secondary leakage. RCS leakage is indicative of material deterioration, possibly of the RCS pressure boundary, which can affect the probability of a design basis event. The primary to secondary leakage limit is based on operating experience with SG tube degradation mechanisms that result in tube leakage. The operational leakage rate criterion in conjunction with the implementation of the Steam Generator Program is an effective measure for minimizing the frequency of steam generator tube ruptures (SGTRs). TS 3.4.13 is applicable in MODES 1, 2, 3, and 4. In MODES 5 and 6, leakage limits are not required because the

reactor coolant pressure is far lower, resulting in lower stresses and reduced potential for leakage.

TS 3.4.14, "RCS Pressure Isolation Valve (PIV) Leakage," specifies the process variable limits and operating restrictions for RCS PIV leakage. The regulations in 10 CFR 50.2, 10 CFR 50.55a(c), and 10 CFR Part 50, Appendix A, GDC 55, discuss RCPB valves, which are normally closed valves in series within the RCPB that separate the high pressure RCS from an attached low pressure system. Although this specification provides a limit on allowable PIV leakage rate, its main purpose is to prevent overpressure failure of the low pressure portions of connecting systems (intersystem LOCA). PIVs are provided to isolate the RCS from the following typically connected systems: SDC system; safety injection system; and the chemical and volume control system. The leakage limit is an indication that the PIVs between the RCS and the connecting systems are degraded or degrading. TS 3.4.14 is applicable in MODES 1, 2, 3, and 4. In MODES 5 and 6, leakage limits are not provided because the lower reactor coolant pressure results in a reduced potential for PIV leakage outside the containment.

TS 3.4.15, "RCS Leakage Detection Instrumentation," specifies the OPERABILITY requirements for RCS leakage detection instrumentation. Leakage detection systems are provided to detect significant RCPB degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, they provide an early indication or warning signal to permit proper evaluation of RCS leakage into the containment area. TS LCO 3.4.15 requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that extremely small leaks are detected in time to allow actions to place the plant in a safe condition, when RCS leakage indicates possible RCPB degradation. TS 3.4.15 is applicable in MODES 1, 2, 3, and 4.

TS 3.4.16, "RCS Specific Activity," specifies the process variable limits and operating restrictions for Dose Equivalent 1-131 and gross specific activity. The TS LCO limits on the specific activity of the reactor coolant ensure that the resulting offsite doses meet the appropriate RG 1.183 acceptance criteria following a SGTR accident. TS 3.4.16 is applicable in MODES 1, 2, and MODE 3 with RCS average temperature ≥ 500 degrees F.

TS 3.4.17, "Steam Generator (SG) Tube Integrity," specifies the requirements to ensure the RCPB integrity function of the SG. The SGTR accident is the limiting design basis event for SG tubes and avoiding an SGTR is the basis for this specification. TS 3.4.17 is applicable in MODES 1, 2, 3, and 4.

The licensee proposed to delete all of Section 3.4 of the SONGS Units 2 and 3, RCS TSs, since all except TS 3.4.3, are only applicable to operating reactor MODES and do not apply to a permanently shutdown and defueled reactor. The NRC staff has reviewed these proposed changes and has determined that these TSs are only needed to provide the LCOs and SRs necessary to maintain functionality and integrity of the RCS pressure boundary. These TSs contain requirements for various RCS parameters such as: thermal limitations for heatup and cooldown rates during plant operation in order to operate within the analyzed requirements for stress intensity and fatigue limits for the reactor vessel; pressurization, which established and maintained an equilibrium under saturated conditions for pressure control to prevent bulk boiling

in the remainder of the RCS; coolant chemistry, which included limits on RCS activity to limit potential offsite doses due to postulated events and limits on RCS conductivity, chlorides, and pH to prevent stress-corrosion cracking; coolant leakage, which established primary system leakage limits to allow prompt identification and isolation of leaks before the integrity of the RCS pressure boundary was impaired; safety and relief valves, which specifies operability requirements for the safety and relief valves designed to prevent overpressurization of, and damage to, the primary system boundary; and structural integrity, which addresses the inservice inspection requirements of the primary system boundary components. All of these TSs are related to assuring the integrity of the RCS pressure boundary. The RCS TSs are only important for a reactor authorized to operate or retain irradiated fuel in the reactor vessel. However, because 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactors or placing fuel in the reactor vessels at SONGS Units 2 and 3, the RCS is no longer functional or used in any capacity.

Regarding the applicability of TS 3.4.3 and TS 3.4.3.1 at all times, the NRC staff notes that the RCS and pressurizer are drained and vented, to the extent possible, and consequently there is no longer any concern about exceeding the RCS and pressurizer P/T or cyclic limits. The requirements of 10 CFR Part 50, Appendix G, no longer apply to a permanently shutdown and defueled reactor because the RCPB will no longer be used as a fission product barrier. Therefore, TS 3.4.3 is no longer needed and may be deleted. Similarly, operating the unit within the fatigue analysis performed in accordance with the ASME Code Section III requirements no longer applies. Therefore, TS 3.4.3.1 is no longer needed and may also be deleted.

The NRC staff has also reviewed the RCS TSs proposed for deletion (TS 3.4.1, TS 3.4.2, TS 3.4.3, TS 3.4.3.1, TS 3.4.4, TS 3.4.5, TS 3.4.6, TS 3.4.7, TS 3.4.8, TS 3.4.9, TS 3.4.10, TS 3.4.12.1, TS 3.4.12.2, TS 3.4.13, TS 3.4.14, TS 3.4.15, TS 3.4.16, and TS 3.4.17), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this SE. The staff notes that these TSs indicate MODES for which these TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for a permanently shutdown and defueled reactor, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2) for SONGS Units 2 and 3, it is prohibited from operating the reactors or placing fuel in the reactor vessels and, therefore, SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply. Furthermore, because irradiated fuel has been permanently removed from the reactor pressure vessels, the RCS is no longer relevant as a fission product barrier.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 3.4, Reactor Coolant System, is acceptable.

3.7.11 Section 3.5, Emergency Core Cooling Systems (ECCS)

Section 3.5 of the SONGS Units 2 and 3 TSs, "Emergency Core Cooling Systems (ECCS)," contains LCOs that provide for appropriate functional capability of ECCS equipment required for

mitigation of DBAs or transients so as to protect the integrity of a fission product barrier. The following TSs are being proposed for deletion.

TS 3.5.1, "Safety Injection Tanks (SITs)," specifies the requirements for the SITs to ensure they are capable of supplying water to the reactor vessel during the blowdown phase of a LOCA, to provide inventory to help accomplish the refill phase that follows thereafter, and to provide RCS makeup for a small-break LOCA. TS 3.5.1 is applicable in MODES 1 and 2, and in MODE 3 with pressurizer pressure ≥ 715 psia.

TS 3.5.2, "ECCS - Operating," specifies the requirements for the ECCS trains so as to provide core cooling and negative reactivity to ensure that the reactor core is protected after a LOCA, CEA ejection accident, loss of secondary coolant accident (including uncontrolled steam release), and SGTR. The ECCS consists of the high pressure safety injection (HPSI) and the low pressure safety injection (LPSI) subsystems. TS 3.5.2 is applicable in MODES 1 and 2, and MODE 3 with pressurizer pressure ≥ 400 psia.

TS 3.5.3, "ECCS - Shutdown," specifies the requirements for ECCS with the reactor in MODE 3 with pressurizer pressure < 400 psia, and in MODE 4. In these MODES, an ECCS train is composed of a single HPSI subsystem. One OPERABLE ECCS train is acceptable without a single failure consideration, based on the stable reactivity condition of the reactor and the limited core cooling requirements.

TS 3.5.4, "Refueling Water Storage Tank (RWST)," specifies the requirements for RWST OPERABILITY. During accident conditions, the RWST provides a source of borated water to the ECCS and containment spray system pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown. TS 3.5.4 is applicable in MODES 1, 2, 3, and 4 because RWST OPERABILITY requirements are dictated by ECCS and containment spray system OPERABILITY requirements. Since both the ECCS and the containment spray system must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation.

TS 3.5.5, "Trisodium Phosphate (TSP) Dodecahydrate," specifies the requirements for TSP crystals to be placed in baskets on the floor of the containment building to ensure that iodine, which may be dissolved in the recirculated reactor cooling water following a LOCA, remains in solution. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the recirculation phase following an accident. TS 3.5.5 is applicable in MODES 1, 2, and 3, when the RCS is at elevated temperature and pressure, providing an energy potential for a LOCA.

The NRC staff has reviewed the proposed changes to the ECCS TSs and has determined that these TSs are only needed to provide the LCOs and SRs necessary to maintain functionality of the systems that provide emergency cooling to the reactor core and assure the appropriate functional capability ECCS required for mitigation of DBAs when the reactor is in MODES 1 through 4. These TSs includes multiple LCOs addressing the SITs, HPSI and LPSI subsystems; part of the ECCS, designed to provide adequate emergency cooling capability to

the reactor in the event of a LOCA; the RWST, designed to supply borated water to the ECCS during accident conditions; and the TSP baskets to help retain iodine in solution. All of these TSs are related to provide cooling for a reactor vessel core. Since SONGS Units 2 and 3 are permanently shut down and defueled, there are no accidents of any kind that would require emergency core cooling and the accidents that these systems and components were designed to mitigate are no longer possible.

The NRC staff also reviewed the ECCS TSs proposed for deletion (TS 3.5.1, TS 3.5.2, TS 3.5.3, TS 3.5.4, and TS 3.5.5), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff notes that these TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for a permanently shutdown and defueled reactor, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels, and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 3.5, Emergency Core Cooling Systems, is acceptable.

3.7.12 Section 3.6, Containment Systems

Section 3.6 of SONGS Units 2 and 3 TSs, "Containment Systems," contains the LCOs, Actions, and SRs that provide for appropriate control of process variables, design features, or operating restrictions required to protect the integrity of the containment as a fission product barrier; and appropriate functional capability of ESF equipment required for mitigation of DBAs or transients so as to protect the integrity of containment. The following TSs are being proposed for deletion from this section.

TS 3.6.1, "Containment," specifies the requirements for the containment to ensure it is capable of withstanding the pressures and temperatures of the limiting DBA without exceeding the design leakage rate. The containment steel liner and its penetrations establish the leakage limiting boundary of the containment. This TS provides the operating restrictions required to protect the integrity of the containment as a fission product barrier and limits the leakage of fission product radioactivity from the containment to the environment. TS 3.6.1 is applicable in MODES 1, 2, 3, and 4.

TS 3.6.2, "Containment Air Locks," specifies the requirements for the structural integrity and leak tightness of the containment air locks. As part of the containment pressure boundary, the air lock safety function is related to control of the containment leakage rate resulting from a DBA. Thus, each containment air lock's structural integrity and leak tightness is essential to the successful mitigation of such an event. TS 3.6.2 is applicable in MODES 1, 2, 3, and 4.

TS 3.6.3, "Containment Isolation Valves," specifies the requirements for the isolation capability of the containment via the containment isolation valves. Containment isolation valves form a part of the containment boundary and their OPERABILITY supports leak tightness of the containment. TS 3.6.3 is applicable in MODES 1, 2, 3, and 4.

TS 3.6.4, "Containment Pressure," specifies the limitations on internal containment pressure. Containment internal pressure is an initial condition used in the DBA analyses to establish the maximum peak containment internal pressure. Maintaining containment pressure at less than or equal to the LCO upper pressure limit ensures that, in the event of a DBA, the resultant peak containment accident pressure will remain below the maximum allowed containment internal pressure. Maintaining containment pressure at greater than or equal to the LCO lower pressure limit ensures that the containment will not exceed the design negative differential pressure following the accidental actuation of the Containment Spray System. TS 3.6.4 is applicable in MODES 1, 2, 3, and 4.

TS 3.6.5, "Containment Air Temperature," specifies the limitations on containment average air temperature. Containment average air temperature is an initial condition used in the DBA analyses that establishes the containment environmental qualification operating envelope for both pressure and temperature. During a DBA, with an initial containment average air temperature less than or equal to the LCO temperature limit, the resultant accident temperature profile assures that the containment structural temperature is maintained below its design temperature and that required safety-related equipment will continue to perform its function. TS 3.6.5 is applicable in MODES 1, 2, 3, and 4.

TS 3.6.6.1, "Containment Spray and Cooling Systems," specifies the operability requirements for containment atmosphere cooling to limit post-accident pressure and temperature in containment to less than the design values. Reduction of containment pressure and the iodine removal capability of the spray reduce the release of fission product radioactivity from containment to the environment, in the event of a DBA, to within limits. The containment spray system consists of two separate trains. Each train includes a containment spray pump, spray headers, valves and piping. The RWST supplies borated water to the containment spray system during the injection phase of operation. In the recirculation mode of operation, containment spray pump suction is transferred from the RWST to the containment sump. Two trains of containment cooling, each of sufficient capacity to supply 50 percent of the design cooling requirement, are provided. Two trains with two fan units each are supplied with cooling water from the component cooling water system. All four fans are required to furnish the design cooling capacity. Air is drawn into the coolers through the fans and discharged to the SG compartments and pressurizer compartment. TS 3.6.6.1 is applicable in MODES 1, 2, and 3.

TS 3.6.6.2, "Containment Cooling Systems," specifies the operability requirements for containment atmosphere cooling to limit post-accident pressure and temperature in containment to less than the design values. Reduction of containment pressure reduces the release of fission product radioactivity from containment to the environment, in the event of a DBA, to within limits. Two trains of containment cooling, each of sufficient capacity to supply 50 percent of the design cooling requirement, are provided. Two trains with two fan units each are supplied with cooling water from the component cooling water system. All four fans are required to

furnish the design cooling capacity. Air is drawn into the coolers through the fans and discharged to the SG compartments and pressurizer compartment. TS 3.6.6.2 is applicable in MODE 4, when a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature, requiring the operation of the containment cooling trains.

TS 3.6.8, "Containment Dome Air Circulators," specifies the requirements for the containment dome air circulators to reduce the potential for breach of the containment due to a hydrogen oxygen reaction. The dome air circulators accelerate the air mixing process between the upper dome space of the containment atmosphere during LOCA operations. They also prevent any hot spot air pockets during the containment cooling mode and avoid any hydrogen concentration in pocket areas. Two dome air circulator trains are required to be operable. Each train consists of two fans with their own motors and controls and is automatically initiated by a containment cooling actuation signal (CCAS). While each train has two fans, only one operable fan is required for the train to be operable, since each fan can provide the necessary flow rate to adequately mix the containment atmosphere. TS 3.6.8 is applicable in MODES 1 and 2.

The NRC staff has reviewed the licensee's proposed changes for Section 3.6 of the SONGS Units 2 and 3 TSs and has determined that the TSs are only needed to provide the LCOs and SRs necessary to maintain functionality of the containment. These TSs include multiple LCOs addressing containment integrity, which includes: containment pressure, containment air temperature, and containment air locks, which forms part of the containment pressure boundary; and containment isolation valves, designed to isolate the containment in the event of a LOCA to prevent the release of fission products to the atmosphere; containment spray and cooling, which limit post-accident pressure and temperature in containment; and dome air circulators that help reduce the potential hydrogen concentration pockets in containment following a design basis accident. All of these TSs are related to assuring the integrity of the containment as a fission product boundary. The containment TSs are only important for a reactor authorized to operate or retain irradiated fuel in the reactor vessel. However, because 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactors or placing fuel in the reactor vessels at SONGS Units 2 and 3, the containment SSCs are no longer functional or used in any capacity and the associated TSs are no longer meaningful.

The NRC staff also reviewed the containment TSs proposed for deletion (TS 3.6.1, TS 3.6.2, TS 3.6.3, TS 3.6.4, TS 3.6.5, TS 3.6.6.1, TS 3.6.6.2, and TS 3.6.8), to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff notes that these TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for a permanently shutdown and defueled reactor, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels, and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 3.6, Containment Systems, is acceptable.

3.7.13 Section 3.7, Plant Systems

Section 3.7 of the SONGS Units 2 and 3 TSs, "Plant Systems," contains the LCOs, Actions, and SRs that provide for appropriate functional capability of balance-of-plant equipment required for safe operation of the facility. This section contains operability requirements related to the steam generators, feedwater system, cooling water, ventilation, and spent fuel storage.

The licensee proposed deletion of the following LCOs in Section 3.7 of the SONGS Units 2 and 3 TSs:

TS 3.7.1, "Main Steam Safety Valves (MSSVs)," specifies the requirements for the MSSVs to ensure they are capable of providing overpressure protection for the secondary system. The MSSVs also provide protection against overpressurizing the RCPB by providing a heat sink for the removal of energy from the RCS, if the preferred heat sink provided by the condenser and circulating water system, is not available. TS 3.7.1 is applicable in MODES 1, 2, and 3.

TS 3.7.2, "Main Steam Isolation Valves (MSIVs)," specifies the requirements for the MSIVs to ensure that they are capable of isolating steam flow from the secondary side of the SGs following a high energy line break (HELB). MSIV closure terminates flow from the unaffected (intact) steam generator. One MSIV is located in each main steam line outside, but close to, containment. The MSIVs are downstream from the MSSVs, atmospheric dump valves, and auxiliary feedwater pump turbine steam supplies to prevent them from being isolated from the SGs by MSIV closure. Closing the MSIVs isolates each SG from the other, and isolates the turbine, steam bypass system, and other auxiliary steam supplies from the steam generators. TS 3.7.2 is applicable in MODES 1, 2, and 3 except when all MSIVs are closed and deactivated.

TS 3.7.3, "Main Feedwater Isolation Valves (MFIVs)," specifies the requirements for MFIVs. The MFIVs isolate main feedwater (MFW) flow to the secondary side of the steam generators following a HELB. Closure of the MFIVs terminates flow to the steam generators, terminating the event for feedwater line breaks (FWLBs) occurring upstream of the MFIVs. The consequences of events occurring in the main steam lines or in the MFW lines downstream of the MFIVs will be mitigated by their closure. Closure of the MFIVs effectively terminates the addition of feedwater to an affected steam generator, limiting the mass and energy release for steam line breaks (SLBs) or FWLBs inside containment, and reducing the cooldown effects for SLBs. TS 3.7.3 is applicable in MODES 1, 2, and 3 except when MFIV is closed and deactivated.

TS 3.7.4, "Atmospheric Dump Valves (ADVs)," specifies the requirements for providing a method for cooling the unit to shutdown cooling system entry conditions, should the preferred heat sink via the steam bypass system to the condenser not be available. This is done in conjunction with the auxiliary feedwater (AFW) system providing cooling water from the condensate storage tank (CST). TS 3.7.4 is applicable in MODES 1, 2, and 3, and in MODE 4 when steam generator is relied upon for heat removal.

TS 3.7.5, "Auxiliary Feedwater (AFW) System," specifies the requirements to ensure that the AFW system automatically supplies feedwater to the steam generators to remove decay heat from the RCS upon the loss of normal feedwater supply. TS 3.7.5 is applicable in MODES 1, 2, and 3, and in MODE 4 when steam generator is relied upon for heat removal.

TS 3.7.6, "Condensate Storage Tank (CST T-121 and T-120)," specifies the requirements to ensure a safety grade source of water to the SGs for removing decay and sensible heat from the RCS. The CSTs provide a passive flow of water, by gravity, to the AFW System. TS 3.7.6 is applicable in MODES 1, 2, and 3, and in MODE 4 when steam generator is relied upon for heat removal.

TS 3.7.7, "Component Cooling Water (CCW) System," specifies the requirements to ensure that the CCW system provides a heat sink for the removal of process and operating heat from safety-related components during a DBA or transient. During normal operation, the CCW system also provides this function for various nonessential components. The CCW System serves as a barrier to the release of radioactive byproducts between potentially radioactive systems and the salt water cooling system, and thus to the environment. TS 3.7.7 is applicable in MODES 1, 2, 3, and 4.

TS 3.7.7.1, "Component Cooling Water (CCW) Safety Related Makeup System," specifies the requirements to ensure a safety-related CCW makeup system is available to maintain the water inventory in the CCW trains during a 7-day post-accident period. The safety-related makeup system is designed to supply water to the CCW trains following loss of normal CCW makeup from the nuclear service water system. For this purpose, sufficient water inventory is contained in the single primary plant makeup (PPMU) storage tank for both CCW trains. From the PPMU tank, water is transferred to the CCW return heads by two safety-related pumps. TS 3.7.7.1 is applicable in MODES 1, 2, 3, and 4.

TS 3.7.8, "Salt Water Cooling (SWC) System," specifies the requirements to ensure that the SWC system provides a heat sink for the removal of process and operating heat from safety-related components during a DBA or transient. During normal operation, and a normal shutdown, the SWC system also provides this function for various safety-related and nonsafety-related components. The safety-related function is covered by TS 3.7.8. TS 3.7.8 is applicable in MODES 1, 2, 3, and 4.

TS 3.7.10, "Emergency Chilled Water (ECW)," specifies the requirements to ensure that the ECW system provides a heat sink for the removal of process and operating heat from selected safety-related air handling systems during a DBA or transient. The design basis of the ECW system is to remove the post-accident heat load from ESF spaces following a DBA coincident with a loss of offsite power. Each train provides chilled water to the HVAC units at the design temperature and flow rate. TS 3.7.10 is applicable in MODES 1, 2, 3, and 4.

TS 3.7.19, "Secondary Specific Activity," specifies the limit on secondary coolant specific activity during power operation to minimize releases to the environment because of normal operation, AOOs, and accidents. The accident analysis of the main steam line break (MSLB) assumes an

initial secondary coolant specific activity used for determining the radiological consequences of the postulated accident. The accident analysis, based on this and other assumptions, shows that the radiological consequences of an MSLB do not exceed the TEDE limit. TS 3.7.19 is applicable in MODES 1, 2, 3, and 4.

The NRC staff has reviewed the proposed changes to TSs 3.7.1 through TS 3.7.10, and TS 3.7.19 and has determined that these TSs are only necessary to assure the operability of certain plant systems during reactor operation. These TSs involve: MSSVs, which provide overpressure protection for the secondary system; MSIVs, which isolate steam flow from the secondary side of the steam generator following a MSLB; MFIVs, which isolate main feedwater flow to the secondary side of the steam generators following a HELB; ADVs, which provide a method for cooling the unit should the condenser not be available; AFW system, which supplies feedwater to the steam generators upon the loss of the normal feedwater supply; CSTs, which provide the preferred source of water to the steam generators for removing decay and sensible heat from the RCS; CCW system, CCW safety-related makeup system, and the SWC system, which provide a heat sink for the removal of process and operating heat from safety-related components during a DBA or transient to the ultimate heat sink; the ECW system that removes heat from ESF spaces through safety-related air handling systems; and secondary specific activity, which specifies a limit on secondary coolant specific activity during power operation.

The above TSs were intended to protect the fuel in the reactor from potential operational transients and accidents. However, 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactor or placing fuel in the reactor vessel. Consequently, there are no longer any transient or accident conditions that these systems and components protect against or mitigate. Therefore, the NRC staff finds the deletion of 3.7.1 through 3.7.10, as detailed above, is acceptable. TS 3.7.19 provides the operational limits on secondary coolant specific activity limiting the potential radiological consequences of an accident that could release pressurized steam from the SGs. Since 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactor or placing fuel in the reactor vessel, there is no source of heat available to pressurize the SGs and no source of activity. Therefore, the NRC staff finds the deletion of TS 3.7.19 is acceptable.

The NRC staff has also reviewed Section 3.7 of the SONGS Units 2 and 3, TS 3.7.1, TS 3.7.2, TS 3.7.3, TS 3.7.4, TS 3.7.5, TS 3.7.6, TS 3.7.7, TS 3.7.7.1, TS 3.7.8, TS 3.7.10, and TS 3.7.19 proposed for deletion to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff notes that these TSs indicate MODES for which the TSs are applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for permanently shutdown and defueled reactors, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Therefore, based on the evaluation above, the NRC staff finds that the licensee's proposed change to delete Plant Systems TS 3.7.1, TS 3.7.2, TS 3.7.3, TS 3.7.4, TS 3.7.5, TS 3.7.6, TS 3.7.7, TS 3.7.7.1, TS 3.7.8, TS 3.7.10 and 3.7.19, is acceptable.

TS 3.7.11, "Control Room Emergency Air Cleanup System (CREACUS)," specifies the requirements to ensure that the CREACUS provides a protected environment from which operators can control SONGS Units 2 and 3, following an uncontrolled release of radioactivity, hazardous chemicals, or smoke. The CREACUS consists of two independent, redundant trains that recirculate and filter the air in the control room envelope (CRE) and a CRE boundary that limits the inleakage of unfiltered air. Each CREACUS train consists of an emergency air conditioning unit, emergency ventilation air supply unit, emergency isolation dampers, and cooling coils and two cabinet coolers. Each emergency air conditioning unit includes a prefilter, a high efficiency particulate air (HEPA) filter, an activated carbon adsorber section for removal of gaseous activity (principally iodines), and a fan. A second bank of HEPA filters follows the adsorber section to collect carbon fines. Ductwork, motor-operated dampers, doors, barriers, and instrumentation also form part of the system. Upon receipt of the actuating signal, normal air supply to the CRE is isolated and the stream of ventilation air is recirculated through the system's filter trains. The prefilters remove any large particles in the air to prevent excessive loading of the HEPA filters and charcoal adsorbers.

There are two CREACUS operational modes. Emergency mode is an operational mode when the control room is isolated to protect operational personnel from radioactive exposure through the duration of a DBA. Isolation mode is an operational mode when the CRE is isolated to protect operational personnel from toxic gases and smoke. Actuation of the CREACUS places the system into either of two separate states of operation, depending on the initiation signal. Actuation of the system to either the emergency mode or isolation mode of CREACUS operation closes the unfiltered-outside-air intake and unfiltered exhaust dampers and aligns the system for recirculation of air within the CRE through the redundant trains of HEPA and charcoal filters. The emergency mode also initiates pressurization of the CRE. Outside air is added to the air being recirculated from the CRE. Pressurization of the CRE minimizes infiltration of unfiltered air through the CRE boundary from all the surrounding areas adjacent to the CRE boundary. The CRE supply and the outside air supply of the normal control room HVAC are monitored by radiation and toxic-gas detectors, respectively. One detector output above the setpoint will cause actuation of the emergency mode or isolation mode as required. The actions of the isolation mode are more restrictive, and will override the actions of the emergency mode of operation. TS 3.7.11 is applicable in MODES 1, 2, 3, 4, 5, and 6 and during movement of fuel assemblies in the containment or fuel storage pool.

When SONGS Units 2 and 3 were authorized to operate, the CREACUS provided a protected environment from which operators could control the units following postulated accidents involving an uncontrolled release of radioactivity, including an FHA. Prior to SONGS Units 2 and 3 permanently shutting down and defueling, the TSs for the CREACUS provided the LCOs and SRs necessary to maintain the control room environment following an accident. Specifically, during irradiated fuel movement, the CREACUS provided a protected environment from which operators can control the unit following a postulated uncontrolled release of radioactivity from an FHA. CRE will remain habitable during and following a DBA. In MODES 5

and 6, the CREACUS is required to cope with the release from a rupture of a waste gas tank. During movement of fuel assemblies, the CREACUS must be operable to cope with the release from an FHA.

The licensee provided information on the toxic gases isolation of CREACUS in Section 3.2.10.2.3 of the licensee's permanently defueled technical specification amendment request. Specifically, per the NRC's SE associated with the issuance of SONGS License Amendment Nos. 127 and 116 for Units 2 and 3, respectively dated February 9, 1996 (ADAMS Accession No. ML021990684), the toxic gas isolation of CREACUS is not relied on to prevent or mitigate a design basis accident or transient because the plant design includes other means to safely shut down the plant if the control room becomes uninhabitable. As such, the toxic gas isolation instrumentation was relocated from the TS and placed in the Licensee Controlled Specifications with an applicability of MODES 1, 2, 3, 4, 5, and 6. Since an NRC SE has already accepted the removal of toxic gas isolation of CREACUS from the TSs, a new NRC staff determination is not required. The staff concludes that automatic toxic gas isolation of CREACUS is not required during movement of fuel assemblies in the fuel storage pool at the permanently defueled SONGS Units 2 and 3.

With the termination of reactor operations at SONGS Units 2 and 3 and the permanent removal of the fuel from the reactor core in each unit, the postulated accidents involving failure or malfunction of the reactor, RCS, or secondary system are no longer applicable. While there are no transients that continue to apply to SONGS Units 2 and 3, there are still postulated DBAs. As discussed in Sections 3.1 through 3.6 of this SE, the remaining DBAs applicable to the defueled reactors of SONGS Units 2 and 3 show that the dose consequences are acceptable without relying on SSCs remaining functional for accident mitigation during and following the event, with the exception of the SFP structure.

The NRC staff evaluated these accident analyses and confirmed that no ESF system is used to mitigate the CR, EAB, or LPZ dose consequences. This includes no credit for the FHIS, the PACU filtration system, the CRIS and the CREACUS. Since SONGS Units 2 and 3 are permanently shutdown and defueled, and greater than 17 months of decay time has elapsed since permanent shut down, the remaining DBAs applicable to the facility demonstrate that the dose consequences within the CR are acceptable without relying on SSCs remaining functional for accident mitigation, including an FHA in the FHB. (The one exception to this is the continued function of the passive fuel storage pool structure, which will be maintained as a TS for SONGS Units 2 and 3.)

In summary, the radiological consequences of the remaining DBAs for SONGS Units 2 and 3 assume no credit for CR isolation or recirculation filtration and no credit for any accident mitigation by the FHB ventilation system. Calculated doses at the EAB, LPZ, and CR are within 10 CFR Part 50.67 limits, and RG 1.183 dose limits. Since the DBA accident analysis for SONGS Units 2 and 3 assumed no credit for control room post-accident recirculation system emergency ventilation or filtration, the CREACUS is no longer required. Therefore, isolation of the CRE via the CRIS and CREACUS is not necessary for any of the postulated DBAs. As noted before, the intent of Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) is to capture into TSs those SSCs that are part of the primary success path of a safety sequence analysis. With SONGS

Units 2 and 3 permanently shutdown and defueled, and the irradiated fuel having decayed for a minimum period of 17 months, the CREACUS is no longer needed or credited in the primary success path of a safety sequence analysis related to an accident. Since the radiological consequences of the accident analyses are within the appropriate acceptance criteria without credit for the CREACUS, the NRC staff finds that the licensee's proposed change to delete TS 3.7.11, is acceptable.

The licensee intends to retain TS 3.7.16, TS 3.7.17, and TS 3.7.18 but revise these TSs to delete the REQUIRED ACTIONS note that states that LCO 3.0.3 is not applicable. LCO 3.0.3 is being deleted from the SONGS Units 2 and 3 TSs and removal of a reference to TS 3.0.3 is a conforming change. In addition, with the deletion of all TSs in Section 3.1 through 3.6, the licensee also proposes to renumber these TSs to 3.1.1 to 3.1.3, respectively

TS 3.7.16, "Fuel Storage Pool Water Level," specifies the requirements to ensure that the minimum water level in the SFP meets the assumptions of iodine decontamination factors following an FHA. The water also provides shielding during the movement of spent fuel. This TS is applicable during movement of irradiated fuel assemblies in the SFP. The licensee has proposed to retain this TS in the permanently defueled TSs essentially unchanged. The Note in Required Action A.1 (LCO 3.0.3 is not applicable), is being deleted to conform to the deletion of TS LCO 3.0.3. The licensee has also proposed to renumber this TS as 3.1.1, based on the proposed deletion of all the preceding TSs.

Criterion 2 of 10 CFR 50.36(c)(2)(ii)(B) states that TS LCOs must be established for a "process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." The purpose of this criterion is to capture those process variables that have initial values assumed in the DBA. TS 3.7.16, "Fuel Storage Pool Water Level," specifies the TS required LCOs and SRs that ensure the minimum water level in the SFP meets the assumptions of iodine decontamination factors following an FHA or cask drop accident.

SCE's analysis of the postulated FHA or cask drop accident assumes that there is at least 23 feet of water between the top of the damaged fuel assemblies and the fuel pool surface. The gap activity in the damaged rods is assumed to be instantaneously released into the SFP. Radionuclides in the gap release are assumed to be filtered by the 23 feet of water before emerging from the SFP. The activity exhaust rate from the auxiliary building is established to complete the release in 2 hours, as required by RG 1.183, but does not credit the auxiliary building ventilation for any mitigation of the release.

Since the 23-foot water level of the SFP is an initial condition of the FHA and the cask drop DBA, it satisfies Criterion 2 for inclusion in TSs and is being retained for SONGS Units 2 and 3 in their permanently shutdown and defueled condition. The amendment request by SCE does not involve any change to the technical language in the TS. The discussion in this evaluation of the SFP water level TS is provided only for completeness since the SFP water level is an important initial condition in the FHA and cask drop accident analysis and will continue to be part of the SONGS TSs.

TS 3.7.17, "Fuel Storage Pool Boron Concentration," specifies the requirements to ensure that the SFP boron concentration is > 2000 parts per million (ppm). The specified concentration of dissolved boron in the SFP preserves the assumptions used in the analyses of the potential critical accident scenarios as described in the criticality analysis of record, which is that a minimum of 2000 ppm of boron is needed to ensure that criticality does not occur during the worst case fuel loading accident. This concentration of dissolved boron is the minimum required for fuel assembly storage and movement within the spent fuel pool. This TS is applicable whenever fuel assemblies are stored in the spent fuel pool. This TS is being retained in the permanently defueled TS essentially unchanged. The Note in Required Action A.1 (LCO 3.0.3 is not applicable), is being deleted to conform to the deletion of TS LCO 3.0.3. The licensee has also proposed to renumber this TS as 3.1.2, based on the proposed deletion of all the preceding TSs.

TS 3.7.18, "Spent Fuel Assembly Storage," specifies the restrictions on the placement of fuel assemblies within the SFP, in accordance with Figure 3.1.3-1 through Figure 3.1.3-4 in the accompanying LCO, to ensure the keff of the SFP will always remain < 0.95, assuming the pool to be flooded with unborated water. This TS applies whenever any fuel assembly is stored in the spent fuel pool. TS 3.7.18 is being retained in the permanently defueled TS essentially unchanged. The Note in Required Action A.1 (LCO 3.0.3 is not applicable), is being deleted to conform to the deletion of TS LCO 3.0.3. The licensee has also proposed to renumber this TS as 3.1.3, based on the proposed deletion of all the preceding TSs.

The NRC staff reviewed the proposed deletion of the reference to LCO 3.0.3 in the Required Actions Note in TS 3.7.16, TS 3.7.17, and TS 3.7.18. The staff finds that deletion of the Note, "LCO 3.0.3 is not applicable," in each of these TSs is appropriate and the conforming change to the deletion of TS LCO 3.0.3, as discussed in Section 3.7.6 of this SE. Therefore, the staff finds that the licensee's proposed change to delete the reference to LCO 3.0.3 in TS 3.7.16, TS 3.7.17, and TS 3.7.18 (renumber as TS 3.1.1, TS 3.1.2, and TS 3.1.3, respectively – see below), is acceptable.

The NRC staff also reviewed the proposed change to renumber TS 3.7.16, 3.7.17, and TS 3.7.18, to TS 3.1.1, TS 3.1.2, and TS 3.1.3, respectively, and found the change to be editorial and conforming to the overall changes to the TSs. Therefore, the NRC staff finds that the licensee's proposed renumbering of the TSs is acceptable.

3.7.14 Section 3.8, Electrical Power Systems

The licensee proposed to delete SONGS Units 2 and 3 electrical power systems TS 3.8.1, TS 3.8.4, TS 3.8.7, and TS 3.8.9, since these TSs are MODE dependent and only applicable to an operating reactor. Therefore, these TSs do not apply to the permanently shutdown and defueled condition of SONGS Units 2 and 3.

TS 3.8.1, "AC [Alternating Current] Sources - Operating," specifies the requirements to ensure that the offsite power sources (normal preferred and alternate preferred power sources), and the standby power sources (Train A and Train B DGs), provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that

the fuel, RCS, and containment design limits are not exceeded. TS 3.8.1 is applicable in MODES 1, 2, 3, and 4.

TS 3.8.4, "DC [Direct Current] Sources - Operating," specifies the requirements to ensure that the DC electrical power subsystems (with each subsystem consisting of one battery, the *required battery charger, and the corresponding control equipment and interconnecting cabling* supplying power to the associated bus within the subsystem) are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an AOO or postulated DBA. TS 3.8.4 is applicable in MODES 1, 2, 3, and 4.

TS 3.8.7, "Inverters - Operating," specifies the requirements to ensure that required inverters are OPERABLE such that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. These requirements include the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, RCS, and containment design limits are not exceeded. TS 3.8.7 is applicable in MODES 1, 2, 3, and 4.

TS 3.8.9, "Distribution Systems - Operating," specifies the requirements to ensure availability of AC, DC, and AC instrument bus electrical power for the systems *required to shut down the* reactor and maintain it in a safe condition after an AOO or a postulated DBA. The AC, DC, and AC vital electrical power distribution systems are designed to provide sufficient capacity, *capability, redundancy, and reliability to ensure the availability of necessary power to ESF* systems so that the fuel, RCS, and containment design limits are not exceeded. TS 3.8.9 is applicable in MODES 1, 2, 3, and 4.

The NRC staff has reviewed the SONGS Units 2 and 3 electrical power systems LCOs in TS 3.8.1, TS 3.8.4, TS 3.8.7, and TS 3.8.9, which have been proposed for deletion, to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff notes that these TSs indicate MODES for which the TS is applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for the permanently shutdown and defueled reactors, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), *it is prohibited from operating the reactors or placing fuel in the reactor vessels.* Therefore, SONGS Units 2 and 3 are no longer in a configuration or a condition under which these TS MODES apply. Based on the above, the staff finds the deletion of TS 3.8.1, TS 3.8.4, TS 3.8.7, and TS 3.8.9 from TS Section 3.8, Electrical Systems, is acceptable.

The licensee has also proposed to delete SONGS Units 2 and 3 electrical power systems TS 3.8.2, TS 3.8.3, TS 3.8.5, TS 3.8.6, TS 3.8.8, and TS 3.8.10, based on the MODE dependent applicably of these TSs. However, these TSs are also directly applicable during the movement of irradiated fuel assemblies or are support systems for TSs required during the movement of irradiated fuel assemblies. The following evaluations of these electrical power systems TSs assess the licensee's justification as to why these TSs do not apply to the

permanently shutdown and defueled condition of SONGS Units 2 and 3 during movement of irradiated fuel assemblies.

TS 3.8.2, "AC Sources - Shutdown," specifies the requirements to ensure that the offsite power sources (normal preferred and alternate preferred power sources), and the standby power sources (Train A and Train B DGs), provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded. TS 3.8.2 is applicable during MODES 5 and 6 and during movement of fuel assemblies in containment or in the fuel storage pool.

TS 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," provides for proper operation of the DGs, by specifying the parameters and ensuring there will be sufficient quantity and proper quality of the fuel oil, lube oil, and starting air systems. Stored diesel fuel oil is required to have sufficient supply for 7 days of rated load operation for each DG. It is also required to meet specific standards for quality. Additionally, sufficient lubricating oil supply must be available to ensure the capability to operate each DG at rated load for 7 days. Lastly, each DG is equipped with two air start systems, which have adequate capacity for five successive start attempts on the DG without recharging the air start receivers. TS 3.8.3 is applicable whenever the DGs are required to be operable.

TS 3.8.5, "DC Sources Shutdown," specifies the requirements to ensure availability of the DC electrical power system and subsystems (with each subsystem consisting of one battery, required battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the subsystem), in order to provide normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching. TS 3.8.5 is applicable during MODES 5 and 6 and during movement of fuel assemblies in containment or in the fuel storage pool.

TS 3.8.6, "Battery Parameters," specifies the requirements to ensure the limits on battery float current as well as electrolyte temperature, level, and float voltage for the DC power subsystem batteries. Battery parameters are required solely for the support of the associated DC electrical power subsystems (per TS 3.8.4 and TS 3.8.5). Therefore, battery parameter limits are only required (and TS 3.8.6 is only applicable) when the DC electrical power source is required to be operable.

TS 3.8.8, "Inverters – Shutdown," specifies the requirements to ensure stability and reliability of the preferred source of power for the 120 Volt AC vital buses. The inverters can be powered from an internal AC source/rectifier or from the station battery. The inverter provides an uninterruptible power source for the safety-related instrumentation and controls. TS 3.8.8 is applicable during MODES 5 and 6 and during movement of fuel assemblies within containment or in the fuel storage pool.

TS 3.8.10, "Distribution Systems - Shutdown," specifies the requirements for the onsite AC, DC, and AC instrument bus electrical power distribution systems. The TS specifies sufficient capacity, capability, redundancy, and reliability of the distribution system to ensure the availability of necessary power to ESF systems so that the fuel, RCS, and containment design

limits are not exceeded. TS 3.8.10 is applicable during MODES 5 and 6 and during movement of fuel assemblies within containment or in the fuel storage pool.

The SONGS Unit 2 and 3 TS Basis documents indicates that the shutdown electrical power systems TS 3.8.2, TS 3.8.3, TS 3.8.5, TS 3.8.6, TS 3.8.8, and TS 3.8.10 provide assurance that:

a. The units can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the units status; and

c Adequate AC electrical power is provided to mitigate events postulated during shut down, such as an FHA.

The NRC staff has reviewed the SONGS Units 2 and 3 shutdown electrical power systems TSs (TS 3.8.2, TS 3.8.3, TS 3.8.5, TS 3.8.6, TS 3.8.8, and TS 3.8.10), which have been proposed for deletion, to ensure that these LCOs no longer satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The staff notes that these TSs indicate MODES for which the TS is applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for the permanently shutdown and defueled reactors, such as SONGS Units 2 and 3, has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactors or placing fuel in the reactor vessels and SONGS Units 2 and 3 is no longer in a configuration or a condition under which these TS MODES apply. Based on the above, the NRC staff finds that the licensee's proposed change to delete TS 3.8.2, TS 3.8.3, TS 3.8.5, TS 3.8.6, TS 3.8.8, and TS 3.8.10, from TS Section 3.8, Electrical Systems, for MODES 5 and 6, is acceptable.

The NRC staff also reviewed the non-MODE dependent applicability during movement of fuel assemblies within containment and in the fuel storage pool. Because 10 CFR 50.82(a)(2) prohibits operation of the plant or placing fuel in the reactor vessel, the prohibition on placing fuel in the reactor vessel, it also precludes core alterations and the movement of fuel assemblies within containment. Therefore, these TSs are no longer needed during movement of fuel assemblies within containment.

As detailed in Sections 3.1 through 3.6 of this SE, the remaining accident analyses applicable to the permanently shutdown and defueled reactors of SONGS Units 2 and 3 show that the dose consequences within the control room are acceptable without relying on SSCs remaining functional for accident mitigation during any of the remaining DBAs, including FHAs. (The one exception to this is the continued function of the passive fuel storage pool structure, which will be maintained as a TS for SONGS).

For TS 3.8.2, AC Sources – Shutdown, the FHA is the applicable DBA related to the TS requirement for functional capability of AC sources (offsite power and DGs) during the TS

specified condition of during movement of fuel assemblies in the fuel storage pool. Because the FHA analysis, and the other DBAs identified for SONGS Units 2 and 3, do not rely on normal or emergency power for accident mitigation (including any need for providing airborne radiological protection), the AC sources are not required during movement of fuel assemblies in the fuel storage pool for mitigation of a potential FHA or any of the other DBAs. Specifically, the accident analyses show that the dose consequences are acceptable without relying on any SSCs to remain functional during and following the postulated events, with the exception of the SFP support structure. Therefore, during movement of fuel assemblies in the fuel storage pool, there are no systems that function or actuate and are credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the DBA. As such, the requirement for AC sources is no longer necessary because there are no design-basis events that rely on AC sources for mitigation. Consequently, AC sources no longer meet the requirements of Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) and can be removed from TSs. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.2, during movement of fuel assemblies in the fuel storage pool, is acceptable.

The NRC staff has reviewed the need for TS 3.8.3, Diesel Fuel Oil, Lube Oil, and Starting Air, during movement of fuel assemblies in the fuel storage pool. Since TS 3.8.3 exists solely to support the DG requirements of TS 3.8.1 and TS 3.8.2, the deletion of these TSs is consistent with the elimination of the need for DGs and also eliminates the need for the DG support systems. The NRC staff has determined that the requirement for DGs and associated supporting TSs are no longer necessary because the remaining DBAs for SONGS Units 2 and 3 do not rely on the DGs for mitigation. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.3, during movement of fuel assemblies in the fuel storage pool, is acceptable.

The NRC staff has reviewed the need for TS 3.8.5, DC Sources – Shutdown, during movement of fuel assemblies in the fuel storage pool. Because the FHA analysis, and the other DBAs identified for SONGS Units 2 and 3, do not rely on safety-related DC sources of electrical power for accident mitigation (including any need for providing airborne radiological protection), the DC sources are not required during movement of fuel assemblies in the fuel storage pool for mitigation of a potential FHA or any of the other DBAs. Specifically, the accident analyses show that the dose consequences are acceptable without relying on any SSCs to remain functional during and following the postulated events. Therefore, during movement of fuel assemblies in the fuel storage pool, there are no systems that function or actuate and are credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the DBA. As such, the requirement for DC sources is no longer necessary because there are no design-basis events that rely on DC sources for mitigation. Consequently, DC sources no longer meet the requirements of Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) and can be removed from TSs. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.5, during movement of fuel assemblies in the fuel storage pool, is acceptable.

The NRC staff has reviewed the need for TS 3.8.6, Battery Parameters, during movement of fuel assemblies in the fuel storage pool. Since TS 3.8.6 exists solely to support the DC source requirements of TS 3.8.4 and TS 3.8.5, the deletion of these TSs is consistent with the elimination of the need for DC sources and also obviates the need for the battery support

systems. The staff has determined that the requirement for DC sources and associated supporting TSs are no longer necessary because the remaining DBAs for SONGS Units 2 and 3 do not rely on the DC sources for mitigation. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.6, battery parameters, during movement of fuel assemblies in the fuel storage pool, is acceptable.

The NRC staff has reviewed the need for TS 3.8.8, Inverters – Shutdown, during movement of fuel assemblies in the fuel storage pool. Because the FHA analysis, and the other DBAs identified for SONGS Units 2 and 3 do not rely on inverters or the safety-related 120 Volt AC electrical power for accident mitigation (including any need for providing airborne radiological protection), the inverters are not required during movement of fuel assemblies in the fuel storage pool for mitigation of a potential FHA or any of the other DBAs. Specifically, the accident analyses show that the dose consequences are acceptable without relying on any SSCs to remain functional during and following the postulated events, with the exception of the SFP support structure. Therefore, during movement of fuel assemblies in the fuel storage pool, there are no systems that function or actuate and are credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the DBA. As such, the requirement for inverters is no longer necessary because there are no design-basis events that rely on inverters for mitigation. Consequently, inverters no longer meet the requirements of Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) and can be removed from TSs. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.8, during movement of fuel assemblies in the fuel storage pool, is acceptable.

The NRC staff has reviewed the need for TS 3.8.10, Distribution System – Shutdown, during movement of fuel assemblies in the fuel storage pool. Because the FHA analysis, and the other DBAs identified for SONGS Units 2 and 3, do not rely on the safety-related AC, DC and AC instrument bus electrical distribution systems for accident mitigation (including any need for providing airborne radiological protection), these safety-related distributions systems are not required during movement of fuel assemblies in the fuel storage pool for mitigation of a potential FHA or any of the other DBAs. Specifically, the accident analyses show that the dose consequences are acceptable without relying on any SSCs to remain functional during and following the postulated events, with the exception of the SFP support structure. Therefore, during movement of fuel assemblies in the fuel storage pool, there are no systems that function or actuate and are credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the DBA. As such, the requirement for safety-related AC, DC and AC instrument bus electrical distribution systems is no longer necessary because there are no design-basis events that rely on safety-related AC, DC and AC instrument bus electrical distribution systems for mitigation. Consequently, AC, DC and AC instrument bus electrical distribution systems no longer meet the requirements of Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) and can be removed from TSs. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 3.8.10, during movement of fuel assemblies in the fuel storage pool, is acceptable.

3.7.15 Section 3.9, Refueling Operations

Section 3.9 of the SONGS Units 2 and 3 TSs, "Refueling Operations," contains the LCOs, Actions, and SRs related to refueling operations. This section contains the following LCOs:

TS 3.9.1, "Boron Concentration," places limits on the boron concentrations of the RCS and the refueling canal to ensure that the reactor remains subcritical during refueling. Refueling boron concentration is the soluble boron concentration in the coolant in each of these volumes, which have direct access to the reactor core during refueling. The boron concentration limits required by TS LCO 3.9.1 are specified in the COLR. The boron concentration limit specified in the COLR will maintain a k_{eff} of < 0.95 during fuel handling operations with CEAs and fuel assemblies assumed to be in the most adverse configuration (least negative reactivity) allowed by unit procedures. TS 3.9.1 is applicable in MODE 6.

TS 3.9.2, "Nuclear Instrumentation," requires that two source range monitors (SRMs) to be OPERABLE to ensure that redundant monitoring capability is available to detect changes in core reactivity. The SRMs are required to provide a signal to alert the operator to unexpected changes in core reactivity such as by a boron dilution event or an improperly loaded fuel assembly. TS 3.9.2 is applicable in MODE 6.

TS 3.9.3, "Containment Penetrations," specifies the requirements for containment closure during the conduct of CORE ALTERATIONS and movement of fuel assemblies within containment. The containment penetrations included within TS 3.9.3 are the equipment hatch, personnel airlock doors, and penetrations that provide direct access from the containment atmosphere to the outside atmosphere. TS 3.9.3 limits the consequences of an FHA involving handling fuel within containment by limiting the potential escape paths for fission product radioactivity released within containment. TS 3.9.3 is applicable during CORE ALTERATIONS and during the movement of fuel assemblies within containment.

TS 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation - High Water Level," specifies requirements for the SDC system in MODE 6 to remove decay heat and sensible heat from the RCS, to provide mixing of borated coolant, to provide sufficient coolant circulation to minimize the effects of a boron dilution accident, and to prevent boron stratification. One loop of the SDC system is required to be OPERABLE and in operation in MODE 6, with the water level > 20 feet above the top of the reactor vessel flange. Only one SDC loop is required to be OPERABLE, because the volume of water above the reactor vessel flange provides backup decay heat removal capability. TS 3.9.4 is applicable in MODE 6, with the water level > 20 feet above the top of the reactor vessel flange.

TS 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation - Low Water Level," also specifies requirements for the SDC system in MODE 6 to remove decay heat and sensible heat from the RCS, to provide mixing of borated coolant, to provide sufficient coolant circulation to minimize the effects of a boron dilution accident, and to prevent boron stratification. However, with the water level < 20 feet above the top of the reactor vessel flange, both SDC loops must be OPERABLE. Additionally, one loop of SDC must be in operation. TS 3.9.5 is applicable in MODE 6 with the water level < 20 feet above the top of the reactor vessel flange.

TS 3.9.6, "Refueling Water Level," specifies a minimum water level of 23 feet above the top of the reactor vessel flange during movement of fuel assemblies or CEAs within the reactor pressure vessel, and during movement of fuel assemblies within containment. A minimum refueling cavity water level of 23 feet above the top of the reactor vessel flange is required to ensure that the radiological consequences of a postulated FHA inside containment are within acceptable limits. The requirements of TS LCO 3.9.6, in conjunction with a minimum decay time of 72 hours prior to fuel movement, ensures that the release of fission product radioactivity, subsequent to an FHA, results in doses that are well within the guideline values specified in Regulatory Guide 1.183. TS 3.9.6 is only applicable during movement of fuel assemblies or CEAs within the reactor pressure vessel, and during movement of fuel assemblies within containment.

The licensee proposed to delete Section 3.9 of the SONGS Units 2 and 3 TSs LCOs, since they are only applicable to an operating reactor and do not apply to the permanently shutdown and defueled condition of SONGS Units 2 and 3.

The NRC staff has reviewed the proposed changes and has determined that Section 3.9 TSs are only needed to provide the LCOs and SRs necessary to maintain functionality of plant systems required for refueling operations. These TSs involve: boron concentration, which places limits on the boron concentrations of the RCS and the fuel transfer canal during refueling; nuclear instrumentation, which monitors the core reactivity condition during refueling operations; containment penetrations, which specifies requirements for containment closure during the conduct of refueling operations; residual heat removal and coolant circulation – high and low water level, which removes decay heat and sensible heat from the RCS, provides mixing of borated coolant, and prevents boron stratification; and refueling cavity water level, which specifies a minimum water level of 23 feet above the top of the reactor vessel flange during movement of irradiated fuel assemblies within containment. However, 10 CFR 50.82(a)(2) prohibits the licensee from operating the plant or placing fuel in the reactor vessel. Therefore, refueling operations are no longer permitted at SONGS Units 2 and 3, and the LCOs in Section 3.9 TSs are no longer relevant.

The NRC staff has also reviewed the refueling operations TSs proposed for deletion to ensure that these LCOs were no longer required to satisfy the 10 CFR 50.36 criteria for inclusion in TSs, as described in Section 2.1 of this evaluation. The NRC staff notes that these TSs indicate MODES for which each TS is applicable. MODES, as defined in TSs, correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning with fuel in the reactor vessel. The reference to MODES for a permanently shutdown and defueled reactor has no meaning and is not relevant. Because SCE has submitted certifications pursuant to 10 CFR 50.82(a)(2), it is prohibited from operating the reactor or placing fuel in the reactor vessel and SONGS Units 2 and 3 are no longer in a configuration or a condition under which the TS MODES apply.

Based on the above, the NRC staff finds that the licensee's proposed change to delete TS Section 3.9, Refueling Operations, is acceptable.

3.7.16 Section 4.0, Design Features

TS 4.1, "Site" provides a description regarding the location of SONGS. The licensee has proposed to retain this TS section in the permanently defueled SONGS Units 2 and 3 TSs with no changes.

TS 4.2, "Reactor Core," provides a general description of the number of and design material requirements for the fuel and control element assemblies used in the reactor core. The licensee has proposed to delete the design feature descriptions for fuel and control element assemblies, since they are only applicable to an operating reactor and do not apply to the permanently shutdown and defueled condition of SONGS Units 2 and 3.

The NRC staff has reviewed the proposed changes to delete the reactor core fuel and control element assemblies design features from SONGS Units 2 and 3 TSs. Since 10 CFR 50.82(a)(2) prohibits the licensee from operating the reactors or placing fuel in the reactor vessels, the design features related to the reactor core fuel assemblies and control rods are no longer relevant at SONGS Units 2 and 3. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 4.2, reactor core design features, is acceptable.

TS 4.3, "Fuel Storage," provides a description and the requirements regarding prevention of criticality of spent fuel, prevention of SFP drainage and spent fuel capacity limitations. This TS section is being retained in the permanently defueled TSs, with the exception of TS 4.3.1.2, which is the design and maintenance of the new fuel storage racks as discussed below. The licensee has also made editorial changes to the TS references in this section to conform to the proposed renumbering of certain retained TSs.

TS 4.3.1.2 has been proposed to be deleted because new fuel is no longer stored onsite and License Condition 2.B.(3) is being revised to no longer allow receipt of new fuel. The NRC staff has reviewed the proposed changes to remove the new fuel storage rack design features from the TSs. Since the licensee currently has no new fuel stored onsite and since the facility license will no longer allow new fuel to be stored onsite, the requirements for new fuel storage racks are no longer applicable.

Based on the above, the NRC staff finds the proposed changes to delete the new fuel storage rack design features from SONGS Units 2 and 3 TS 4.3.1.2 to be acceptable. The staff also reviewed the proposed renumbering of references in TS 4.3.1, Criticality, and determined that the changes to be conforming and editorial in nature. Therefore, the NRC staff finds that the licensee's proposed changes to TS 4.3, Fuel Storage, is acceptable.

3.7.17 Section 5.2, Organization and Section 5.3, Facility Staff Qualifications

SONGS Units 2 and 3 permanently defueled TS 5.1, "Responsibility"; TS 5.2, "Organization"; and TS 5.3, "Facility Staff Qualifications," were previously approved by the NRC staff in License Amendment Nos. 227 and 220 for SONGS Units 2 and 3, respectively, dated September 30, 2014 (ADAMS Accession No. ML14183B240).

The licensee has proposed several additional changes to TS 5.2, Organization, and TS 5.3, Facility Staff Qualification that were not included in Amendment Nos. 227 and 220. The first change is to capitalize the position of CERTIFIED FUEL HANDLER, consistent with its use as a defined term in TS 1.0, Definitions.

The NRC staff reviewed the proposed change to capitalize the position of CERTIFIED FUEL HANDLER where it is used in TS 5.2 and TS 5.3 and concludes the change is editorial in nature such that the current intent of the affected TS requirements is unchanged. Therefore, the staff finds that the licensee's proposed change to capitalize CERTIFIED FUEL HANDLER in TS 5.2 and TS 5.3, is acceptable.

The licensee has also proposed a change to Facility Staff TS 5.2.2.c (note that this was originally TS 5.2.2.b but was renumbered to TS 5.2.2.c by Amendment Nos. 227 and 220), to clarify that during unexpected absences of on-duty shift crew members, no fuel movement or movement of heavy loads over storage racks containing fuel is permitted. Specifically;

Facility Staff TS 5.2.2.c currently states:

> c. Shift crew composition may be less than the minimum requirement of Table 5.2.2-1 for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements.

Revised Facility Staff TS 5.2.2.c would state:

> c. Shift crew composition may be less than the minimum requirement of Table 5.2.2-1 for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements. During such absences, no fuel movement or movement of heavy loads over storage racks containing fuel is permitted.

The NRC staff has reviewed the proposed revision to TS 5.2.2.c restricting fuel movement or movement of heavy loads over storage racks containing fuel when an unexpected absence of the on-duty shift crew results in a minimum crew composition less than specified in TSs. The staff finds that additional restriction on fuel movement and heavy loads prudent considering the reduced staffing levels at a permanently shutdown and defueled reactor facility. Therefore, the NRC staff finds that the proposed licensee change to TS 5.2.2.c, is acceptable.

The licensee has also proposed a change to Facility Staff Qualifications TS 5.3.1 to delete the qualification requirements for multi-discipline supervisors. SCE states that it will no longer be utilizing the position of multi-discipline supervisor. Specifically;

Facility Staff Qualifications TS 5.3.1 currently states:

5.3.1 Each member of the facility staff shall meet or exceed the minimum qualifications of ANSI N18.1-1971 for comparable positions, except a) the radiation protection manager, who shall meet or exceed the qualifications of Regulatory Guide 1.8, September 1975, and b) multi-discipline supervisors who shall meet or exceed the qualifications listed below.

a. Education: Minimum of a high school diploma or equivalent.

b. Experience: Minimum of four years of related technical experience which shall include three years power plant experience of which one year is at a nuclear plant.

c. Training: Complete the multi-discipline supervisor training program.

Revised Facility Staff Qualifications TS 5.3.1 would state:

5.3.1 Each member of the facility staff shall meet or exceed the minimum qualifications of ANSI N18.1-1971 for comparable positions, except a) the radiation protection manager, who shall meet or exceed the qualifications of Regulatory Guide 1.8, September 1975.

The NRC Staff has reviewed the proposed deletion of the qualifications for multi-discipline supervisors from the SONGS Units 2 and 3 TSs and concluded that the qualifications are not necessary since the licensee no longer utilizes multi-discipline supervisors. Therefore, the NRC staff finds that the licensee's proposed change to TS 5.3.1, is acceptable.

3.7.17.1 Section 5.4, Technical Specification (TS) Bases Control

SONGS Units 2 and 3, TS 5.4, "Technical Specifications (TS) Bases Control," is a program that provides the requirements for changing the TS Bases without prior NRC approval. TS 5.4 will remain applicable with the reactor permanently shutdown and defueled. As such, it is being retained and revised, as follows, to reflect a permanently defueled condition.

Currently, the licensee is required to submit changes to the TS Bases to the NRC, which have been implemented without prior NRC approval, within 6 months following every Unit 3 refueling, not to exceed 24 months. The licensee has proposed to revise TS 5.4.4 to be consistent with the submittal of UFSAR updates for the permanently shutdown and defueled status of SONGS Units 2 and 3. The TS Bases changes (that do not require NRC approval) will be submitted to the NRC for information and/or review every 24 months consistent with the UFSAR updates.

The NRC staff has reviewed the proposed change to TS 5.4.4 that aligns the submittal of changes to the TS Bases to every 24 months consistent with the submittal of the UFSAR changes. The NRC staff has determined that the proposed revision to the frequency of submitting the TS Bases Control changes to NRC is administrative in nature. The revised TS

5.4.4 continues to meet the minimum frequency of the original TS. In addition, the change is consistent with the requirements of 10 CFR 50.71(e) for providing UFSAR updates to the NRC for a permanently shutdown and defueled reactor (i.e., every 24 months). Therefore, the NRC staff finds that the licensee's proposed change to TS 5.4.4, is acceptable.

3.7.17.2 Section 5.5.1, Procedures

TS 5.5.1, "Procedures," addresses procedures, programs and manuals required by the SONGS Units 2 and 3 TSs. The licensee proposes to delete that following procedures from the permanently defueled technical specifications:

TS 5.5.1.1, "Scope," requires that written procedures be established, implemented, and maintained covering certain activities. The licensee has proposed to delete TS 5.5.1.1, paragraphs b and f.

TS 5.5.1.1, paragraph b., currently states:

> The emergency operating procedures required to implement the requirements of NUREG-0737 and NUREG-0737, Supplement 1, as stated in Generic Letter 82-33;

NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980 (ADAMS Accession No. ML051400209), and NUREG-0737, Supplement 1, "Clarification of TMI Action Plan Requirements: Requirements for Emergency Response Capability," January 1983 (ADAMS Accession No. ML102560009), as stated in Generic Letter 82-33, "Supplement 1 to NUREG-0737 - Emergency Response Capabilities," dated December 17, 1982 (ADAMS Accession No. ML031080548), incorporated into one document all Three Mile Island (TMI)-related items approved for implementation by the Commission at that time. This included the use of human factored, function oriented, emergency operating procedures to improve human reliability and the ability to mitigate the consequences of a broad range of initiating events for operating reactors, and subsequent multiple failures or operator errors, without the need to diagnose specific events.

The licensee has proposed to delete the requirement of TS 5.5.1.1.b. because the emergency operating procedures discussed therein only pertain to accidents and events resulting from reactor operation. The licensee stated that the referenced procedures are no longer required for a permanently shutdown and defueled reactor.

The NRC staff reviewed the proposed deletion of TS 5.5.1.1.b. and determined that NUREG-0737, as supplemented, implemented programmatic changes to the way reactor operators are trained, instrumentation information is presented, and procedures are structured, using human factors and a function oriented approach to address operating events and accidents. These accidents, and the associated emergency operating procedures to detect, respond to, and mitigate such accidents, concerned malfunctions of the reactor and its supporting systems are not relevant to a permanently shutdown and defueled reactor, which is

no longer authorized to operate or place fuel in the reactor vessel. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.1.1.b., is acceptable.

TS 5.5.1.1.f., concerns the modification of the core protection calculator (CPC) addressable constants. Software modifications to constants, algorithms, or fuel cycle specific data shall be performed in accordance with the most recent version of "CPC Protection Algorithm Software Change Procedure," (CEN-39(A)-P). The licensee has proposed to delete TS 5.5.1.1.f. because the CPC is no longer required. The CPCs are one of two systems that monitor core power distribution online and derive the LHR and DNBR parameters and associated RPS trips. The TSs that rely on the CPC are TS 3.3.1 RPS Instrumentation - Operating and TS 3.3.3 Control Element Assembly Calculators, and are only applicable in MODES 1 and 2.

The NRC staff has determined that the instrumentation-related TS 3.3.1 and TS 3.3.3 that reference the CPC, as discussed in the Section 3.7.9 of this SE, are no longer required based on the permanent shutdown and defueled condition of SONGS Units 2 and 3. The CPC is part of the RPS to protect the reactor core from damage. Since SONGS Units 2 and 3 are not authorized to operate or emplace fuel in the reactor vessel, protection of the reactor core is no longer relevant, and a control procedure for the modification of the CPC, as required in TS 5.5.1.1.f., is unnecessary. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.1.1.f., is acceptable.

3.7.17.3 Section 5.5.2, Programs and Manuals

TS 5.5.2.4, "Component Cyclic or Transient Limit Program," controls to track cyclic and transient occurrences to ensure that RCS components are monitored for fatigue evaluation based on a conservative estimate of the magnitude and frequency of the temperature and pressure transients resulting from normal operation, normal and abnormal load transients and accident conditions. The licensee proposes to delete this program since the RCS components monitored by this program are no longer used at SONGS Units 2 and 3 considering its permanently shutdown and defueled status.

The NRC staff has determined that deletion of the Component Cyclic or Transient Limit Program from TSs is consistent with the transition to a permanently shutdown and defueled facility. Since, in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the plant or placing fuel in the reactor vessel, the RCS and reactor support systems are no longer in use. Consequently, the component cyclic or transient limit program is not relevant at SONGS Units 2 and 3 since the components monitored by the program are permanently out of service. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.4, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.5, "Reactor Coolant Pump Flywheel Inspection Program," provides for the inspection of the reactor coolant pump flywheels. The licensee proposed to delete this program since the reactor coolant pump flywheel is a component only used in support of reactor operation. Inspection of the reactor coolant pump flywheel is not relevant to SONGS Units 2 and 3 since the licensee is no longer authorized to operate the reactor or emplace fuel in the reactor vessel.

The NRC staff has determined that deletion of the Reactor Coolant Pump Flywheel Inspection Program from TSs is consistent with the transition to a permanently shutdown and defueled facility. Since, in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the plant or placing fuel in the reactor vessel, reactor coolant pumps are no longer used in support of any function at the facility. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.5, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.6, "Secondary Water Chemistry Program," provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The licensee proposed to delete this program because the components that the program was established to protect, using water chemistry control, are associated with reactor operation. With the licensee's decision to cease reactor operations, these components are no longer in operation and do not need protection from degradation or stress corrosion cracking.

The NRC staff has determined that the deletion of the Secondary Water Chemistry Program is consistent with the transition to a permanently shutdown and defueled facility. Since, in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the plant or placing fuel in the reactor vessel, the SGs and turbine are no longer used in support of any function at the facility. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.6, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.7, "Explosive Gas and Storage Tank Radioactivity Monitoring Program," provides controls for potentially explosive gas mixtures in the gaseous radwaste system, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The licensee has proposed to revise the explosive gas and storage tank radioactivity monitoring program to be consistent with the permanently shutdown and defueled condition of the SONGS Units 2 and 3 facility. Paragraphs a. and b. of the program are being deleted because these portions of the explosive gas and storage tank radioactivity monitoring program pertain only to reactor support systems that are no longer needed due to SONGS permanently shutdown and defueled condition. Specifically, there will no longer be any source of explosive or radioactive gases generated from reactor operation. In addition, the licensee states that the gaseous radwaste system and the waste gas decay tank have been vented and removed from service. As such, references to potentially explosive gas mixtures and methods for determining gaseous radioactivity have been deleted. The licensee has proposed to retain the storage tank radioactivity monitoring program as modified below:

TS 5.5.2.7 Storage Tank Radioactivity Monitoring Program

This program provides controls for the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The liquid radwaste quantities shall be determined in accordance with the

Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures."

The program shall include a surveillance program to ensure that the quantity of radioactivity contained in all outdoor liquid radwaste tanks that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents and do not have tank overflows and surrounding area drains connected to the Liquid Waste Management System is less than the amount that would result in concentrations less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Storage Tank Radioactivity Monitoring Program surveillance frequencies.

The NRC staff has reviewed the proposed revision to the Storage Tank Radioactivity Monitoring Program. The staff finds the proposed changes prudent given the uncertainty in how future radwaste generated by flushing and cutting of radioactive systems will be stored and processed. Therefore, the NRC staff finds that the licensee's proposed change to TS 5.5.2.7, Storage Tank Radioactivity Monitoring Program, is acceptable.

TS 5.5.2.8, "Primary Coolant Sources Outside Containment Program," was established to minimize leakage from portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident. The licensee proposed to delete this program since primary coolant systems have been drained at SONGS Units 2 and 3 and there are no longer any transient or accident conditions associated with primary coolant sources given the permanently shutdown and defueled condition of the plant.

The NRC staff has determined that deletion of TS 5.5.2.8, "Primary Coolant Sources Outside Containment Program," is consistent with the transition to a permanently shutdown and defueled facility. Since the licensee has certified its permanent cessation of operations and defueling in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the reactors or placing fuel in the reactor vessels. Consequently, there are no DBAs involving reactor operation or refueling and there can no longer be any transients or accidents involving primary coolant outside of containment. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.8, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.9, "Pre-Stressed Concrete Containment Tendon Surveillance Program," provides controls for monitoring any tendon degradation in the pre-stressed concrete containment. The licensee has proposed to delete this program because the status of the containment is not relevant to the permanently shutdown and defueled reactors at SONGS Units 2 and 3.

The NRC staff considers that TS 5.5.2.9, "Pre-Stressed Concrete Containment Tendon Surveillance Program," is only applicable to a reactor authorized to operate or retain irradiated fuel in the reactor vessel. Pursuant to the licensee's certifications under 10 CFR 50.82(a)(2), the license is prohibited from operating the reactors or placing fuel in the reactor vessels at SONGS Units 2 and 3. Consequently, there are no DBAs involving reactor operation or refueling and no reliance on the containment to mitigate operating reactor DBAs. Thus, the staff has determined that containment tendon surveillance program TS is no longer applicable. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.9, is acceptable.

TS 5.5.2.10, "Inservice Inspection and Testing Program," establishes the controls for periodic inspection and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves in accordance with the ASME Operation and Maintenance Code. These code classes protect equipment relied upon to prevent and mitigate DBAs. The licensee proposed to delete this program since there is no longer any ASME Code Class 1, 2 or 3 pumps and valves, or Code Class CC or MC components in the SONGS Units 2 and 3 inservice inspection and testing program that continue to operate and perform a specific function in mitigating the consequences of a reactor accident due to the permanently shutdown and defueled status of the plants.

Because the licensee is prohibited from operating the plant or placing fuel in the reactor vessel, in accordance with 10 CFR 50.82(a)(2), there are no longer any ASME Code class pumps and valves that remain in operation and are to be relied upon to mitigate a DBA. As such, the inservice inspection and testing program is no longer relevant to SONGS Units 2 and 3, given the permanently shutdown and defueled status of these facilities. The NRC staff also notes that the licensee shall continue to monitor the performance and condition of all SSCs associated with the storage, control, or maintenance of spent fuel in in a safe condition and with reasonable assurance that these SSCs are capable of fulfilling their intended functions, pursuant to 10 CFR 50.65, ""Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.10, Inservice Inspection and Testing Program, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.11, "Steam Generator (SG) Program," ensures that the SG tube integrity is maintained. The licensee proposed to delete this program since SONGS Units 2 and 3 are permanently defueled and not authorized to operate; therefore, the SGs are no longer functional and the SG tubes will not be subjected to the temperature and pressure effects that the SG program was put in place to protect against.

The NRC staff has determined that the SG program is only relevant to an operating reactor where the SGs are used for removing heat associated with reactor operation. Since the licensee has certified its permanent cessation of operations and defueling in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the reactors or placing fuel in the reactor vessels. Consequently, the SGs are no longer used in support of any function at the facility. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.11, appropriately reflects the change in plant status, and is acceptable.

TS 5.5.2.12, "Ventilation Filter Testing Program (VFTP)," establishes the required testing and frequency of the CREACUS high efficiency particulate filters and charcoal adsorbers utilized by the system.

The VFTP is being deleted because it pertains only to reactor support systems that does not apply in a permanently defueled condition. As noted, in part, by the licensee in its license amendment request, dated March 21, 2014, "[t]he accident analysis applicable to the permanently defueled condition does not rely on ventilation filters for accident mitigation."

The NRC staff has determined that reference to the VFTP only appears in SONGS Units 2 and 3 TSs in three places: TS 5.5.2.12; TS 3.7.11 "Control Room Emergency Air Cleanup System (CREACUS)" (SR 3.7.11.2 and SR 3.7.11.4); and TS 5.5.2.16.d of the "Control Room Envelope Habitability Program." The VFTP is used to confirm the function and operability of the CREACUS. The NRC staff has evaluated CREACUS in Section 3.7.13 (TS 3.7.11) and found that CREACUS is no longer required in the SONGS TSs per Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C). Since TS 5.5.2.12 "Ventilation Filter Testing Program" only exists to support the SRs of TS 3.7.11 (i.e. SR 3.7.11.2 and SR 3.7.11.4, respectively) and since the NRC approves that deletion of TS 3.7.11, the NRC staff finds the licensee's proposed change to delete TS 5.5.2.12, is acceptable.

TS 5.5.2.13, "Diesel Fuel Oil Testing Program," pertains to the testing of both new and stored fuel oil used to supply the EDGs. The accident analyses applicable to the permanently shutdown and defueled condition at SONGS no longer rely on EDGs for accident mitigation. The requirement for EDGs, which are supported by the fuel oil being tested per this program, has been proposed for deletion from the TSs.

The NRC staff has reviewed the proposed changes against the requirements in 10 CFR 50.36 and Chapter 15 of the SONGS UFSAR and concluded that the EDG fuel oil and lube oil system are not required. These support systems to the EDGs are not required because there are no active systems or associated support systems credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the FHA DBA. The staff confirmed that there are no other DBAs that rely on EDGs or the EDG support systems. In addition, the NRC staff approves the deletion of TS 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," in Section 3.7.14 of this SE. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.13, the diesel fuel oil testing program, is acceptable.

TS 5.5.2.15, "Containment Leakage Rate Testing Program," is being proposed for deletion because the containment leakage rate testing program pertains only to verifying the operability of the containment systems. The need for containment or the associated required TSs does not apply in a permanently shutdown and defueled condition. The requirements for containment systems (i.e. TS 3.6.1, TS 3.6.2, TS 3.6.3, TS 3.6.4, TS 3.6.5, TS 3.6.6.1, TS 3.6.6.2, TS 3.6.8 and TS 3.9.3) are being deleted, as described in Section 3.7.12 of this SE.

Primary containment integrity and isolation are only required for post-accident conditions from power operations. However, 10 CFR 50.82(a)(2) prohibits the licensee from operating the plant

or placing fuel in the reactor vessel. Therefore TS 3.6.1, TS 3.6.2, TS 3.6.3, TS 3.6.4, TS 3.6.5, TS 3.6.6.1, TS 3.6.6.2, TS 3.6.8 and TS 3.9.3, which address primary containment integrity and isolation during power operations and refueling operations, are no longer applicable. The program specified TS 5.5.2.15 requires the implementation of containment leakage rate testing in accordance with 10 CFR Part 50 Appendix J, Option B, "Performance-Based Requirements." The TS 5.5.2.15 program is no longer needed since 10 CFR 50.54(o) excludes permanently defueled units from the requirements of 10 CFR Part 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors." Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.15, Containment Leakage Rate Testing Program, is acceptable.

TS 5.5.2.16, "Control Room Envelope Habitability Program," ensures that adequate radiation protection is provided to permit access and occupancy of the CRE under DBA conditions without personnel receiving radiations exposures above limits. The licensee has proposed this program for deletion because the CRE is not required for providing airborne radiological protection for the control room operators for the remaining DBAs at SONGS Units 2 and 3 based on the permanently shutdown and defueled status of the facility.

The NRC staff evaluated the remaining accident analyses at SONGS Units 2 and 3 and confirmed that no ESF system is credited in the mitigation of the CR, EAB, or LPZ dose consequences, as detailed in Sections 3.2 through 3.6 of this SE. This includes no credit for the FHIS, the fuel handling building PACU filtration system, the CRIS and the CREACUS. The evaluation of the DBAs applicable to the permanently shutdown and defueled facility demonstrate that the dose consequences within the CRE are acceptable without relying on SSCs remaining functional for accident mitigation, including FHAs. (The one exception to this is the continued function of the passive fuel storage pool structure, which will be maintained as a TS for SONGS.)

Reference to the "Control Room Envelope Habitability Program" only appears in the current SONGS Units 2 and 3 TSs in two places: TS 5.5.2.16, "Control Room Envelope Habitability Program" and TS 3.7.11, "Control Room Emergency Air Cleanup System (CREACUS)" (SR 3.7.11.4).

The NRC staff previously determined in its evaluation of TS 3.7.11, "CREACUS," Section 3.7.13 of this SE, that CREACUS no longer satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C). Consequently, the NRC staff has approved the deletion of TS 3.7.11 for SONGS Units 2 and 3. Since the Control Room Envelope Habitability Program only exists to support a surveillance requirement of TS 3.7.11 (i.e. SR 3.7.11.4) and since TS 3.7.11 will be deleted, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.16, Control Room Envelope Habitability Program, is acceptable.

TS 5.5.2.17, "Battery Monitoring and Maintenance Program," provides controls for safety-related battery maintenance. The licensee proposes deletion of this program consistent with the deletion of the corresponding TS for DC electrical systems and associated batteries. The licensee states that the SONGS accident analyses do not rely on batteries for any accident mitigation.

The NRC staff has reviewed the proposed changes against the requirements in 10 CFR 50.36 and Chapter 15 of the SONGS UFSAR and concluded that the DC electrical distribution system batteries are not required. The support systems to the DC electrical distribution system, including the batteries, are not required because there are no active systems or associated support systems credited as part of the initial conditions of an analysis or as part of the primary success path for mitigation of the remaining DBAs at SONGS Units 2 and 3. In addition, the NRC staff has approved the deletion of TS 3.8.6, "Battery Parameters," in Section 3.7.14 of this SE. Therefore, the NRC staff finds that the licensee's proposed change to delete the TS 5.5.2.17, the battery monitoring and maintenance program, is acceptable.

3.7.17.4 Section 5.6, Safety Function Determination Program (SFDP)

The SONGS Units 2 and 3, "Safety Function Determination Program (SFDP)," as detailed in TS 5.6.1, TS 5.6.2, TS 5.6.3 and TS 5.6.4, ensures that a loss of safety function is detected and appropriate actions taken. Upon failure to meet two or more LCOs at the same time, an evaluation shall be made to determine if loss of safety function exists. The program implements the requirements of LCO 3.0.6. LCO 3.0.6 directs an evaluation in accordance with the SFDP to determine if a loss of safety function exists based on the status of redundant TS safety systems and associated support systems (systems that support the functionality of the safety system) to ensure the appropriate required actions are taken to maintain overall reactor safety. There are no active SSCs at SONGS Units 2 and 3 that are required for accident mitigation with the permanent cessation of reactor operations and the permanent removal of the fuel from the reactor vessels, as discussed in the evaluation of the remaining DBAs in Sections 3.2 through 3.6 of this SE. Therefore, the requirements of the SFDP, which directs cross-train checks of multiple and redundant safety systems, no longer apply.

Based on the permanently shutdown and defueled status of SONGS Units 2 and 3, all specifications for the active systems from the defueled TSs have been proposed for deletion by this licensing action. Consequently, the SFDP is no longer meaningful. In addition, the SFDP is invoked by LCO 3.0.6, which is being deleted in its entirety, as discussed in Section 3.7.6 of this SE. Therefore, the NRC staff finds that the licensee's proposed change to delete TS Section 5.6, Safety Function Determination Program, is acceptable.

3.7.17.5 Section 5.7, Reporting Requirements

TS 5.7.1.1, "Annual Reports," requires a Reactor Coolant System Specific Activity Report in accordance with TS 5.7.1.1.b. The report gathered data on reactor conditions when the I-131 or gross specific activity of the reactor coolant exceeded limits specified in TS 3.4.16. The licensee has proposed to delete SONGS Units 2 and 3, TS 5.7.1.1.b, "Reactor Coolant System Specific Activity Report," since it is not applicable to a permanently shutdown and defueled reactor.

The NRC staff has reviewed the proposed deletion of TS 5.7.1.1 concerning the Reactor Coolant Specific Activity Report. The facility RCSs have been drained and the activity of the RCS is no longer relevant to the SONGS Units 2 and 3 in their permanently shutdown and

defueled status. In addition, as noted above, TS 5.7.1.1.b only exists to analyze data related to the exceedance of limits specified in TS 3.4.16. Since RCS activity is not meaningful for SONGS and TS 3.4.16 will be deleted, the NRC staff finds that the licensee's proposed change to delete TS 5.7.1.1, is acceptable.

TS 5.7.1.2, "Annual Radiological Environmental Operating Report," covers summaries, interpretations, and analyses of trends related to the radiological environmental monitoring program, for each unit, during the previous calendar year.

The licensee has proposed to revise the TS description by replacing applicability of the report to the "facility" rather than to each 'unit." In addition, the licensee is deleting a Note indicating "a single submittal may be made for a multiple unit station." This note is no longer necessary since the SONGS facility is no longer treated as a multiunit site for the purposes of the annual radiological environmental operating report.

The NRC staff reviewed the proposed revision to TS 5.7.1.2 and concludes that changing the word "unit" to "facility" and the deletion of the multiple unit station note is a clarifying change that is editorial in nature such that the current intent of the requirement is unchanged. Therefore, the NRC staff finds that the licensee's proposed change to TS 5.7.1.2, Annual Radiological Environmental Operating Report, is acceptable.

TS 5.7.1.3, "Radioactive Effluent Release Report," covers "...the operation of the unit during the previous calendar year...." In addition, the report shall summarize the "...effluents released from the unit," and "... radioactive waste shipped from the unit directly..." and "... radioactive waste shipped from the unit's intermediary processor..."

The licensee proposed to revise the TS description by replacing "unit" with "facility" such that the description will state "... the operation of the facility during the previous calendar year ..." and, effluents "... released from the facility" and "... radioactive waste shipped from the facility directly ..." and "... radioactive waste shipped from the facility's intermediary processor...." In addition, the licensee is deleting a Note indicating "a single submittal may be made for a multiple unit station." This note is no longer necessary since the SONGS facility is no longer treated as a multiunit site for the purposes of the radioactive effluent release report.

The NRC staff reviewed the proposed revision to TS 5.7.1.3 and concludes that changing the word "unit" to facility" and the deletion of the multiple unit station note is a clarifying change that is editorial in nature such that the current intent of the requirement is unchanged. Therefore, the NRC staff finds that the licensee's proposed change to TS 5.7.1.3, Radioactive Effluent Release Report, is acceptable.

TS 5.7.1.5, "Core Operating Limits Report (COLR)," establishes the core operating limits prior to each reload cycle. The licensee proposed to delete this program since it is prohibited from reloading fuel into the SONGS Units 2 and 3 reactor core and the safety limits established by this report no longer apply.

The NRC staff has determined that the proposed deletion of the COLR would appropriately reflect the permanently shutdown and defueled condition of the facility. The COLR only applies to reactors authorized to operate. Since the licensee is prohibited from operating the SONGS reactors or placing fuel in the reactor vessels, the COLR is no longer necessary. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.7.1.5, is acceptable.

TS 5.7.1.6, "Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR)," documents the pressure and temperature limits for heatup, cooldown, heatup and cooldown rates, low temperature operation, criticality, and hydrostatic testing as referenced in the following TSs:

- TS 3.4.3 RCS Pressure and Temperature (P/T) Limits
- TS 3.4.6 RCS Loops – Mode 4
- TS 3.4.7 RCS Loops – Mode 5, Loops Filled
- TS 3.4.12.1 Low Temperature Overpressure Protection (LTOP) System, RCS Temperature≤PTLR Limit
- TS 3.4.12.2 Low Temperature Overpressure Protection (LTOP) System, RCS Temperature>PTLR Limit

The licensee proposes to delete this program since the RCS is no longer used at SONGS Units 2 and 3 in its permanently shutdown and defueled status.

The NRC staff has determined that deletion of the Reactor Coolant System Pressure and Temperature Limits Report from TSs is consistent with the transition to a permanently shutdown and defueled facility. Since, in accordance with 10 CFR 50.82(a)(2), the licensee is prohibited from operating the reactors or placing fuel in the reactor vessels, the RCS and reactor support systems are no longer in use. Consequently, the RCS PTLR is not relevant at SONGS Units 2 and 3 since the RCS is no longer functional. The staff notes that the change is consistent with the deletion of the Section 3.4 RCS TSs that reference the PTLR as discussed in Section 3.7.10 of this SE. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.7.1.6, appropriately reflects the change in the SONGS plant status, and is acceptable.

TS 5.7.1.7, "Hazardous Cargo Traffic Report," requires that SCE monitors the hazardous cargo traffic on Interstate Highway 5 and the railroad line near SONGS and submits the results to the NRC Regional Administrator once every 3 years. This reporting requirement addressed potential changes in use characteristics of these transportation routes over the life of the facility. In the enclosure to the license amendment request dated March 21, 2014, SCE proposed to delete this reporting requirement from the TSs. In the supplement dated February 23, 2015, SCE stated that it would continue to perform the hazardous traffic report in accordance with a licensee-controlled documents.

The requirements of 10 CFR 50.36(c)(5) state that Administrative Controls TSs should include reporting necessary to assure operation of the facility in a safe manner. The reporting requirements included in Section 5.6 of NUREG-1432, "Standard Technical Specifications – Combustion Engineering Plants," Volume 1 (ADAMS Accession No. ML12102A165), include only those reports specified in the LCOs and those required by regulation. The Hazardous

Cargo Traffic Report does not directly relate to operation of the facility in a safe manner. Rather, it helps identify changes in the site environs that should be periodically assessed to ensure that the scope of events considered in the design-basis remains adequate. Consequently, the report does not significantly contribute to assuring operation in a safe manner. Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.7.1.7, Hazardous Cargo Traffic Report, and implement a similar reporting requirement in a licensee controlled document, is acceptable.

TS 5.7.2, "Special Reports," provides a description and requirements regarding reports related to inspections, tests, and maintenance activities as directed in other SONGS TSs. The listed Special Reports pertain to 1) a pre-planned alternate method of monitoring post-accident instrumentation functions, 2) abnormal degradation of the containment structure detected during tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program, and 3) a report, following entry into MODE 4, concerning inspections performed in accordance with the SG program. The licensee states that these reports are being deleted because they do not apply in a permanently defueled condition.

The NRC staff concludes that the TS required special report information on inspections, tests, and maintenance activities for safety-related instrumentation, containment, and SGs, apply to SSCs that are no longer relevant at a permanently shutdown and defueled SONGS reactors. In addition, the NRC has approved the deletion of the associated TSs for the SSC that are subject to these special reports from the SONGS Unit 2 and 3 permanently defueled TSs. Specifically:

(1) the special report for a pre-planned alternate method of monitoring post-accident instrumentation functions is no longer necessary since the post-accident monitoring instrumentation in TS 3.3.11 is being deleted from the SONGS defueled TSs, as discussed in Section 3.7.9 of this SE.

(2) the special report on abnormal degradation of the containment structure detected during tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program is no longer necessary since the tendon surveillance program in TS 5.5.2.9 is being deleted from the SONGS defueled TSs, as discussed in Section 3.7.17.3 of this SE.

(3) the special report, following entry into MODE 4, concerning inspections performed in accordance with the SG program is no longer necessary since the SG program in TS 5.5.2.11 is being deleted from the SONGS defueled TSs, as discussed in Section 3.7.17.3 of this SE.

Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.7.2, Special Reports, is acceptable.

3.8 Changes to Facility Operating License

In SCE's March 21, 2014, license amendment request, as supplemented by a letters dated February 25, 2015, and March 18, 2015, the licensee proposed to remove, modify, and add, several facility operating license conditions, based on the permanently shutdown and defueled status of SONGS Units 2 and 3.

3.8.1 Changes to License Condition 2.B.(2)

Currently License Condition 2.B.(2), for SONGS Units 2 and 3, reads:

> (2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, use, and operate the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license.

The licensee is proposing to strike reference in the license condition to "...operate..." the facility.

The revised License Condition 2.B.(2) will read, as follows:

> (2) Southern California Edison Company (SCE), pursuant to Section 103 of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess and use the facility at the designated location in San Diego County, California, in accordance with the procedures and limitations set forth in this license.

Pursuant to 10 CFR 50.82(a)(2), as a result of the 10 CFR 50.82(a)(1)(i) and 10 CFR 50.82(a)(1)(ii) certifications submitted by the licensee, the 10 CFR Part 50 licenses for SONGS Units 2 and 3 no longer authorize operation of the reactors. As such, reference to operation of the facility in License Condition 2.B.(2) is inconsistent with the limitation imposed on the licensee by 10 CFR 50.82(a)(2). Therefore, the NRC staff finds the licensee's proposed change to License Condition 2.B.(2) provides consistency with 10 CFR 50.82(a)(2) and, is acceptable.

3.8.2 Changes to License Condition 2.B.(3)

Currently License Condition 2.B.(3), for SONGS Units 2 and 3, reads:

> (3) SCE, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

The licensee is proposing to revise this license condition to read, as follows:

> (3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

The licensee states the proposed revision to this license condition is consistent with the restrictions of 10 CFR 50.82(a)(2) that no longer authorizes operation or emplacement of fuel in the reactor vessels at SONGS Units 2 and 3.

The proposed change removes the authorization for receipt and use of special nuclear material (SNM) as reactor fuel and eliminates the reference to use of the SNM for reactor operations. The proposed change also limits the possession of SNM pursuant to the license condition as being "that was used" as reactor fuel. Pursuant to 10 CFR 50.82(a)(2) the 10 CFR Part 50 licenses for SONGS Units 2 and 3 no longer authorize operation of the reactors. As such, the licensee has no need to receive SNM in the form of reactor fuel and cannot use SNM as reactor fuel for reactor operations. The continued authorization to possess SNM "that was used" as reactor fuel is necessary as the licensee currently possesses the reactor fuel that was used for the past operations of the reactor. Based on the above, the NRC staff finds the licensee's proposed change to License Condition 2.B.(3) is consistent with the permanently shutdown status of SONGS Units 2 and 3 and is, therefore, acceptable.

3.8.3 Changes to License Condition 2.B.(4)

Currently License Condition 2.B.(4), for SONGS Units 2 and 3, reads:

> (4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

The licensee is proposing to revise this license condition to read, as follows:

> (4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

The licensee states the proposed revision to this license condition is consistent with the restrictions of 10 CFR 50.82(a)(2) that no longer authorizes operation or emplacement of fuel in the reactor vessels at SONGS Units 2 and 3. The proposed changes remove the authorization for receipt and use of byproduct, source, and SNM as sealed neutron sources for reactor startup but retains authorization to possess such sources previously used for reactor startup. The deletion of the authorization to receive and use sources for reactor startup is consistent with the fact that SONGS Units 2 and 3 are no longer authorized to operate and the continued authorization to possess neutron sources that were used for reactor startup is consistent with the safe storage of byproduct, source, and SNM. As such, the NRC staff finds that the licensee's proposed change to License Condition 2.B.(4), is consistent with the permanently shutdown status of the facilities and is, therefore, acceptable.

3.8.4 Changes to License Condition 2.C.(1)

Current License Condition 2.C.(1), for SONGS Units 2 and 3, reads:

> Maximum Power Level
>
> (1) Southern California Edison Company (SCE) is authorized to operate the facility at reactor core power levels not in excess of full power (3438 megawatts thermal).

The licensee is proposing to delete this license condition, which will read:

> (1) Deleted

The licensee states that this license condition can be deleted because SONGS Units 2 and 3 are permanently shut down and defueled in accordance with 10 CFR 50.82(a)(2) and therefore power operation is no longer authorized.

The NRC staff has reviewed the proposed deletion of License Condition 2.C.(1) and determined that power operation is no longer authorized at SONGS Units 2 and 3 based on the licensee's 10 CFR 50.82(a)(2) certifications of being permanently shutdown and defueled. The licensee is not authorized to operate the SONGS Units 2 and 3 at any power. Therefore, the NRC staff finds the licensee's proposed change to delete License Condition 2.C.(1) is appropriate and, is acceptable.

3.8.5 Changes to License Condition 2.C.(14) [Unit 2] and License Condition 2.C.(12) [Unit 3]

Current License Condition 2.C.(14) for SONGS Units 2 and License Condition 2.C.(12) for SONGS Unit 3, read:

> Fire Protection (Section 9.5.1, SER, SSER #4, SSER #5, Section 1.12, SSER #5; SE dated November 15, 1982; Revision 1 to Updated Fire Hazards Analysis Evaluation dated June 29, 1988)
>
> SCE shall implement and maintain in effect all provisions of the approved fire protection program. This program shall be (1) as described in the Updated Fire Hazards Analysis through Revision 3 as revised by letters to the NRC dated May 31, July 22. and November 20, 1987 and January 21, February 22, and April 21, 1988; and (2) as approved in the NRC staff's Safety Evaluation Report (SER) (NUREG-0712) dated February 1981; Supplements 4 and 5 to the SER, dated January 1982 and February 1982, respectively; and the safety evaluation dated November 15, 1982; as supplemented and amended by the Updated Fire Hazards Analysis Evaluation for San Onofre 2 and 3, Revision 1 dated June 29, 1988. SCE may make changes to the approved fire protection program without prior approval of the Commission

only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

The licensee is proposing to delete License Condition 2.C.(14) for SONGS Unit 2 and delete License Condition 2.C.(12) for SONGS Unit 3, which will read:

Unit 2

(14) Deleted

Unit 3

(12) Deleted

The licensee states that this license condition is based on maintaining an operational fire protection program in accordance with 10 CFR 50.48, "Fire protection," with the ability to achieve and maintain safe shutdown of the reactor in the event of a fire and is no longer applicable at SONGS Units 2 and 3. However, many of the elements that are applicable for the operating plant fire protection program continue to be applicable during plant decommissioning. During the decommissioning process, a fire protection program is required by 10 CFR 50.48(f) to address the potential for fires that could result in a radiological hazard. However, the regulation is applicable regardless of whether a requirement for a fire protection program is included in the facility license. Therefore, a license condition requiring such a program for a permanently shutdown and defueled plant is not needed.

The NRC staff finds that License Conditions 2.C.(14) and 2.C.(12), "Fire Protection," for SONGS Units 2 and 3, respectively, are based on maintaining fire protection programs that provides reasonable assurance that the ability to achieve and maintain safe shutdown in the event of a fire in accordance with 10 CFR 50.48. Achieving and maintaining safe shutdown in the event of a fire is no longer applicable to the decommissioned fire protection programs at SONGS Units 2 and 3, since units are permanently shutdown and the fuel has been removed from the reactors. However, elements of the fire protection program continue during decommissioning to address fire events that could result in radiological hazards. The regulation in 10 CFR 50.48(f) requires SONGS Units 2 and 3 to address the potential for fires, which could result in a radiological hazard. The licensee has proposed that the rule is sufficient to ensure that a program is maintained and therefore having a license condition that also requires fire protection programs for the permanently shutdown and defueled units is redundant. Basis on the evaluation above, the NRC staff concludes that reliance on 10 CFR 50.48(f) is appropriate and the fire protection license condition is no longer necessary. Therefore, the NRC staff finds that the licensee's proposed change to delete License Condition 2.C.(14) for SONGS Units 2, and License Condition 2.C.(12) for SONGS Unit 3, is acceptable.

3.8.6 Changes to License Condition 2.C.(27) [Unit 2] and License Condition 2.C.(28) [Unit 3]

Current License Condition 2.C.(27) for SONGS Unit 2, and License Condition 2.C.(28) for SONGS Unit 3, read:

> Upon implementation of Amendment No. 214 [Unit 2 and Amendment No. 206, Unit 3] adopting TSTF 448, Revision 3, the determination of control room envelope (CRE) unfiltered air inleakage as required by SR 3.7.11.4 in accordance with TS 5.5.2.16.c(i), the assessment of CRE habitability as required by Specification 5.5.2.16.c(ii), and the measurement of CRE pressure as required by Specification 5.5.2.16.d, shall be considered met. Following implementation:
>
> (a) The first performance of SR 3.7.11.4, in accordance with Specification 5.5.2.16.c(i) shall be within the specified frequency of 6 years, plus the 18-month allowance of SR 3.0.2, as measured from May 18, 2004, the date of the most recent successful tracer gas test, as stated in the September 17, 2004 letter response to Generic Letter 2003-01, or within the next 18 months if the time period since the most recent successful tracer gas test is greater than 6 years.
>
> (b) The first performance of the periodic assessment of CRE habitability, Specification 5.5.2.16.c(ii), shall be within 3 years, plus the 9-month allowance of SR 3.0.2, as measured from May 18, 2004, the date of the most recent successful tracer gas test, as stated in the September 17, 2004, letter response to Generic Letter 2003-01, or within the next 9 month if the time period since the most recent successful tracer gas is greater than 3 years.
>
> (c) The first performance of the periodic measurement of CRE pressure, Specification 5.5.2.16.d, shall be within 6 months.

The licensee is proposing to delete License Condition 2.C.(27) for SONGS Unit 2 and License Condition 2.C.(28) for SONGS Unit 3, which will read:

> Unit 2
>
> (27) Deleted
>
> Unit 3
>
> (28) Deleted

The NRC staff evaluated the remaining accident analyses at SONGS Units 2 and 3 and confirmed that no ESF system is used to mitigate the CR, EAB, or LPZ dose consequences, as

detailed in Sections 3.2 through 3.6 of this SE. This includes no credit for the FHIS, the fuel handling building PACU filtration system, the CRIS and the CREACUS. Since SONGS Units 2 and 3 are permanently shut down and defueled, and greater than 17 months of decay time has elapsed since permanent shut down, the remaining DBAs applicable to the facility demonstrate that the dose consequences within the CRE are acceptable without relying on SSCs remaining functional for accident mitigation, with the exception of the passive fuel storage pool structure. In addition, the staff has determined that related CREACUS TS 3.7.11, and the Control Room Envelope Habitability Program TS 5.5.2.16, are no longer needed, as discussed in Sections 3.7.13 and 3.7.17.3, respectively, of this SE. Based on the discussion above, the NRC staff finds that the licensee's proposed change to delete of SONGS Unit 2 License Condition 2.C.(27), and SONGS Unit 3 License Condition 2.C.(28), is acceptable.

3.8.7 New License Condition 2.C.(28) [Unit 2] and License Condition 2.C.(29) [Unit 3]

By letter dated February 25, 2015 (ADAMS Accession No. ML15058A033), the licensee responded to an RAI from the NRC staff regarding the actions that will be taken by SCE to provide reasonable assurance that the passive, long-lived structures and components in the SFP, the fire protection system, and the radiation protection system, will be maintained in a safe condition beyond the normal licensed operating period of 40 years, pursuant to the provisions of 10 CFR 50.51(b). The NRC staff asked the licensee to identify and list the long-live, passive structures and components. In addition, the staff requested a summary of actions that will be taken to monitor and maintain the long-lived, passive structures and components. One of the staff's concerns involved the aging of neutron absorbing materials used for criticality control in SFPs.

SCE responded to the specific concern on the use of neutron absorbing materials in the SFP racks at SONGS. SCE noted that the SONGS SFP racks do contain Boraflex, a neutron-absorbing material. However, no credit is taken in SONGS accident analyses or licensing basis for the existence of the Boraflex. In addition, the NRC previously evaluated and approved borated stainless steel rods that may be placed in fuel assembly guide tubes (GTs) for reactivity control. This feature has not been implemented. If implemented in the future, SONGS will institute a surveillance program where, at 5-year intervals, 1 percent of the GT-Inserts will be inspected for any material degradation. The allowance for GT-Inserts and the commitment to the associated inspection program are described in Section 2.3.3.1.2.4.2 of the SE for Amendment Nos. 213 and 205 for SONGS Units 2 and 3, respectively (ADAMS Accession No. ML072550175).

The licensee stated that its current plans are to have all the spent fuel currently stored in the SFPs transferred to the dry cask storage ISFSI before the operating license for either SONGS Units 2 or 3 expires. However, SCE stated it will develop a list of long-lived, passive structures and components if unforeseen circumstances threaten to extend the period of fuel storage in the SFP beyond the current licensed period. SCE will develop the list and an associated aging-management program for those components if all of the spent fuel has not been removed from the SFP by February 16, 2021.

The expiration date of the Unit 2 operating license (that is, the end of the initial 40-year period of operation) is February 16, 2022. The expiration date of the Unit 3 operating license is November 15, 2022. All spent fuel onsite is expected to be moved to the ISFSI approximately 3 years prior to the expiration of the initial 40-year period of operation for both Units 2 and 3. Therefore, for the Units 2 and 3 SFPs, there is no anticipated need for long-lived, passive structures and components beyond the 40-year period of operation for Units 2 and 3, nor is there an anticipated need to monitor or maintain such structures and components beyond the licensed 40-year period of operation. Should the transition of fuel to the ISFSI be delayed by unforeseen events, it is possible that spent fuel could remain in the SFPs beyond the expiration of the 40-year operating period. Therefore, SCE proposed new license conditions for SONGS Units 2 and 3.

New License Condition 2.C.(28) for SONGS Unit 2, and License Condition 2.C.(29) for SONGS Unit 3, will read:

Unit 2

(28) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 2 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 2 until such time that all spent fuel has been removed from the Unit 2 spent fuel pool.

Unit 3

(29) Prior to February 16, 2021, if all spent fuel has not been removed from the Unit 3 spent fuel pool, an aging-management program shall be submitted for NRC approval. The scope of the program shall include those long-lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the spent fuel pool. Once approved, the program shall be described in the Updated Final Safety Analysis Report and shall remain in effect for Unit 3 until such time that all spent fuel has been removed from the Unit 3 spent fuel pool.

The NRC staff has evaluated the licensee's proposed response to the maintenance of long-lived passive structures and components considering the following applicable NRC regulations:

The regulation in 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 62, "Prevention of criticality in fuel storage and handling," requires the prevention of criticality by physical systems or processes, preferably by use of geometrically safe configurations.

The regulations in 10 CFR 50.51(b) require licensees that have provided certifications for permanent cessation of power operations and permanent removal of fuel in accordance with 10 CFR 50.82(a)(1)(i) and 10 CFR 50.82(a)(1)(ii) to take actions necessary to decommission and decontaminate the facility and continue to maintain the facility in a safe condition.

The regulations in 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," require licensees to monitor performance or condition of SSCs to ensure they are capable of fulfilling their intended function. The scope of the monitoring specified in 10 CFR 50.65(a)(1) applies to safety-related SSCs as stated in 10 CFR 50.65(b)(1) and to nonsafety-related SSCs whose failure could prevent safety-related SSCs from fulfilling their intended function as stated in 10 CFR 50.65(b)(2)(ii).

The regulations in 10 CFR 50.68 specify requirements for the prevention of criticality accidents and mitigating the radiological consequences of a criticality accident.

The licensee has proposed aging management related license conditions for both SONGS Units 2 and 3, contingent that all remaining fuel will be removed from the SFP by February 16, 2021. If by this time the fuel is not removed from the SFP, the license condition will require that the licensee submit an aging management program for NRC approval. The scope of the program shall include those long lived, passive structures and components that are needed to provide reasonable assurance of the safe condition of the spent fuel in the SFP. Once approved, the program shall be described in the UFSAR and shall remain in effect until such time that all spent fuel has been removed from the SFP. The NRC staff notes that the proposed changes do not affect the design or use of the existing fuel racks, and therefore no criticality analysis was made in association with the changes. The proposed changes also keep intact the systems for the SFP needed to keep the fuel in a subcritical condition. The staff has reviewed the licensee's response to the staff's aging-management concerns and the proposed license conditions to address the concerns. Given that the licensee expects to have all fuel removed from the SONGS SFPs prior to the expiration of the original operating license, the NRC staff has concluded that the proposed new License Condition 2.C.(28) for SONGS Unit 2 and License Condition 2.C.(29) for SONGS Unit 3, adequately address the staff's concerns regarding the maintenance of passive, long-lived structures and components in a safe condition beyond the normal licensed operating period of 40 years, and therefore, finds that the new license conditions are acceptable.

3.8.8 Deletion of License Condition 2.J and Proposed New License Condition 3

Current License Condition 2.J, reads:

Unit 2

J. This license is effective as of the date of issuance and shall expire at midnight on February 16, 2022.

Unit 3

J. This license is effective as of the date of issuance and shall expire at midnight on November 15, 2022.

Revised License Condition 2.J would state for SONGS Units 2 and 3, will read:

J. Deleted

SCE stated that this license condition can be deleted because SONGS Units 2 and 3 have permanently ceased operation. 10 CFR 50.82(a)(2) prohibits operation of the SONGS Units 2 and 3 reactor since the certifications described therein have been docketed. SCE has proposed that this license condition be replaced by new License Condition 3, which conforms to 10 CFR 50.51, "Continuation of license," in that the license authorizes ownership and possession of SONGS Units 2 and 3 until the Commission notifies the licensee in writing that the license is terminated. The proposed new license condition for SONGS Units 2 and 3, to be used in place of License Condition 2.J., will be License Condition 3.

New License Condition 3 for SONGS Unit 2, will read:

3 On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 2 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On July 22, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 2 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

New License Condition 3 for SONGS Units 3, will read:

3. On June 12, 2013, Southern California Edison (SCE) certified that operations at San Onofre Nuclear Generating Station Unit 3 would permanently cease in accordance with 10 CFR 50.82(a)(1)(i). On June 28, 2013, SCE certified that the fuel had been permanently removed from the reactor vessel in accordance with 10 CFR 50.82(a)(1)(ii). As a result, the 10 CFR 50 license no longer authorizes operation of the reactor, or the emplacement or retention of fuel in the reactor vessel.

   This license is effective as of the date of issuance and authorizes ownership and possession of San Onofre Nuclear Generating Station Unit 3 until the Commission notifies the licensee in writing that the license is terminated. The licensee shall:

   A. Take actions necessary to decommission the plant and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition; and

   B. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the applicable provisions of the 10 CFR 50 facility license as defined in Section 2 of this license.

The NRC staff has reviewed the proposed deletion of Licensee Condition 2.J and the proposed new License Condition 3 and determined that License Condition 2.J, which documented the date of the expiration of the license, is no longer meaningful for the permanently shutdown condition of the plant in the process of decommissioning. The proposed new License Condition 3 documents the current condition of the plant and summarizes the actions and requirements applicable to the facility by regulation. The proposed License Condition 3 is consistent with the regulatory requirements applicable to the facility in the permanently shutdown and defueled condition, and consistent with a previously issued license conditions for the permanently shutdown and defueled Millstone Unit 1 and the Kewaunee Power Station. Based on the above, the NRC staff finds that the proposed license condition changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified on May 28, 2015, of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding as published in the *Federal Register* on September 16, 2014 (79 FR 55513). The amendments also relates to changes in recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: M. Chernoff
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T. Martinez-Navedo
D. Cunanan
E. Dickson
J. Hickman

Date: July 17, 2015

T. Palmisano

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosures:
1. Amendment No. 230 to NPF-10
2. Amendment No. 223 to NPF-15
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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EDickson, NRR
MChernoff, NRR
SJones, NRR
DCunanan, NRR
DNold, NRR

ADAMS Accession No.: ML15139A390 * see previous **concurrence via memo

OFFICE	NRR/DORL/LPL4-2/PM	NRR/DORL/LPL4-2/LA	NRR/DRA/ARCB/BC**	NRR/DSS/STSB/BC**	NRR/DSS/SCVB/BC**
NAME	WHuffman*	PBlechman*	UShoop (by JDozier for)	RElliott* (by MChernoff for)	RDennig
DATE	5/21/15	7/13/15	02/13/15	4/2/15	9/30/14
OFFICE	NRR/DSS/SBPB/BC**	NRR/DSS/SRXB/BC**	NRR/DE/EEEB/BC**	NRR/DE/EICB/BC**	OGC/NLO
NAME	GCasto	CJackson	JZimmerman	JThorp	BMizuno*
DATE	3/16/15	3/27/15	6/1/15	2/27/15	7/14/15
OFFICE	NRR/DORL/LPL4-2/BC	NRR/DORL/LPL4-2/PM			
NAME	MKhanna	TWengert			
DATE	7/17/15	7/17/15			

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EXHIBIT 10

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November , 2017

Mr. Thomas J. Palmisano
Vice President and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - ISSUANCE OF AMENDMENTS TO REVISE THE PERMANENTLY DEFUELED EMERGENCY PLAN (CAC NOS. L53160, L53161, and L53162)

Dear Mr. Palmisano:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 168 to Facility Operating License No. DPR-13, Amendment No. 236 to Facility Operating License No. NPF-10, and Amendment No. 229 to Facility Operating License No. NPF-15 for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively. The amendments consist of changes to the Permanently Defueled Emergency Plan (PDEP) in response to your application dated December 15, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16355A015), as supplemented by letter dated May 5, 2017 (ADAMS Accession No. ML17160A324). The proposed changes more fully reflect the status of the facility, as well as the reduced scope of potential radiological accidents once all spent fuel has been moved to dry cask storage within the onsite independent spent fuel storage installation (ISFSI), an activity which is currently scheduled for completion in 2019.

The proposed changes replace the SONGS PDEP and associated Emergency Action Level (EAL) Bases Manual (hereafter referred to as the EAL scheme) with an ISFSI-Only Emergency Plan (IOEP) and associated EAL scheme. The NRC staff determined that the proposed SONGS IOEP and associated EAL changes continue to meet the standards in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.47, “Emergency plans,” and the requirements in Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” of 10 CFR Part 50, as exempted. As such, the SONGS IOEP and associated EAL changes provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

The NRC staff has determined that its documented safety evaluation does not contain Sensitive Security-Related Information (SUNSI) pursuant to 10 CFR 2.390, “Public inspections, exemptions, requests for withholding.” In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

A copy of the related Safety Evaluation is provided in Enclosure 4. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice. If you have any questions, please contact me at 301 -415-3178, or via e-mail at marlayna.vaaler@nrc.gov.

Sincerely,

Marlayna G. Vaaler, Project Manager
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety and Safeguards

Docket Nos. 50-206, 50-361, and 50-362

Enclosures:
1. Amendment No. 168 to DPR-13
2. Amendment No. 236 to NPF-10
3. Amendment No. 229 to NPF-15
4. Safety Evaluation

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

DOCKET NO. 50-206

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 168
License No. DPR-13

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:

   A. The application for a license amendment filed by the Southern California Edison Company and the San Diego Gas and Electric Company (the licensee), dated December 15, 2016, as supplemented by letter dated May 5, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and applicable portions of the Commission's regulations set forth in 10 CFR Chapter I, and all required notifications to other agencies or bodies have been duly made;

   B. Construction of San Onofre Nuclear Generating Station, Unit 1 (the facility) has been completed in conformity with Construction Permit No. CPPR-13 and the application, as amended, the provisions of the Act, and the regulations of the Commission;

   C. The facility will operate in conformity with the application, as amended, the provisions of the Act, and the applicable rules and regulations of the Commission;

   D. There is reasonable assurance (i) that the activities authorized by this amended license can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with applicable portions of the Commission's regulations set forth in 10 CFR Chapter I;

   E. The licensee is technically qualified to engage in the activities authorized by this license in accordance with the Commission's regulations set forth in 10 CFR Chapter I;

Enclosure 1

F. The licensee has satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;

G. The issuance of this license will not be inimical to the common defense and security or to the health and safety of the public;

H. The issuance of this license is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the Commission's regulations and all applicable requirements have been satisfied; and

I. The possession of source, byproduct, and special nuclear material as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30, 40, and 70.

2. Accordingly, the license is amended by changes to paragraph 2.C(2) of Facility Operating License No. DPR-13, and is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 168, are hereby incorporated in the license. Southern California Edison Company shall maintain the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days following SCE's submittal of a written certification to the NRC that all spent nuclear fuel assemblies have been transferred out of the spent fuel pools and placed in storage within the onsite ISFSI.

FOR THE NUCLEAR REGULATORY COMMISSION

Bruce A. Watson, CHP, Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety and Safeguards

Attachment:
Change to Facility
Operating License No. DPR-13

Date of Issuance: November , 2017

ATTACHMENT TO LICENSE AMENDMENT NO. 168

TO FACILITY OPERATING LICENSE NO. DPR-13

DOCKET NO. 50-206

Replace the following page of the Facility Operating License No. DPR-13 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the area of change.

Facility Operating License No DPR-13

REMOVE	INSERT
3	3

chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(5) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This license shall be deemed to contain and is subject to the conditions specified in the Act and the applicable provisions of the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is not authorized to operate the facility as a nuclear reactor.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 168, are hereby incorporated in the license. Southern California Edison Company shall maintain the facility in accordance with the Technical.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 236
License No. NPF-10

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated December 15, 2016, as supplemented by letter dated May 5, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, as supplemented, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the Commission's regulations and all applicable requirements have been satisfied.

Enclosure 2

2. Accordingly, the license is amended by changes to paragraph 2.C(2) of Facility Operating License No. NPF-10, and is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 236, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days following SCE's submittal of a written certification to the NRC that all spent nuclear fuel assemblies have been transferred out of the spent fuel pools and placed in storage within the onsite ISFSI.

FOR THE NUCLEAR REGULATORY COMMISSION

Bruce A. Watson, CHP, Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety and Safeguards

Attachment:
Change to Facility
Operating License No. NPF-10

Date of Issuance: November , 2017

ATTACHMENT TO LICENSE AMENDMENT NO. 236

TO FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Replace the following page of the Facility Operating License No. NPF-10 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the area of change.

Facility Operating License No NPF-10

REMOVE	INSERT
3	3

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 2 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Deleted

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 236, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 229
License No. NPF-15

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated December 15, 2016, as supplemented by letter dated May 5, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, as supplemented, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the Commission's regulations and all applicable requirements have been satisfied.

Enclosure 3

2. Accordingly, the license is amended by changes to paragraph 2.C(2) of Facility Operating License No. NPF-15, and is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 229, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days following SCE's submittal of a written certification to the NRC that all spent nuclear fuel assemblies have been transferred out of the spent fuel pools and placed in storage within the onsite ISFSI.

FOR THE NUCLEAR REGULATORY COMMISSION

Bruce A. Watson, CHP, Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety and Safeguards

Attachment:
Change to Facility
Operating License No. NPF-15

Date of Issuance: November , 2017

ATTACHMENT TO LICENSE AMENDMENT NO. 229

TO FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Replace the following page of the Facility Operating License No. NPF-15 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the area of change.

Facility Operating License No. NPF-15

REMOVE	INSERT
3	3

(3) SCE, pursuant to the Act and 10 CFR Part 70, to possess at any time special nuclear material that was used as reactor fuel, in accordance with the limitations for storage, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required; and possess any byproduct, source and special material as sealed neutron sources that was used for reactor startup;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 2 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Deleted

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 229, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF

NUCLEAR SECURITY AND INCIDENT RESPONSE

RELATED TO AMENDMENT NO. 168 TO FACILITY OPERATING LICENSE NO. DPR-13

AND AMENDMENT NO. 236 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 229 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-206, 50-361, AND 50-362

1.0 INTRODUCTION

The San Onofre Nuclear Generating Station (SONGS), Units 1, 2 and 3, are decommissioning nuclear power reactor units located in San Diego County, California, approximately 62 miles southeast of Los Angeles, and approximately 51 miles northwest of San Diego, on an 84 acre site located entirely within the Camp Pendleton Marine Corps Base. The licensee, Southern California Edison (SCE), is the holder of Facility Operating License Nos. DPR-13 (Unit 1), NPF-10 (Unit 2) and NPF-15 (Unit 3), which were issued pursuant to the Atomic Energy Act of 1954, as amended, and Part 50, "Domestic Licensing of Production and Utilization Facilities," of Title 10 of the *Code of Federal Regulations* (10 CFR).

SONGS, Unit 1, was granted its provisional operating license by the U.S. Nuclear Regulatory Commission (NRC) on January 1, 1968 (Reference 1), and ceased operation on November 30, 1992 (Reference 2). The licensee completed defueling on March 6, 1993 (Reference 3), and maintained the unit in SAFSTOR until June 1999, when it initiated active decommissioning and dismantlement, or DECON (Reference 4). On December 28, 1993 (Reference 5), the NRC approved the Permanently Defueled Technical Specifications for SONGS, Unit 1. SCE submitted the proposed Decommissioning Plan for SONGS, Unit 1, on November 3, 1994 (Reference 6). As a result of the 1996 revision to the regulations in 10 CFR 50.82, "Termination of license," the NRC replaced the requirement for a decommissioning plan with a requirement for a Post Shutdown Decommissioning Activities Report (PSDAR). On August 28, 1996, the SONGS, Unit 1, Decommissioning Plan became the

SONGS 1 PSDAR (61 FR 67079; December 19, 1996). On December 15, 1998 (Reference 7), SCE submitted an update to the PSDAR to the NRC, as required by 10 CFR 50.82(a)(7), in order to begin planning for the dismantlement and decommissioning of SONGS, Unit 1. Dismantlement of SONGS, Unit 1, is essentially complete and most of the structures and equipment have been removed and sent to a nuclear waste disposal facility. All of the SONGS, Unit 1, fuel is being stored in the onsite independent spent fuel storage installation (ISFSI).

By letter dated June 12, 2013 (Reference 8), SCE submitted a certification to the NRC indicating its intention to permanently cease power operations at SONGS, Units 2 and 3, as of June 7, 2013, pursuant to 10 CFR 50.82(a)(1)(i). By letters dated June 28, 2013 (Reference 9), and July 22, 2013 (Reference 10), SCE submitted certifications of permanent removal of fuel from the Unit 3 and Unit 2 reactor vessels as of October 5, 2012, and July 18, 2013, respectively, pursuant to 10 CFR 50.82(a)(1)(ii). Upon docketing of these certifications, and pursuant to 10 CFR 50.82(a)(2), the SONGS, Units 2 and 3, facility operating licenses no longer authorize operation of the reactors or emplacement or retention of fuel into the reactor vessels.

By application dated December 15, 2016 (Reference 11), as supplemented by letter dated May 5, 2017 (Reference 12), the licensee requested changes to the SONGS Permanently Defueled Emergency Plan (PDEP) pursuant to 10 CFR 50.54(q), “Emergency plans.” The proposed changes replace the SONGS PDEP and associated Emergency Action Level (EAL) Bases Manual (hereafter referred to as the EAL scheme) with an ISFSI-Only Emergency Plan (IOEP) and associated EAL scheme. The NRC staff determined that the proposed SONGS IOEP and associated EAL changes continue to meet the standards in 10 CFR 50.47, “Emergency plans,” and the requirements in Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” of 10 CFR Part 50, as exempted. As such, the SONGS IOEP and associated EAL changes provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

The proposed changes more fully reflect the decommissioning status of the facility, as well as the reduced scope of potential radiological accidents once all spent fuel has been moved to dry cask storage within the onsite ISFSI, an activity which is currently scheduled for completion in 2019. The supplement to the current application, dated May 5, 2017, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on February 14, 2017 (82 FR 10601).

2.0 REGULATORY EVALUATION

This safety evaluation assesses the acceptability of the proposed SONGS ISFSI-Only IOEP and associated EAL scheme. This plan would replace the current SONGS PDEP and associated EAL scheme after all of the SONGS, Units 2 and 3, spent fuel has been transferred from the spent fuel pools (SFPs) to the expanded onsite ISFSI. The regulatory requirements, as exempted by letter dated June 4, 2015 (Reference 13), and associated guidance on which the NRC based its acceptance and evaluation are as follows:

2.1 NRC Regulations

- 10 CFR 50.47(b)(1), as exempted, states, in part: "... each principal response organization has staff to respond and to augment its initial response on a continuous basis;"

- 10 CFR 50.47(b)(2) states, in part: "... adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available ...;"

- 10 CFR 50.47(b)(4), as exempted, states, in part: "A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee…;"

- 10 CFR Part 50, Appendix E, Section IV.A, as exempted, states, in part: "The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization…;"

- 10 CFR Part 50, Appendix E, Section IV.C.1, as exempted, states, in part: "The emergency classes defined shall include (1) notification of unusual events, (2) alert…;"

- 10 CFR 72.32, "Emergency Plan," Section (a)(3), states: "A classification system for classifying accidents as 'Alerts';" and

- 10 CFR 72.32(a)(7) states, in part: "A brief description of the responsibilities of licensee personnel should an accident occur…."

2.2 Regulatory Guidance

- Revision 1 to NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (Reference 14), provides a common reference and guidance source for nuclear facility operators to develop radiological emergency response plans.

- Office of Nuclear Security and Incident Response / Division of Preparedness and Response (NSIR/DPR) Interim Staff Guidance (ISG) – 2, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants" (Reference 15), provides guidance for the review of permanently defueled emergency plans for power reactor sites undergoing decommissioning.

- Office of Nuclear Materials Safety and Safeguards / Spent Fuel Project Office (NMSS/SFPO) ISG – 16, "Emergency Planning" (Reference 16), provides emergency plan review guidance applicable to facilities licensed pursuant to the regulatory requirements found at 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

- Nuclear Energy Institute (NEI) document NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors" (Reference 17), endorsed by the NRC in a letter dated March 28, 2013 (Reference 18), as generic (non-plant-specific) EAL scheme development guidance.

3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the licensee's regulatory and technical analyses in support of its proposed emergency plan changes, as described in the application dated December 15, 2016, as supplemented by letter dated May 5, 2017. The technical evaluation is detailed below.

3.1 Background

SONGS, Unit 1, has been permanently shutdown since November 30, 1992, and the final removal of fuel from its reactor vessel was completed on March 6, 1993. SONGS, Units 2 and 3, have been shutdown since January 2012, and SCE submitted certifications of permanent removal of fuel from the Unit 3 and Unit 2 reactor vessels as of October 5, 2012, and July 18, 2013, respectively. SONGS is authorized to possess and store irradiated nuclear fuel at the permanently shutdown and defueled SONGS facility. The spent fuel from SONGS, Unit 1, is stored in the onsite ISFSI and at the General Electric-Hitachi Nuclear Energy Americas, LLC, Morris Operation facility (Docket No. 72-01) located in Morris, Illinois. After the SONGS, Units 2 and 3, reactors were shutdown, all fuel assemblies were removed from the reactor vessels and placed in the SONGS SFPs.

By letter dated March 31, 2014 (Reference 19), as supplemented by letters dated September 9, 2014 (Reference 20), October 2, 2014 (Reference 21), October 7, 2014 (Reference 22), October 27, 2014 (Reference 23), November 3, 2014 (Reference 24), and December 15, 2014 (Reference 25), SCE requested exemptions for SONGS from (1) certain planning standards in 10 CFR 50.47(b) regarding onsite and offsite radiological emergency plans for nuclear power reactors; (2) certain requirements in 10 CFR 50.47(c)(2) that require establishment of plume exposure and ingestion pathway emergency planning zones for nuclear power reactors, and (3) certain requirements in 10 CFR Part 50, Appendix E, Section IV, regarding the content of emergency plans. The NRC approved the requested exemptions in a letter dated June 4, 2015 (Reference 13).

By letters dated June 5, 2015, the NRC issued Amendment No. 166 to Facility Operating License No. DPR-13, Amendment No. 228 to Facility Operating License No. NPF-10, and Amendment No. 221 to Facility Operating License No. NPF-15 for SONGS, Units 1, 2 and 3, respectively, and the ISFSI, for changes to the EAL scheme (Reference 26), and Amendment No. 167 to Facility Operating License No. DPR-13, Amendment No. 229 to Facility Operating License No. NPF-10, and Amendment No. 222 to Facility Operating License No. NPF-15 for SONGS, Units 1, 2, and 3, respectively, and the ISFSI, for changes to the emergency plan (Reference 27). The PDEP and EAL scheme were fully implemented on July 8, 2015 (Reference 28), in accordance with the above-referenced license amendments.

3.2 Proposed Changes

In its application dated December 15, 2016 (Reference 11), as supplemented by letter dated May 5, 2017 (Reference 12), SCE requested that the NRC review and approve a proposed IOEP, including a proposed ISFSI-Only EAL scheme, that is based on NEI 99-01, Revision 6 (Reference 17). The proposed amendments would replace the existing SONGS PDEP and associated EAL scheme, which currently reflect spent fuel from SONGS, Units 1, 2, and 3, being stored in the SFPs and onsite ISFSI. The major changes that SCE is requesting are: (1) removal of the various emergency actions related to the SFPs; (2) removal of non-ISFSI related emergency event types; (3) replacing the "Shift Manager" title with the "ISFSI Shift Supervisor (ISS)" title as the position that assumes the Emergency Director's responsibilities; and (4) a revision to the SONGS Emergency Response Organization (ERO).

The proposed changes modify the scope of onsite emergency preparedness requirements to reflect the reduced potential radiological accidents with all spent fuel in dry cask storage within the ISFSI. The off-normal events and accidents addressed in the SONGS IOEP are related to the dry storage of spent nuclear fuel at the ISFSI, and include only off-normal, accident, natural phenomena, and hypothetical events and consequences affecting the SONGS ISFSI.

Under the previous facility condition with spent fuel stored within the SONGS SFPs, the most severe postulated beyond-design-basis accident involved a highly unlikely sequence of events that cause a heat-up of the spent fuel, postulated to occur without heat transfer, such that the zircaloy fuel cladding reaches ignition temperature. While highly improbable, the resultant zircaloy fire could lead to the release of large quantities of fission products to the atmosphere. However, after removal of the spent fuel from the SONGS SFPs, the age and configuration of spent fuel stored in dry cask storage precludes the possibility of such a zircaloy fire scenario. After all the spent fuel is transferred to dry cask storage within the SONGS ISFSI, the number and severity of potential radiological accidents is significantly less than when spent fuel was stored in the SFPs. For these reasons, the potential radiological consequences of accidents possible at SONGS after all spent fuel is transferred to the ISFSI are further reduced.

There continues to be no need for formal offsite radiological emergency preparedness (REP) plans under 44 CFR Part 350 at SONGS because no design-basis accident or reasonably credible beyond-design-basis accident can result in radioactive releases that exceed the U.S. Environmental Protection Agency (EPA) Early Phase Protective Action Guides (PAGs) (Reference 29) beyond the exclusion area boundary.

3.3 Evaluation

The NRC staff reviewed the changes from the current SONGS PDEP to the proposed IOEP and ISFSI-Only EAL scheme, including the licensee's evaluation of the changes, to verify that the proposed IOEP and EAL scheme continue to meet the standards contained in 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50, as exempted, applicable to the approved 10 CFR Part 50 emergency plan for the long-term defueled conditions at SONGS. The NRC staff also performed a review to ensure that the proposed IOEP would be consistent with the requirements of 10 CFR 72.32 for an ISFSI not located on the site of an operating nuclear power reactor. Although the requirements of 10 CFR 72.32 do not apply to a 10 CFR

Part 50 licensee, such as SONGS, the NRC uses these regulations as guidance to promote consistency between specifically licensed and generally licensed ISFSIs.

3.3.1 *ISFSI EALs and Removal of SFP Initiating Conditions and EALs*

The initiating conditions (ICs) and EALs associated with the emergency classification levels in the current PDEP are based on Appendix C to NEI 99-01, Revision 6 (Reference 17), which addresses a nuclear power reactor that has permanently ceased operations and transferred spent fuel from the reactor vessel to the SFPs (permanently defueled). After all spent fuel has been removed from the SFPs and placed in dry cask storage within the ISFSI, the ICs and EALs in Appendix C to NEI 99-01 that are associated with the SFPs at a decommissioning facility are no longer required. Additionally, certain ICs and EALs whose primary function is not associated with the SFPs are no longer required when administrative controls are established to limit source term accumulation and the offsite consequences of uncontrolled effluent releases.

Examples of administrative controls for radiological source term accumulation limits and methods to control the accidental dispersal of the radiological source are:

- Limits on radioactive materials collected on filter media and resins (dose rate limit);
- Limits on surface or fixed contamination on work areas that may create airborne radioactive material (activity limits), and
- Limiting dispersal mechanisms that may cause a fire (e.g., limits on combustible material loading, use of a fire watch to preclude fires, etc.) or placement of a berm around a radioactive liquid storage tank.

Other ICs proposed for deletion include those associated with the mitigative strategies contained in certain SCE license conditions, as well as response procedures for potential or actual aircraft attacks. These will be eliminated after all spent fuel is removed from the SFPs and stored in the onsite SONGS ISFSI. The ICs listed in Table 1 below are being deleted, either partially or in their entirety as indicated, from the PDEP and EAL scheme for SONGS. The ICs being deleted are either associated only with SFP operation or are ICs for which administrative controls to limit possible effluent releases have been established.

Table 1: Initiating Conditions to be Deleted or Modified

ALERT	UNUSUAL EVENT
PD-AA1 (all EALs) Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 millirems (mrem) total effective dose equivalent (TEDE) or 50 mrem committed dose equivalent (CDE).	**PD-AU1 (all EALs)** Release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limit for 60 minutes or longer.

PD-AA2 (all EALs) UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity.	**PD-AU2 (all EALs)** UNPLANNED rise in plant radiation levels.
PD-HA1* HOSTILE ACTION within the Vehicle Barrier System (VBS) boundary ~~or airborne attack threat within 30 minutes~~.	**PD-SU1 (all EALs)** UNPLANNED spent fuel pool temperature rise.
PD-HA1.2 A validated notification from the NRC of an aircraft attack threat within 30 minutes of the site.	**PD-HU1.3** A validated notification from the NRC providing information of an aircraft attack threat.
	PD-HU2 (all EALs)** Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling.

* Only the strike-through portion is being deleted.

** For an ISFSI-only facility, the condition addressed by PD-HU2 remains fully addressed by IC EU1.1 (which is being retained in the SONGS emergency plan).

The currently existing SONGS ICs and EALs not listed in Table 1 are being retained. The EAL ICs being deleted include all ICs associated with the categories of abnormal radioactivity release and system malfunction. These two categories apply only to SFP operation. The EAL ICs being retained in the SONGS IOEP are appropriate to address the condition of an ISFSI-only facility (i.e., no fuel stored in the spent fuel pools).

The SONGS ICs and EALs to be retained are listed in Table 2, and include one new EAL being proposed in IC E-HU1, “Damage to a loaded cask CONFINEMENT BOUNDARY,” which bounds the deleted ICs. In addition, the new EAL E-HU1.2 provides threshold values for the AREVA ISFSI and the new HOLTEC ISFSI at SONGS, based on the generic AREVA and HOLTEC Technical Specification values provided in the respective Certificates of Compliance.

Table 2: Initiating Conditions to be Maintained or Added

ALERT	UNUSUAL EVENT
Independent Spent Fuel Storage Installation (ISFSI)	
PD-HA1 HOSTILE ACTION within the VBS boundary.	**PD-HU1** Confirmed SECURITY CONDITION or threat.

PD-HA1.1 A HOSTILE ACTION is occurring or has occurred within the VBS boundary as reported by the SSS [Security Shift Supervisor].	**PD-HU1.1** A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the SSS. **PD-HU1.2** Notification of a credible security threat directed at the site.
PD-HA3 Other conditions exist which in the judgement of the ISS/ED [Emergency Director] warrant declaration of an ALERT. **PD-HA3.1** Other conditions exist which in the judgment of the ISS/ED indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the ISFSI or a security event that involves probable life threatening risk to site personnel or damage to ISFSI equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guide exposure levels.	**PD-HU3** Other conditions exist which in the judgment of the ISS/ED warrant declaration of an UNUSUAL EVENT. **PD-HU3.1** Other conditions exist which in the judgment of the ISS/ED indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the ISFSI or indicate a security threat to the ISFSI has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation occurs.
	E-HU1 Damage to a loaded canister CONFINEMENT BOUNDARY. **E-HU1.1** Damage to a loaded Transnuclear canister CONFINEMENT BOUNDARY as indicated by dose rates greater than EITHER of the following: • 520 milliroentgen per hour (mR/hr) (gamma) 3 feet from the surface at the top centerline. • 190 mR/hr (gamma) 3 feet from the surface of the neutron shield at the mid-height centerline. **E-HU1.2** Damage to a loaded Holtec canister CONFINEMENT BOUNDARY as indicated by dose rates greater than EITHER of the following: • 60 mR/hr (gamma + neutron) on the top of the closure lid of a VVM [Vertical Ventilated Module], measured in accordance with the EAL Technical Basis.

	• 7000 mR/hr (gamma + neutron) on the side of a TRANSFER CASK, measured in accordance with the EAL Technical Basis.

The most severe beyond-design-basis accident postulated for SONGS with spent fuel stored within the SFPs involved a highly unlikely sequence of events that cause heat-up of the spent fuel, postulated to occur without heat transfer, such that the zircaloy fuel cladding reaches ignition temperature. Because this limiting, beyond-design-basis scenario is no longer possible due to the transfer of spent fuel from the SFPs to dry cask storage in the onsite ISFSI, SCE assessed the following design-basis accidents associated with the performance of decommissioning activities with all irradiated fuel stored in the SONGS ISFSI: (1) cask drop accident (fuel related accident); (2) radioactive material handling accident (non-fuel related), and (3) accidents initiated by external events. For design-basis accident scenarios (1) and (2), the results of the assessment indicate that the projected radiological doses at the exclusion area boundary are less than the EPA PAGs. The effects of external events, such as fires, floods, wind (including tornados), earthquakes, lightning, and physical security breaches on the SONGS ISFSI that could affect the confinement boundary of the ISFSI remain unchanged from the effects that were considered under the existing PDEP.

As discussed in the June 4, 2015, exemption from certain emergency preparedness requirements (Reference 13), an analysis of the potential radiological impacts of a design-basis accident at SONGS in a permanently defueled condition indicated that any releases beyond the exclusion area boundary were below the EPA PAG exposure levels. The basis for these exemptions has not changed and remains in effect for the proposed emergency plan changes.

Because of the very low risk of consequences to public health and safety resulting from the postulated accidents related to the SONGS ISFSI, no potential emergencies are classified as higher than an Alert, in accordance with the requirements of 10 CFR Part 50, Appendix E, Section IV.C.1, as exempted. Classification of emergencies as no higher than an Alert also maintains consistency with the regulations in 10 CFR 72.32(a)(3), “Classification of accidents.”

Based on the NRC staff’s review of the SONGS IOEP and associated EAL scheme, as described above, the NRC staff concludes that the planning standard of 10 CFR 50.47(b)(4), as exempted, pertaining to a standard emergency classification and action level scheme, is addressed in an acceptable manner in the SONGS IOEP, considering the permanently shutdown and defueled status of the facility, and the proposed transfer of all remaining spent fuel from the SONGS SFPs to the ISFSI by 2019.

3.3.2 *SONGS Emergency Response Organization Revision*

The existing SONGS PDEP provides for two (2) ERO augmented positions – a Duty ERO Coordinator and a Radiation Control Coordinator. The proposed SONGS IOEP would replace these positions with a Resource Manager. The Resource Manager will assist in assessing the event and coordinating required resources, including public information interface. The Resource Manager will be in contact with the Emergency Director within two hours of classification of an Unusual Event or an Alert. The Resource Manager does not need to physically report to SONGS to perform their responsibilities. In addition, SCE proposes that, for

a declared emergency involving radiological consequences (E-HU1), a minimum of one person trained in radiological monitoring and assessment will report to the SONGS ISFSI within four hours of the emergency declaration. Supplemental personnel shall report at the discretion of the Emergency Director and/or Resource Manager.

In its evaluation of the proposed changes to the SONGS ERO, the NRC staff considered the accident analyses referenced in the previous section related to the deletion of EALs, either partially or in their entirety, as indicated, as they relate to SFP operation. Specifically, the NRC staff considered the postulated accidents that could occur with all spent fuel moved into the SONGS ISFSI, which pose a very low risk to public health and safety. The staff notes that SCE also continues to commit to maintain the appropriate level of augmented response to an emergency, to include an event involving radiological consequences.

In the Statement of Considerations for the Final Rule for Emergency Planning Licensing Requirements for Independent Spent Fuel Storage Facilities and Monitored Retrievable Storage Facilities (MRS) (60 FR 32430; June 22, 1995), the Commission stated, in part:

> For there to be a significant environmental impact resulting from an accident involving the dry storage of spent nuclear fuel, a significant amount of the radioactive material contained within a cask must escape its packaging and enter the biosphere. There are two primary factors that protect the public health and safety from this event. The first is the design requirements for the cask that are imposed by regulation.
>
> These general design criteria place an upper bound on the energy a cask can absorb before the fuel is damaged. No credible dynamic events have been identified that could impart such significant amounts of energy to a storage cask after that cask is placed at the ISFSI.
>
> Additionally, there is a second factor which does not rely upon the cask itself but considers the age of the spent fuel and the lack of dispersal mechanisms. There exists no significant dispersal mechanism for the radioactive material contained within a storage cask.
>
> . . .
>
> Based on the design limitations, the majority of spent fuel is cooled greater than 5 years. At this age, spent fuel has a heat generation rate that is too low to cause significant particulate dispersal in the unlikely event of a cask confinement boundary failure.

Although the SONGS spent fuel analysis has not been able to identify any design-basis accident that would result in a failure of the confinement barrier for the dry storage casks or the irradiated fuel itself, the SONGS IOEP nonetheless requires augmentation of one person trained in radiological monitoring and assessment, who will report to the station within four hours of the emergency declaration for an event involving radiological consequences.

The proposed SONGS IOEP also provides that additional personnel resources may be directed to report to the plant to provide support, as needed, to assess radiological conditions, support maintenance and repair activities, develop and implement corrective action plans, and assist with recovery actions. The supplemental personnel are available from SONGS staff and SCE, and can also be requested from various contractors.

Based on the NRC staff's review of the SONGS IOEP, as described above, the NRC staff concludes that the planning standard of 10 CFR 50.47(b)(2), pertaining to timely augmentation of response capabilities, is addressed in an acceptable manner in the SONGS IOEP, considering the permanently shutdown and defueled status of the facility, and the proposed transfer of all remaining spent fuel from the SFPs to the ISFSI by 2019.

3.3.3 *Replacement of the "Shift Manager" Title with the "ISFSI Shift Supervisor" Title*

SCE revised Section 2.1, "On-Shift Positions," in the SONGS IOEP to reassign the following Emergency Director responsibilities from the Shift Manager to the ISFSI Shift Supervisor:

- Event classification and emergency declaration;
- Decision to notify offsite agencies;
- Authorization for the use of EPA-400 emergency exposure controls (emergency worker dose limits that exceed 10 CFR Part 20 occupational exposure limits);
- Management of available station resources;
- Initiation of assessment and mitigative / corrective actions;
- Initiation of onsite protective actions;
- Decision to call for offsite law enforcement, firefighting, or ambulance assistance;
- Augmentation of the emergency response organization as deemed necessary;
- Notification of SCE corporate officers and the SCE corporate communications department, and
- Notification of offsite agencies (State and local government agencies, Marine Corps Base Camp Pendleton and the NRC).

The NRC staff evaluation verified that the retitled position of ISFSI Shift Supervisor is on-shift at the SONGS site 24-hours a day / 7 days a week, and also serves as the senior management position during off-hours. This position assumes overall command and control of event response as the Emergency Director, and is responsible for monitoring conditions and approving all onsite activities. The SONGS IOEP clearly identifies non-delegable responsibilities, along with other designated tasks, for the ISFSI Shift Supervisor. The NRC staff considers this retitling activity to be an administrative change that will not impact the timing or performance of existing emergency response duties.

Based on the NRC staff's review of the SONGS IOEP, as described above, the NRC staff concludes that the requirements of 10 CFR Part 50, Appendix E, Section IV.A, as exempted, pertaining to responsibilities and duties of individuals assigned to the licensee's emergency organization, are addressed in a satisfactory manner, considering the permanently shutdown and defueled status of the facility, and the proposed transfer of all remaining spent fuel from the SONGS SFPs to the ISFSI by 2019.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments include changes to requirements with respect to installation or use of a facility component located within the protected area and changes to recordkeeping, reporting, or administrative procedures or requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there have been no public comment on such finding, which was published in the *Federal Register* on February 14, 2017 (82 FR 10601). Accordingly, the amendments meet the eligibility criteria for categorical exclusions set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10)(ii). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 STATE CONSULTATION

On November 5, 2017, the NRC staff notified the California State officials, Mr. Ira Schneider, Senior Health Physicist, Medical, Academic and Pharmacy Licensing, Radiologic Health Branch, California Department of Public Health; and Mr. Robert Weisenmiller, California State Liaison Officer, Commissioner, California Energy Commission, regarding the proposed change to approve the SONGS IOEP and associated EAL scheme to reflect the transfer of all spent fuel into dry cas storage at the onsite ISFSI. The California State officials responded on XXXXX XX, 2017, and XXXXX XX, 2017, with no comments.

6.0 CONCLUSION

Based on the its review of the proposed SONGS IOEP and associated EAL scheme, the NRC staff finds that the proposed changes continue to meet the standards in 10 CFR 50.47(b) and the requirements in Appendix E of 10 CFR Part 50, as exempted. The staff finds continued reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at the SONGS facility. In addition, the NRC staff concludes that the SONGS IOEP will be consistent with the emergency planning requirements in 10 CFR Part 72 for an ISFSI not located on the site of an operating reactor. Therefore, the NRC staff concludes that the licensee's proposed changes to the SONGS IOEP and associated EAL scheme in its letter dated December 15, 2016, as supplemented by letter dated May 5, 2017, are acceptable.

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there continues to be reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from the U.S. Nuclear Regulatory Commission, "Southern California Edison Company, et al, Docket No. 50-206, Issuance of Facility Operating License No.

DPR-13," dated September 26, 1991 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13309A138).

2. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-206, Request for Exemption from Full Funding Requirements of 10 CFR 50.75(e)(1)(ii), San Onofre Nuclear Generating Station, Unit 1," dated November 30, 1992 (ADAMS Accession No. ML13319B040).

3. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-206, Certification of Permanently Defueled Status, San Onofre Nuclear Generating Station, Unit 1," dated March 8, 1993 (ADAMS Accession No. ML13319B055).

4. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-206, Post Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station, Unit 1," dated December 15, 1998 (ADAMS Accession No. ML13319B111).

5. Letter from the U.S. Nuclear Regulatory Commission to Southern California Edison, "Issuance of Amendment No. 155 for Facility Operating License No. DPR-13, San Onofre Nuclear Generating Station, Unit No. 1, Permanently Defueled Technical Specifications (TAC No. M86377)," dated December 28, 1993 (ADAMS Accession No. ML13319B059).

6. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-206, Proposed Decommissioning Plan, San Onofre Nuclear Generating Station, Unit 1," dated November 3, 1994 (ADAMS Accession No. ML13319B073).

7. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-206, Post Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station, Unit 1," dated December 15, 1998 (ADAMS Accession No. ML13184A353).

8. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-361 and 50-362, Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station, Units 2 and 3," dated June 12, 2013 (ADAMS Accession No. ML131640201).

9. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-362, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station, Unit 3," dated June 28, 2013 (ADAMS Accession No. ML13183A391).

10. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket No. 50-361, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2," dated July 22, 2013 (ADAMS Accession No. ML13204A304).

11. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-361, 50-362, and 50-206, Amendment Applications 226, 273, and 258, Independent Spent Fuel Storage Installation (ISFSI) Only Emergency Plan (IOEP) and ISFSI-Only Emergency Action Level Scheme (IOEAL), San Onofre Nuclear Generating Station, Units 1, 2, and 3," dated December 15, 2016 (ADAMS Accession No. ML16355A015).

12 Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-361, 50-362, and 50-206, Response to a Request for Additional Information Regarding the License Amendment Request to Change the Emergency Plan and Emergency Action level Scheme to Reflect an ISFSI-Only Configuration, San Onofre Nuclear Generating Station, Units 1, 2, and 3," dated May 5, 2017 (ADAMS Accession No. ML17160A324).

13. Letter from the U.S. Nuclear Regulatory Commission to Southern California Edison, "San Onofre Nuclear Generating Station, Units 1, 2 and 3, and the Independent Spent Fuel Storage Installation – Exemptions From Certain Emergency Planning Requirements (TAC Nos. MF3835, MF3836, and MF3837)," dated June 4, 2015 (ADAMS Accession No. ML15082A143).

14. U.S. Nuclear Regulatory Commission and Federal Emergency Management Agency, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Revision 1, dated November 1980 (ADAMS Accession No. ML040420012).

15. NSIR/DRP-ISG-2, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants," dated May 11, 2015 (ADAMS Accession No. ML14106A057).

16. NMSS/SFST-ISG-16, "Emergency Planning," dated June 14, 2000 (ADAMS Accession No. ML003724570).

17. NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors," Revision 6, dated November 2012 (ADAMS Accession No. ML12326A805).

18 Letter from the U.S. Nuclear Regulatory Commission to NEI, "Technical Evaluation for the Endorsement of NEI 99-01, Revision 6," dated March 28, 2013 (ADAMS Accession No. ML12346A463).

19 Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated March 31, 2014 (ADAMS Accession No. ML14092A332).

20 Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Response to Request for Additional Information Regarding Emergency Planning Exemption Request, San Onofre Nuclear

Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated September 9, 2014 (ADAMS Accession No. ML14258A003).

21. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Response to Request for Additional Information Regarding Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated October 2, 2014 (ADAMS Accession No. ML14280A265).

22. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Response to Request for Additional Information Regarding Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated October 7, 2014 (ADAMS Accession No. ML14287A228).

23. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Response to Requests for Clarification of October 6, 2014, RAI Responses Concerning Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated October 27, 2014 (ADAMS Accession No. ML14303A257).

24. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Response to Request for Additional Information Regarding Emergency Planning Exemption Request, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated November 3, 2014 (ADAMS Accession No. ML14309A195).

25 Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-041, Redacted Version of Response to Request for Additional Information, Proposed Exemptions from Certain Portions of 10 CFR 50.47 and Appendix E, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated December 15, 2014 (ADAMS Accession No. ML14351A078).

26. Letter from the U.S. Nuclear Regulatory Commission to Southern California Edison, "San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation – Issuance of Amendments Re: Changes to the Emergency Action Level Scheme (TAC Nos. MF3838, MF3839, and MF3840)," dated June 5, 2015 (ADAMS Accession No. ML15105A349).

27. Letter from the U.S. Nuclear Regulatory Commission to Southern California Edison, "San Onofre Nuclear Generating Station, Units 1, 2, and 3, and Independent Spent Fuel Storage Installation – Issuance of Amendments Re: Changes to the Emergency Plan (TAC Nos. MF3841, MF3842, and MF3843)," dated June 5, 2015 (ADAMS Accession No. ML 15126A461).

28. Letter from Southern California Edison to the U.S. Nuclear Regulatory Commission, "Docket Nos. 50-206, 50-361, 50-362, and 72-41, Revisions 0 and 1 to the Permanently Defueled Emergency Plan and Revisions to the Emergency Plan Implementing Procedures, San Onofre Nuclear Generating Station, Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation," dated July 8, 2015 (ADAMS Accession No. ML15191A391).

29. U.S. Environmental Protection Agency PAG Manual, "Protective Action Guides and Planning Guidance for Radiological Incidents," dated January 2017 (ADAMS Accession No. ML17044A073).

Principal Contributor: Rick Kinard, NSIR

Dated: November , 2017

EXHIBIT 11

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-206, 50-361, and 50-362; NRC-2018-0004]

Southern California Edison Company

San Onofre Nuclear Generating Station, Units 1, 2, and 3

AGENCY: Nuclear Regulatory Commission.

ACTION: Exemption; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing an exemption from the requirement to maintain a specified level of onsite property damage insurance in response to an October 22, 2015, request from the Southern California Edison Company (the licensee). Specifically, the licensee requested that the San Onofre Nuclear Generating Station, Units 1, 2, and 3, be granted an exemption to permit the licensee to reduce its onsite property damage insurance from $1.06 billion to $50 million.

ADDRESSES: Please refer to Docket ID **NRC-2018-0004** when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- **Federal Rulemaking Web Site:** Go to http://www.regulations.gov and search for Docket ID **NRC-2018-0004**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in this document.
- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Marlayna Vaaler, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-3178; e-mail: Marlayna.Vaaler@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

The San Onofre Nuclear Generating Station, Units 1, 2, and 3 (SONGS), operated by the Southern California Edison Company (SCE) is located approximately 4 miles south of San Clemente, California. The SONGS, Unit 1, Docket No. 50-206, was a Westinghouse 456 megawatt electric (MWe) pressurized water reactor which was granted Facility Operating License No. DPR-13 on January 1, 1968 (ADAMS Accession

No. ML13309A138), and ceased operation on November 30, 1992 (ADAMS Accession No. ML13319B040). The licensee completed defueling on March 6, 1993 (ADAMS Accession No. ML13319B055), and maintained the unit in SAFSTOR until June 1999, when it initiated decommissioning (ADAMS Accession No. ML13319B111). On December 28, 1993 (ADAMS Accession No. ML13319B059), the NRC approved the Permanently Defueled Technical Specifications for SONGS, Unit 1.

The SCE submitted the proposed Decommissioning Plan for SONGS, Unit 1, on November 3, 1994 (ADAMS Accession No. ML13319B073). As a result of the 1996 revision to the regulations in section 50.82 of title 10 of the *Code of Federal Regulations* (10 CFR), the NRC replaced the requirement for a decommissioning plan with a requirement for a Post Shutdown Decommissioning Activities Report (PSDAR). On August 28, 1996, the SONGS, Unit 1, Decommissioning Plan became the SONGS 1 PSDAR (61 FR 67079; December 19, 1996). On December 15, 1998 (ADAMS Accession No. ML13184A353), SCE submitted an update to the PSDAR to the NRC, as required by 10 CFR 50.82(a)(7), in order to begin planning for the dismantlement and decommissioning of SONGS, Unit 1.

The SONGS, Units 2 and 3, Docket Nos. 50-361 and 50-362, are Combustion Engineering 1127 MWe pressurized water reactors, which were granted Facility Operating Licenses NPF-10 on February 16, 1982, and NPF-15 on November 15, 1982, respectively. In June 2013, pursuant to 10 CFR 50.82(a)(1)(i), the licensee certified to the NRC that as of June 7, 2013, operations had ceased at SONGS, Units 2 and 3 (ADAMS Accession No. ML131640201). The licensee subsequently certified, pursuant to 10 CFR 50.82(a)(1)(ii), that all fuel had been removed from the reactor vessels of both units, and committed to maintaining the units in a permanently defueled status (ADAMS Accession Nos. ML13204A304 and ML13183A391 for Unit 2 and Unit 3, respectively).

Therefore, pursuant to 10 CFR 50.82(a)(2), SCE's 10 CFR part 50 licenses no longer authorize operation of SONGS or emplacement or retention of fuel into the reactor vessels. The licensee is still authorized to possess and store irradiated nuclear fuel. Irradiated fuel is currently being stored onsite in spent fuel pools (SFPs) and in dry casks at an Independent Spent Fuel Storage Installation (ISFSI).

The PSDAR for SONGS, Units 2 and 3, was submitted on September 23, 2014 (ADAMS Accession No. ML14272A121), and the associated public meeting was held on October 27, 2014, in Carlsbad, California (ADAMS Accession No. ML14352A063). The NRC confirmed its review of the SONGS, Units 2 and 3, PSDAR and addressed public comments in a letter dated August 20, 2015 (ADAMS Accession No. ML15204A383). On July 17, 2015, the NRC approved the Permanently Defueled Technical Specifications for SONGS, Units 2 and 3 (ADAMS Accession No. ML15139A390).

II. Request/Action

Pursuant to 10 CFR 50.12, "Specific exemptions," SCE requested an exemption from 10 CFR 50.54(w)(1), by letter dated October 22, 2015 (ADAMS Accession No. ML15299A220). The exemption from the requirements of 10 CFR 50.54(w)(1) would permit the licensee to reduce the required level of onsite property damage insurance from $1.06 billion to $50 million.

The regulation at 10 CFR 50.54(w)(1) requires each licensee to have and maintain onsite property damage insurance to stabilize and decontaminate the reactor and reactor site in the event of an accident. The onsite insurance coverage must be either $1.06 billion or whatever amount of insurance is generally available from private sources (whichever is less).

The licensee states that the risk of an incident at a permanently shutdown and defueled reactor is much less than the risk from an operating power reactor. In addition, since reactor operation is no longer authorized at SONGS, there are no events that would require the stabilization of reactor conditions after an accident. Similarly, the risk of an accident that that would result in significant onsite contamination at SONGS is also much lower than the risk of such an event at operating reactors. Therefore, SCE is requesting an exemption from 10 CFR 50.54(w)(1) to reduce its onsite property damage insurance from $1.06 billion to $50 million, commensurate with the reduced risk of an incident at the permanently shutdown and defueled SONGS site.

III. Discussion

Under 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) any of the special circumstances listed in 10 CFR 50.12(a)(2) are present.

The financial protection limits of 10 CFR 50.54(w)(1) were established after the Three Mile Island accident out of concern that licensees may be unable to financially cover onsite cleanup costs in the event of a major nuclear accident. The specified $1.06 billion coverage amount requirement was developed based on an analysis of an accident at a nuclear reactor operating at power, resulting in a large fission product release and requiring significant resource expenditures to stabilize the reactor and ultimately decontaminate and cleanup the site.

These cost estimates were developed based on the spectrum of postulated accidents for an operating nuclear reactor. Those costs were derived from the

consequences of a release of radioactive material from the reactor. Although the risk of an accident at an operating reactor is very low, the consequences onsite and offsite can be significant. In an operating plant, the high temperature and pressure of the reactor coolant system (RCS), as well as the inventory of relatively short-lived radionuclides, contribute to both the risk and consequences of an accident. With the permanent cessation of reactor operations at SONGS and the permanent removal of the fuel from the reactor cores, such accidents are no longer possible. As a result, the reactors, RCS, and supporting systems no longer operate and have no function related to the storage of the irradiated fuel. Therefore, postulated accidents involving failure or malfunction of the reactors, RCS, or supporting systems are no longer applicable.

As described in the PSDAR, SONGS, Unit 1, is being returned to a condition suitable for unrestricted use. According to SCE, there are no structures, systems, or components (SSCs) classified as safety-related remaining at SONGS, Unit 1. Plant dismantlement is complete and nearly all of the SSCs have been shipped offsite for disposal. Only the spent fuel, reactor vessel, and the below-grade portions of some buildings remain onsite. The principal remaining decommissioning activities are soil remediation, compaction, and grading. This is to be completed in conjunction with the future decommissioning of the ISFSI subsequent to shipment offsite of the SONGS stored spent fuel.

The licensee also stated that decommissioning of SONGS, Units 2 and 3, has begun and the nuclear reactors and essentially all associated SSCs in the nuclear steam supply system and balance of plant that supported the generation of power have been retired in place and are being prepared for removal. The SSCs that remain operable are associated with the SFPs and the spent fuel building, are needed to meet other regulatory requirements, or are needed to support other site facilities (e.g., radioactive

waste handling, ventilation and air conditioning, etc.). No remaining active SSCs are classified as safety-related.

During reactor decommissioning, the largest radiological risks are associated with the storage of spent fuel onsite. In its October 22, 2015, exemption request, SCE discusses both design-basis and beyond design-basis events involving irradiated fuel stored in the SFPs. The licensee determined that there are no possible design-basis events at SONGS that could result in an offsite radiological release exceeding the limits established by the U.S. Environmental Protection Agency's (EPA) early-phase Protective Action Guidelines (PAGs) of 1 rem (roentgen equivalent man) at the exclusion area boundary, as a way to demonstrate that any possible radiological releases would be minimal and not require precautionary protective actions (e.g., sheltering in place or evacuation). The staff evaluated the radiological consequences associated with various decommissioning activities, and design basis accidents at SONGS, in consideration of SONGS's permanently shut down and defueled status. The possible design-basis accident scenarios at SONGS have greatly reduced radiological consequences. Based on its review, the staff concluded that no reasonably conceivable design-basis accident exists that could cause an offsite release greater than the EPA PAGs.

The only incident that might lead to a significant radiological release at a decommissioning reactor is a zirconium fire. The zirconium fire scenario is a postulated, but highly unlikely, beyond design-basis accident scenario that involves loss of water inventory from the SFP, resulting in a significant heat-up of the spent fuel, and culminating in substantial zirconium cladding oxidation and fuel damage. The probability of a zirconium fire scenario is related to the decay heat of the irradiated fuel stored in the SFP. Therefore, the risks from a zirconium fire scenario continue to decrease as a function of the time that SONGS has been permanently shut down. The licensee

provided a detailed analysis of hypothetical beyond-design-basis accidents that could result in a radiological release at SONGS in its March 31, 2014, submittal to the NRC (ADAMS Accession No. ML14092A332), as supplemented by letters dated September 9, October 2, October 7, October 27, November 3, and December 15, 2014 (ADAMS Accession Nos. ML14258A003, ML14280A265, ML14287A228, ML14303A257, ML14309A195, and ML14351A078, respectively). One of these beyond design-basis accidents involves a complete loss of SFP water inventory, where cooling of the spent fuel would be primarily accomplished by natural circulation of air through the uncovered spent fuel assemblies. The licensee's analysis of this accident shows that by August 31, 2014, air-cooling of the spent fuel assemblies will be sufficient to keep the fuel within a safe temperature range indefinitely without fuel damage or offsite radiological release.

The Commission has previously authorized a lesser amount of onsite financial protection, based on this analysis of the zirconium fire risk. In SECY-96-256, "Changes to Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w)(1) and 10 CFR 140.11," dated December 17, 1996 (ADAMS Accession No. ML15062A483), the staff recommended changes to the power reactor financial protection regulations that would allow licensees to lower onsite insurance levels to $50 million upon demonstration that the fuel stored in the SFP can be air-cooled. In its Staff Requirements Memorandum to SECY-96-256, dated January 28, 1997 (ADAMS Accession No. ML15062A454), the Commission supported the staff's recommendation that, among other things, would allow permanently shutdown power reactor licensees to reduce commercial onsite property damage insurance coverage to $50 million when the licensee was able to demonstrate the technical criterion that the spent fuel could be air-cooled if the spent fuel pool was drained of water. The staff has used this technical criterion to grant similar exemptions to other decommissioning

reactors (e.g., Maine Yankee Atomic Power Station, published in the *Federal Register* on January 19, 1999 (64 FR 2920); and Zion Nuclear Power Station, published in the *Federal Register* on December 28, 1999 (64 FR 72700)). These prior exemptions were based on these licensees demonstrating that the SFP could be air-cooled, consistent with the technical criterion discussed above.

In SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," dated June 28, 2000, and SECY-01-0100, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in the Spent Fuel Pool," dated June 4, 2001 (ADAMS Accession Nos. ML003721626 and ML011450420, respectively), the NRC staff discussed additional information concerning SFP zirconium fire risks at decommissioning reactors and associated implications for onsite property damage insurance. Providing an analysis of when the spent fuel stored in the SFP is capable of air-cooling is one measure that can be used to demonstrate that the probability of a zirconium fire is exceedingly low. However, the staff has more recently used an additional analysis that bounds an incomplete drain down of the SFP water, or some other catastrophic event (such as a complete drainage of the SFP with rearrangement of spent fuel rack geometry and/or the addition of rubble to the SFP). The analysis postulates that decay heat transfer from the spent fuel via conduction, convection, or radiation would be impeded. This analysis is often referred to as an adiabatic heatup.

The licensee's analyses referenced in its exemption request demonstrates that under conditions where the SFP water inventory has drained completely and only air-cooling of the stored irradiated fuel is available, there is reasonable assurance that after August 2014, the SONGS spent fuel will remain at temperatures far below those associated with a significant radiological release. However, a portion of the air-cooling

analyses credits operation of the normal fuel building ventilation systems because the fuel building structures are robust and offer little potential for natural air exchange with the environment for cooling. Because the normal fuel building ventilation could become unavailable during an initiating event that would lead to complete SFP drainage (i.e., a seismic event), the NRC staff also relied upon the additional time that the fuel in the SONGS SFPs has had to cool since the plant was permanently shutdown in June 2013 during its evaluation of the licensee's exemption request. As discussed in the staff response to a question in SECY-00-0145, "the staff believes that full insurance coverage must be maintained for 5 years or until a licensee can show by analysis that its spent fuel pool is no longer vulnerable to such [a zirconium] fire."

Although the official certifications for permanent cessation of power operations and permanent removal of fuel from the reactor vessel were not submitted until June 2013, the staff notes that SONGS was in an extended outage to address steam generator issues, and neither SONGS, Units 2 nor 3, have produced power since January 2012. This additional storage time for the fuel in the SONGS SFPs has allowed it to cool for greater than the 5 years suggested in SECY-00-0145, which supports the conclusion that zirconium fire risks from the irradiated fuel stored in the SFPs is of negligible concern and exemption from the requested requirements is warranted.

In addition to the air-cooling scenario, the licensee's adiabatic heat-up analyses demonstrate that as of October 12, 2014, there would be at least 17 hours after the loss of all means of cooling (both air and/or water), before the spent fuel cladding would reach a temperature where the potential for a significant offsite radiological release could occur. The licensee states that for this loss of all cooling scenario, 10 hours is sufficient

time for personnel to respond with additional resources, equipment, and capability to restore cooling to the SFPs, even after a non-credible, catastrophic event.

As provided in SCE's letters dated October 7 and December 15, 2014, the licensee furnished information concerning its makeup strategies, in the event of a loss of SFP coolant inventory. The multiple strategies for providing makeup to the SFPs include: using existing plant systems for inventory makeup; an internal strategy that relies on installed fire water pumps and service water or fire water storage tanks; or an external strategy that uses portable pumps to initiate makeup flow into the SFPs through a seismic standpipe and standard fire hoses routed to the SFPs or to a spray nozzle. These strategies will be maintained by a license condition until such time as all fuel has been moved to dry storage in an onsite ISFSI. The licensee states that the equipment needed to perform these actions are located onsite, and that the external makeup strategy (using portable pumps) is capable of being deployed within 2 hours. The licensee also stated that, considering the very low-probability of beyond design-basis accidents affecting the SFPs, these diverse strategies provide defense-in-depth and time to mitigate and prevent a zirconium fire, using makeup or spray into the SFPs before the onset of zirconium cladding rapid oxidation.

In the safety evaluation of the licensee's request for exemptions from certain emergency planning requirements dated June 4, 2015 (ADAMS Accession No. ML15082A204), the NRC staff assessed the SCE accident analyses associated with the radiological risks from a zirconium fire at the permanently shutdown and defueled SONGS site. The NRC staff has confirmed that under conditions where cooling air flow can develop, suitably conservative calculations indicate that by the end of August 2014, the fuel would remain at temperatures where the cladding would be undamaged for an unlimited period. The staff also finds that the additional cooling time provided

for the fuel between January 2012 and the issuance of this exemption provides reasonable assurance that zirconium fire risks from the irradiated fuel stored in the SFPs is of negligible concern. For the very unlikely beyond design-basis accident scenario, where the SFP coolant inventory is lost in such a manner that all methods of heat removal from the spent fuel are no longer available, there will be a minimum of 10 hours from the initiation of the accident until the cladding reaches a temperature where offsite radiological release might occur. The staff finds that 10 hours is sufficient time to support deployment of mitigation equipment, consistent with plant conditions, to prevent the zirconium cladding from reaching a point of rapid oxidation.

The staff's basis as to why it considers $50 million to be an adequate level of onsite property damage insurance for a decommissioning reactor, once the spent fuel in the SFP is no longer susceptible to a zirconium fire, is provided in SECY-96-256. The staff has postulated that there is still a potential for other radiological incidents at a decommissioning reactor that could result in significant onsite contamination besides a zirconium fire. In SECY-96-256, the NRC staff cited the rupture of a large (~450,000 gallon) liquid radioactive waste storage tank containing slightly radioactive water, causing soil contamination and potential groundwater contamination, as the most costly postulated event to decontaminate and remediate (other than a SFP zirconium fire). The postulated large liquid radwaste storage tank rupture event was determined to have a bounding onsite cleanup cost of approximately $50 million.

The NRC staff has determined that the licensee's proposed reduction in onsite property damage insurance coverage to a level of $50 million is consistent with SECY-96-256 and subsequent insurance considerations, resulting from additional zirconium fire risks, as discussed in SECY-00-0145 and SECY-01-0100. In addition, the NRC staff notes that similar exemptions have been granted to other permanently shutdown and

defueled power reactors, upon demonstration that the criterion of the zirconium fire risks from the irradiated fuel stored in the SFP is of negligible concern. As previously stated, the staff concluded that as of October 12, 2014, sufficient irradiated fuel decay time has elapsed at SONGS to decrease the probability of an onsite radiological release from a postulated zirconium fire accident to negligible levels. In addition, the licensee's proposal to reduce onsite insurance to a level of $50 million is consistent with the maximum estimated cleanup costs for the recovery from the rupture of a large liquid radwaste storage tank. Finally, the staff notes that in accordance with the SONGS PSDAR, all spent fuel will be removed from the SFPs and moved into dry storage at an onsite independent spent fuel storage installation (ISFSI) by the end of 2019, and the probability of an initiating event that would threaten pool integrity occurring before that time is extremely low, which further supports the conclusion that the zirconium fire risk is negligible.

The Exemption is Authorized by Law

In accordance with 10 CFR 50.12, the Commission may grant exemptions from the regulations in 10 CFR part 50 as the Commission determines are authorized by law. The NRC staff has determined that granting the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, Section 170, as amended, other laws, or the Commission's regulations, which require licensees to maintain adequate financial protection. Therefore, the proposed exemption for SONGS from the onsite property damage insurance requirements of 10 CFR 50.54(w)(1) is authorized by law.

The Exemption Will Not Present an Undue Risk to Public Health and Safety

The onsite property damage insurance requirements of 10 CFR 50.54(w)(1) were established to provide financial assurance that following a significant nuclear incident,

onsite conditions could be stabilized and the site decontaminated. The requirements of 10 CFR 50.54(w)(1) and the existing level of onsite insurance coverage for SONGS are predicated on the assumption that the reactor is operating. However, SONGS is a permanently shutdown and defueled facility. The permanently defueled status of the facility has resulted in a significant reduction in the number and severity of potential accidents, and correspondingly, a significant reduction in the potential for and severity of onsite property damage. The proposed reduction in the amount of onsite insurance coverage does not impact the probability or consequences of potential accidents. The proposed level of insurance coverage is commensurate with the reduced risk and reduced cost consequences of potential nuclear accidents at SONGS. Therefore, the NRC staff concludes that granting the requested exemption will not present an undue risk to the health and safety of the public.

The Exemption is Consistent with the Common Defense and Security

The proposed exemption would not eliminate any requirements associated with physical protection of the site and would not adversely affect SCE's ability to physically secure the site or protect special nuclear material. Physical security measures at SONGS are not affected by the requested exemption. Therefore, the proposed exemption is consistent with the common defense and security.

Special Circumstances

Under 10 CFR 50.12(a)(2)(ii), special circumstances are present if the application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR 50.54(w)(1) is to provide reasonable assurance that adequate funds will be available to stabilize conditions and cover onsite cleanup costs

associated with site decontamination, following an accident that results in the release of a significant amount of radiological material. Because SONGS is permanently shut down and defueled, it is no longer possible for the radiological consequences of design-basis accidents or other credible events at SONGS to exceed the limits of the EPA PAGs at the exclusion area boundary. The licensee has performed site-specific analyses of highly unlikely, beyond-design-basis zirconium fire accidents involving the stored irradiated fuel in the SFPs. The analyses show that after October 12, 2014, the probabilities of such an accident are minimal. The NRC staff's evaluation of the licensee's analyses confirm this conclusion.

The NRC staff also finds that the licensee's proposed $50 million level of onsite insurance is consistent with the bounding cleanup and decontamination cost, as discussed in SECY-96-256, to account for hypothetical rupture of a large liquid radwaste tank at the SONGS site, should such an event occur. The staff notes that the SONGS technical specifications provide controls for unprotected outdoor liquid storage tanks to limit the quantity of radioactivity contained in these tanks, in the event of an uncontrolled release of the contents of these tanks. Therefore, the staff concludes that the application of the current requirements in 10 CFR 50.54(w)(1) to maintain $1.06 billion in onsite insurance coverage is not necessary to achieve the underlying purpose of the rule for the permanently shutdown and defueled SONGS reactors.

Under 10 CFR 50.12(a)(2)(iii), special circumstances are present whenever compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated. The NRC staff concludes that if the licensee was required to continue to maintain an onsite insurance level of $1.06 billion, the associated insurance premiums would be in excess of those necessary and

commensurate with the radiological contamination risks posed by the SONGS site now that it has entered decommissioning. In addition, such insurance levels would be significantly in excess of other decommissioning reactor facilities that have been granted similar exemptions by the NRC.

The NRC staff finds that compliance with the existing rule would result in an undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted and are significantly in excess of those incurred by others similarly situated. Therefore, the special circumstances required by 10 CFR 50.12(a)(2)(ii) and 10 CFR 50.12(a)(2)(iii) exist for the proposed exemption from the onsite property damage insurance requirements of 10 CFR 50.54(w)(1).

Environmental Considerations

The NRC approval of an exemption to insurance or indemnity requirements belongs to a category of actions that the Commission, by rule or regulation, has declared to be a categorical exclusion, after first finding that the category of actions does not individually or cumulatively have a significant effect on the human environment. Specifically, the exemption is categorically excluded from further analysis under 10 CFR 51.22(c)(25). Pursuant to 10 CFR 51.22(c)(25), the granting of an exemption from the requirements of any regulation in Chapter I of 10 CFR is a categorical exclusion provided that (i) there is no significant hazards consideration; (ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (iii) there is no significant increase in individual or cumulative public or occupational radiation exposure; (iv) there is no significant construction impact; (v) there is no significant increase in the potential for or consequences from radiological

accidents; and (vi) the requirements from which an exemption is sought are among those identified in 10 CFR 51.22(c)(25)(vi).

The NRC staff has determined that approval of the exemption request involves no significant hazards consideration because reducing the licensee's onsite property damage insurance at the decommissioning San Onofre Nuclear Generating Station, Units 1, 2, and 3, does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. The exempted financial protection regulation is unrelated to the operation of SONGS.

Accordingly, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and no significant increase in individual or cumulative public or occupational radiation exposure. The exempted regulation is not associated with construction, so there is no significant construction impact. The exempted regulation does not concern the source term (i.e., potential amount of radiation involved an accident) or accident mitigation; therefore, there is no significant increase in the potential for, or consequences from, a radiological accident. In addition, there would be no significant impacts to biota, water resources, historic properties, cultural resources, or socioeconomic conditions in the region. The requirement for onsite property damage insurance may be viewed as involving surety, insurance, or indemnity matters in accordance with 10 CFR 51.22(c)(25)(vi).

Therefore, pursuant to 10 CFR 51.22(b) and 10 CFR 51.22(c)(25), no environmental impact statement or environmental assessment need be prepared in connection with the approval of this exemption request.

IV. Conclusions

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption from 10 CFR 50.54(w)(1) is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. In addition, special circumstances are present. Therefore, the Commission hereby grants SCE an exemption from the requirements of 10 CFR 50.54(w)(1), to permit the licensee to reduce its onsite property damage insurance to a level of $50 million.

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 5th day of January, 2018.

For the Nuclear Regulatory Commission.

/RA/

Gregory Suber, Deputy Division Director,
Division of Decommissioning, Uranium Recovery
and Waste Programs,
Office of Nuclear Material Safety and Safeguards.

SUBJECT: EXEMPTION FROM THE REQUIREMENTS IN SECTION 54(w)(1) OF TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* (10 CFR), CONCERNING ONSITE PROPERTY DAMAGE INSURANCE (CAC NOS. L53097, L53098, AND L53099)

[DOCUMENT DATE] January 5, 2017 (FRN)

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EXHIBIT 12

U.S.NRC
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NRC Webinar
San Onofre Nuclear Generating Station Final Enforcement Action and Follow-up Inspection Preliminary Results

March 25, 2019

NRC Region IV, Arlington, TX

NRC Region IV Presenters

- Linda Howell, Deputy Director
  Division of Nuclear Materials Safety

- Lee Brookhart, Senior Inspector, Team Leader
  Fuel Cycle and Decommissioning Branch
  Division of Nuclear Materials Safety

Agenda

Topic	Participants
Opening Remarks	Linda Howell
Final Enforcement Action	Linda Howell
NRC Follow up Inspection Activities	Lee Brookhart
Path Forward	Linda Howell
Questions and Answers/Discussion	All Webinar Participants Michael Bloodgood, Facilitator
Closing Remarks	Linda Howell

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- Only in the event of technical difficulties with the webinar, a telephone bridge line will be used:
  - –Bridge Number: (800) 369-1771
  - –Passcode: 7382934
  - –Link to NRC Spotlight web page: https://www.nrc.gov/reactors/operating/ops-experience/songs-spec-insp-activities-cask-loading-misalignment.html

Predecisional Enforcement Conference

- Held on January 24, 2019
- Discussed two apparent violations, safety significance, root causes, and corrective actions

SIGNIFICANCE = "Severity Level"

SEVERITY LEVEL – I
(most significant regulatory concern)

SEVERITY LEVEL – II
(very significant regulatory concern)

SEVERITY LEVEL – III
(significant regulatory concern)

(Escalated Enforcement)

(Non-Escalated Enforcement)

SEVERITY LEVEL – IV
(less significant concern, but more than minor)

Civil Penalty Assessment

- NRC Enforcement Policy Considers:
  - –Enforcement history
  - –Whether the licensee identified the issue
  - –Adequacy of corrective actions

Violation No. 1
Loss of Redundant Drop Protection Features

10 CFR 72.212(b)(3) requires, in part, that each cask used by the general licensee conforms to the terms, conditions, and specifications of a Certificate of Compliance. The spent fuel storage system's Certificate of Compliance requires that the canister be lifted and carried with redundant drop protection features to prevent uncontrolled lowering of the load.

Violation No. 1
Loss of Redundant Drop Protection Features

- S v r t / L v I Vi t
- $116,0 vi Pe y

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Violation No. 2
Failure to Make Required Notification to NRC

10 CFR 72.75(d)(1) requires, in part, that each licensee notify the NRC within 24 hours after the discovery of events involving spent fuel in which important to safety equipment is disabled or fails to function as designed when required to mitigate the consequences of an accident and redundant safety equipment is not available.

Violation No. 2
Failure to Make Required Notification to NRC

- Severity Level III Violation
- No Civil Penalty

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Licensee Response to NRC's Enforcement Action

Southern California Edison has three options:

- Accept the violations and pay civil penalty
- Deny the violation(s) or severity levels
- Protest civil penalty in whole or in part

NRC Follow-up Inspection Activities

- To Determine If:
  - –Root and contributing causes were understood
  - –Extent of condition and extent of cause were identified
  - –Corrective actions taken to preclude reoccurrence were effective

Licensee Causal Evaluations

Four causal evaluations performed by Licensee:

- Root Cause for Downloading Incident
- Apparent Cause to Assess Licensee's Oversight
- Common Cause Evaluation
- Root Cause for Reportability

NRC determined that the evaluations were of adequate depth and breadth; however, two weaknesses were identified.

Causal Evaluations Weaknesses

- Inadequate changes to Executive Oversight Board process
- Issues with Radiation Protection were not formally addressed in causal evaluations

Corrective Actions

- **From the Four Cause Evaluations:**
  - Total of 71 Corrective Actions
  - Total of 9 Corrective Actions to Preclude Repetition
  - Total of 8 Effectiveness Reviews

- **NRC Assessment:**

The corrective actions were comprehensive to address and prevent reoccurrence; however, six corrective action weakness were identified.

Corrective Actions

Subject Areas

- Procedures Changes
- Personnel Enhancements
- Equipment
- Training
- Corrective Action Program
- Demonstrations
- Reportability
- Special Inspection Follow-up Items

Procedures

- **Licensee made changes to spent fuel handling procedures**
  - Critical steps with specific criteria
  - Clearly defined personnel roles, responsibilities, and qualifications
  - Load monitoring equipment enhancements
  - Additional required personnel during downloading

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Corrective Action Weaknesses

- Downloading Procedure
  - –Lacked contingency steps for equipment failures
  - –Incomplete criteria for suspending downloading operations
  - –Incomplete steps to maintain seismic qualifications during cask transport from fuel building to the storage pad

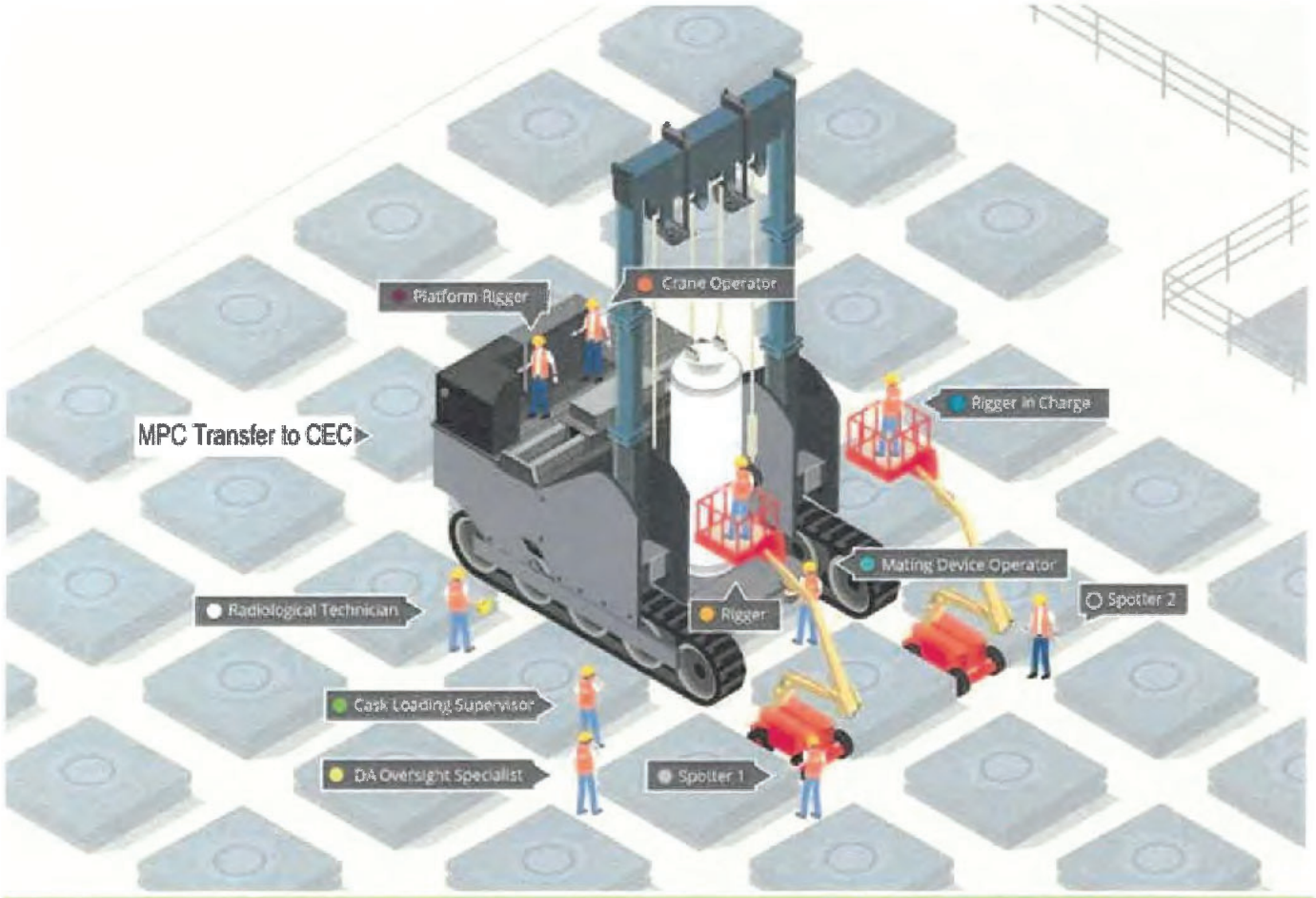
Personnel Enhancements

Previous Personnel on the Storage Pad

- Vertical Cask Transporter Operator
- Spotter in lift basket

Revised Personnel on the Storage Pad

- Vertical Cask Transporter Operator
- Vertical Cask Transporter Platform Rigger
- Rigger-in-Charge in lift basket
- 2nd Rigger in 2nd lift basket
- Cask Loading Supervisor
- Licensee Oversight Specialist
- Radiation Protection personnel
- Two Vertical Cask Transporter spotters
- Mating Device Operator



Revised Downloading Personnel 21

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Rigger-in-Charge &
2nd Qualified Rigger

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Load Indication Enhancements

Previous Monitoring

-
-

Revised Monitoring

-
-
-
-
-
-

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Load Information Displayed on Tablet

25

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Camera above Transfer Cask

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Corrective Action Weakness

- Improper classification of new equipment
  - Intermediate slings and devices
- Inadequate procurement of Important to Safety equipment
  - Load cell devices

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Training

- Developed SONGS specific spent fuel training programs and training procedures
- Revised training program for SONGS Oversight Specialists
- Revised Corrective Action Program training
- Developed event notification training

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Oversight

- Revised contractor oversight procedures
- Dedicated additional SONGS oversight personnel for contractors

NRC identified a weakness regarding maintenance procedure review

Corrective Action Program

- Holtec project personnel work directly under SONGS Corrective Action Program
- Established a full-time Quality Assurance Manager Position
- Training conducted to emphasize use of a low-threshold for initiating corrective action process

Demonstrations Observed by NRC

- Demonstrated moving transfer cask from fuel building to storage pad
  - HI-PORT operations
  - Vertical cask transporter operations
- Demonstrated simulator canister downloading
- Demonstrated simulator canister uploading
- Demonstrated revised fuel building lifting operations

Transfer Cask on HI-PORT to Storage Pad

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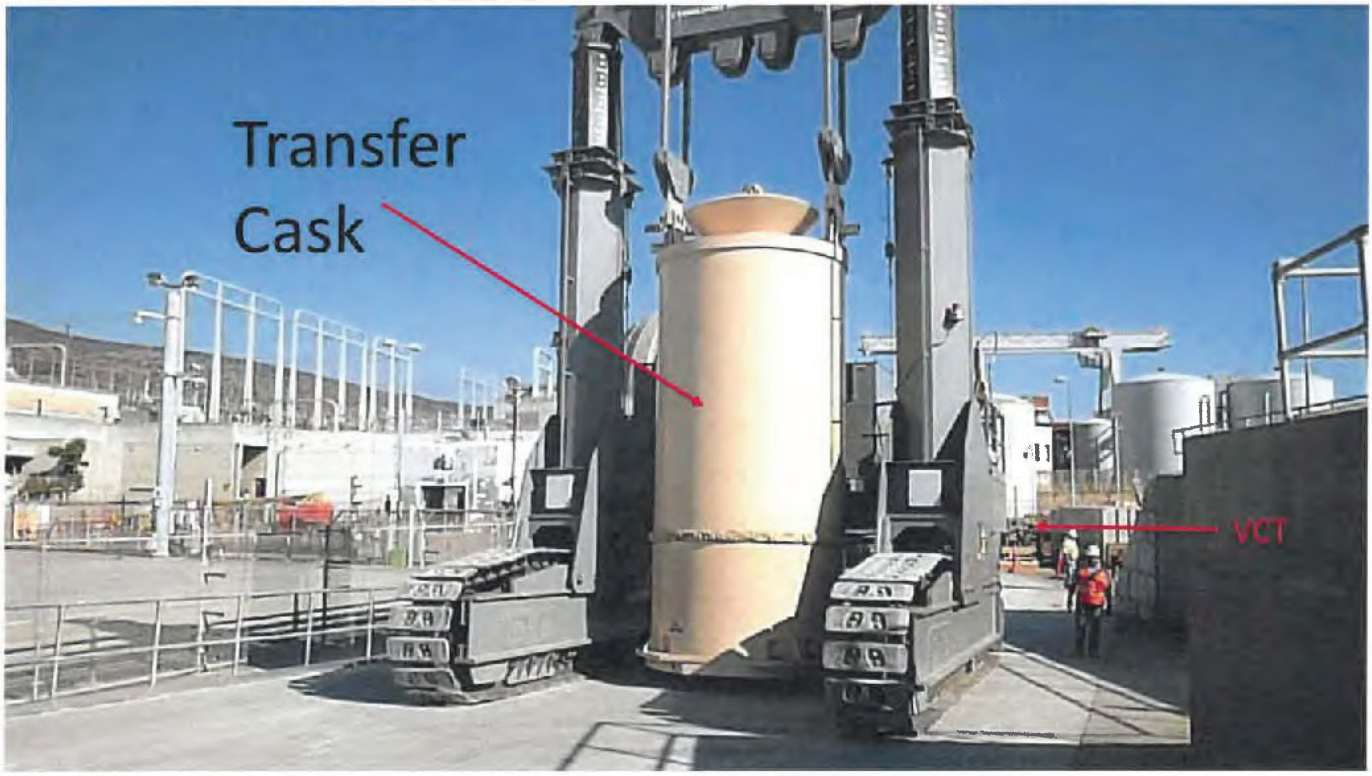
Vertical Cask Transporter Operations



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Downloading

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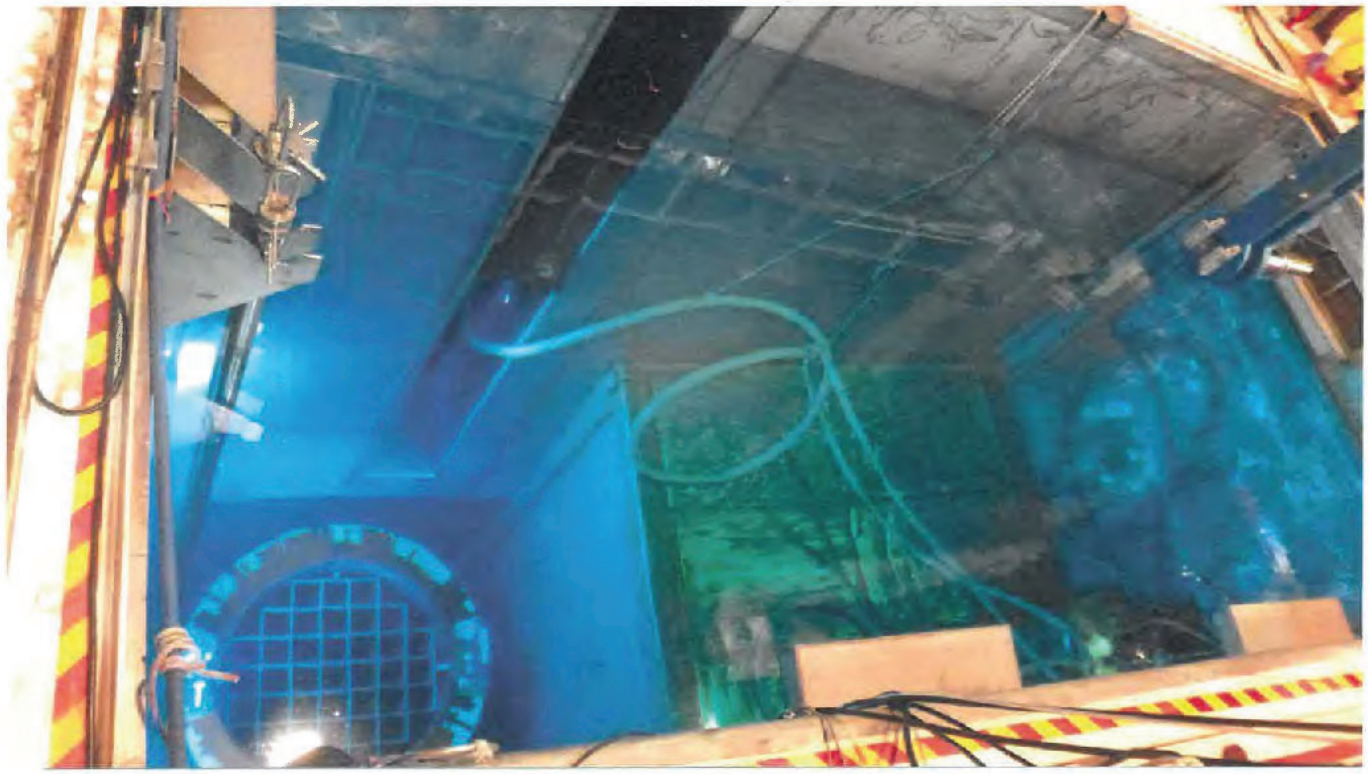
Fuel Building Operations



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Corrective Actions Weakness

- Removal of restraint band from HI-TRAC invalidated seismic analysis

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Reportability

- Revised Notification Procedure to have a conservative bias
- Developed Reportability Training for Managers and Regulatory Affairs personnel
  - Identify reportable events
  - Identify Important to Safety components
  - Identify potential failures or deviations that require NRC notification
- Biennial Refresher Training

Special Inspection Follow-up Items

- Drop Evaluation
  - Canister integrity maintained
  - Fuel damage would likely occur
- Scratch Evaluation
  - Inadequate to support change to Final Safety Analysis Report
  - Several calculation errors

Path Forward

- Corrective actions implemented for causal factors and issues identified during Special Inspection
- Outstanding issue is the assessment of ongoing licensee analyses and process used to change the Final Safety Analysis Report (FSAR)
- Enhanced inspection oversight continues
- Licensee continues to suspend fuel loading operations until analysis is complete and NRC has reviewed the results

NRC Webinar
San Onofre Nuclear Generating Station

BREAK IN SESSION
RETURNING SHORTLY

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Questions and Comments

Facilitator: Michael Bloodgood

Participating via Webinar:

- Type your name, affiliation, and your question into the webinar QUESTION box. The facilitator will pose questions from the QUESTION box to the NRC presenters.

Present in Arlington, TX:

- Raise your hand to get the facilitator's attention. Please state your name and affiliation clearly into the microphone before posing your question or comment.

Feedback, Questions, and Comments

https://www.nrc.gov/public-involve/public-meetings.html

CONCLUSION OF WEBINAR

EXHIBIT 13

WEBINAR TRANSCRIPT

This document provides the transcript from a public meeting (webinar) that was held on November 8, 2018, to discuss preliminary observations of an NRC special inspection that was conducted at San Onofre Nuclear Generating Station in September 2018. The inspection was conducted in response to a situation that resulted in the misalignment of a multi-purpose canister loaded with spent fuel at the San Onofre Nuclear Generating Station.

Hosts of Webinar:

Troy Pruett, Director
Division of Nuclear Materials Safety
Region IV

Patricia Silva, Chief
Inspection and Operations Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards

Eric Simpson, Health Physicist
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety
Region IV

- This is Troy Pruett, with the NRC
in Region IV, and we're going to commence today's webinar
on the results of the San Onofre special inspection.
Thank you for joining the webinar.
NRC speakers will present information related
to the August 3rd, 2018 misalignment
of a multi-purpose canister loaded with spent fuel
at the San Onofre Nuclear Generating Station.
This is the NRC Region IV's first use
of the webinar format to provide information
to the public on a special inspection.
There's are pros and cons
for conducting a webinar public meeting
in place of a face to face meeting.
Ultimately, we decided that the large number
of people from across the United States
that were interested in learning more
about this event made the webinar the best option.
During the webinar, we will present information
explaining photographs and bullets shown on the slides.
The photos we are referencing today are
from downloading operations that occurred prior
to the August 3rd event.
The slides are also available from the webinar handout tab,
as well as the NRC Spotlight Section
on the NRC public webpage at www
.NRC.gov.
From the Spotlight Section, click
on SONGS Cask Loading Issue, and from there,
you'll see a variety of documents available for your review,
today's slides being one of the options.
During the presentation, you may submit written comments

and questions via the webinar chatroom feature.
NRC staff will collect items, and refer them
to today's panel, the NRC panel will answer questions
and respond to comments as time allows.
The webinar is scheduled to end at 5:00 p.m. Central Time,
or 3:00 p.m., Pacific.
If, for some reason, the NRC loses internet connectivity,
we will dial into a telephone bridge line,
and continue the presentation.
The backup bridge line may be reached
by dialing 888-
469-
1677,
and the passcode is 247-
1451.
And again, we will only use this bridge line
if the internet connection
for the NRC fails during the webinar.
We are recording the session today,
and plan to make the video publicly available.
Today's NRC panel has three members,
myself, Troy Pruett, and I'm the Director
of Nuclear Materials Safety in Region IV.
The Region IV office is located in Arlington, Texas,
and my division oversees the inspection activities
at San Onofre.
Also on the panel is Eric Simpson.
Eric is the Special Inspection Team Leader
for the event we are presenting today.
Eric is also an inspector in NRC Region IV.
We also have Patty Silva, Patty is a Branch Chief

from the Division of Spent Fuel Management,
in our headquarters office in Rockville, Maryland.
Patty was also a member of the Special Inspection Team.
Patty joined the panel to provide responses
to some of the questions or comments you might have
that are beyond the scope of Eric's special inspection.
Supporting our presentation,
we have technical staff monitoring the chatroom
for questions and comments,
and communications staff monitoring
and adjusting the audio and video.
Via, our webinar capability will only host up
to 500 participants,
and my staff has communicated
to me that we have hit the 500 registered limit,
and so, just as a reminder, if you encounter somebody
that's not able to log in to the webinar today,
remind them that the presentation will be publicly available
after the meeting, once we get the recording transcribed,
and posted to the public webpage.
So Eric will provide most of the information
regarding the misalignment event at San Onofre.
Eric will begin with background information
on the independent spent fuel storage installation
at San Onofre, he will then provide an overview
of a typical downloading operation.
By downloading, I mean the operation
that lowers the multipurpose canister into the storage vault
at the independent spent fuel storage installation.
Eric will then cover what happened on August 3rd, 2018,
during the downloading operation.
After he explains the event,

Eric will outline the NRC's regulatory concerns,
and our next steps.
While the misalignment event at San Onofre is serious,
at no time was there an actual load drop,
and at no time was there a release
of radioactive material from the multipurpose canister.
Once Eric has completed his presentation,
the NRC panel will begin responding
to questions and comments, when multiple questions
and comments on a similar topic are received,
the NRC staff monitoring the chatroom will provide
the panel a representative question or comment.
I'll now turn the presentation over to Eric.
- Good afternoon, I am Eric Simpson,
a Dry Fuel Storage Inspector of the NRC Region IV office,
here in Arlington, Texas.
Before we discuss the August 3rd event at San Onofre,
I would like to acknowledge the other members
of the NRC Special Inspection Team
that are not sitting on the panel with us today,
those members being Marlon Davis, NRC Headquarters Inspector
for the Division of Spent Fuel Management,
Chris Smith, a Region IV Engineering Inspector,
my Branch Chief, Dr. Janine Katanic, and Mr. Lee Brookhart,
our Senior Dry Fuel Storage Inspector, who has been working
behind the scenes throughout our efforts.
Let's start with an overview of the
San Onofre Independent Spent Fuel Storage Installation.
You will hear me refer
to Independent Spent Fuel Storage Installations as ISFSIs
for short throughout this webinar.

What you see is an overhead schematic
of the San Onofre ISFSI, north is to the left,
which places the Transnuclear horizontal ISFSI
on the eastern side, and the Holtec UMAX ISFSI
on the west, or bottom of the map.
The design is a horizontal storage module.
San Onofre has 63 horizontal storage modules
on this eastern ISFSI pad, 51 of which are loaded
with spent fuel in Unit One reactor waste,
the other three are empty, to the west
of the horizontal ISFSI is the Holtec UMAX ISFSI,
spent fuel is stored in stainless steel canisters
called multipurpose canisters, or MPCs.
Today we will refer to the MPCs simply as a canister.
The canisters are stored vertically
in the UMAX ISFSI vault.
San Onofre has room for 75 canisters in its UMAX ISFSI.
San Onofre had about 2,668 spent fuel assemblies stored
in its unit two and three spent fuel pools.
Currently, about 40% of the spent fuel has been transferred
to the UMAX ISFSI.
This photo shows what it's like looking down
into a UMAX storage vault, what you see are the features
of the divider shell,
we will discuss this in more detail later,
but for now, make a note of the shield ring.
During the August 3rd event, a portion
of the canister was resting on the shield ring.
San Onofre personnel and Holtec contractors failed
to note the misalignment, and that the weight
of the canister was no longer being supported
by the important-to-safety lifting equipment.

This photo shows a Holtec canister.
Spent fuel is placed into a canister
while it is inside the transfer cask.
The transfer cask is then placed
to reduce radiation exposures to workers,
and it is also used to help move the loaded canister out
onto the ISFSI pad.
This photo shows a shield cone.
After loading, the canister of spent fuel contents are dried
and welded shut, the shield cone is installed
on the canister as an additional help
to reduce radiation dose to cask storage workers.
The green slings are for retrieval
of the shield cone after the canister has been lowered
into the storage vault.
The yellow slings are important-to-safety, and are intended
to hold the canister weight during downloading operations.
This photo shows the flat bed transporter
with a transfer cask meeting up
with the vertical cask transporter.
The transfer cask, with the canister inside,
is moved from the fuel building
to the ISFSI pad used in a flatbed transporter.
A vertical cask transporter is used
to move the transfer cask into position
on the ISFSI pad, the vertical cask transporter is also used
to align the transfer cask and the canister
for downloading operations.
This photo shows the mating device used
to connect the transfer cask to the ISFSI vault.
The mating device has a hydraulic door

to allow access from the transfer cask into the ISFSI vault.
As you can see, the mating device is open in this photo.
This photo shows the vertical cask transporter being aligned
to the mating device,
the vertical cask transporter is positioned
over the mating device, properly aligned,
and then they're bolted together.
The mating device door is closed during this process.
This picture shows the spotters,
those are the people in the lift baskets,
pulling the slings through the sheaths
on the vertical cask transporter crossbeam.
The important-to-safety yellow slings are connected
to the canister through lift cleats in the shield cone,
and anchored to the vertical cask transporter.
This photo shows the canister ready for downloading,
the vertical cask transporter lift beam has been raised,
and the full load
of the spent fuel canister is being suspended.
The mating device door is open,
allowing the canister to be downloaded into the ISFSI vault.
So, what exactly happened on August 3rd?
This slide shows a schematic of the ISFSI pad,
and the location of the low dose waiting area.
The slide also shows a photo of the view from that location,
as you can see from the photo to the right,
the low dose waiting area has an obstructed view
of what is happening out on the pad.
Before downloading, all oversight staff,
other than the spotter
and the vertical cask transporter operator, are moved
to the low dose area.

From this position, none of the management
or supervisory oversight staff from San Onofre
or Holtec could observe the downloading of the canister.
San Onofre oversight staff did not have radio headsets,
and did not monitor communications
between the cask loading supervisor, spotter,
and vertical cask transporter operator.
This slide shows photos of the vertical cask transporter,
and the control panel.
The vertical cask transporter operator attempted
to lower the canister into the vault
by lowering the vertical cask transporter lift beam.
The NRC identified numerous deficiencies involving
the operation of the vertical cask transporter.
First, the training program did not ensure
the vertical cask transporter operator was capable
of performing the canister download.
Second, the vertical cask transporter operator is seated
behind shielding, and cannot see the canister being lowered
into the vault, third, cameras are not used
to aid the vertical cask transporter operator,
or oversight staff during downloading operations.
Fourth, the vertical cask transporter operator
did not monitor data available
on the vertical cask transporter control panel
during the download.
As a result, the vertical cask transporter operator
did not identify a decrease in hydraulic pressure,
which in and of itself is an indication
of a loss of mode condition.
Fifth, procedures did not provide adequate instructions

for the monitoring
of critical parameters during the download.
Lastly, the August 3rd event was the first time
for the vertical cask transporter operator
to download a spent fuel canister into the vault,
and no supervisory oversight was available
on the vertical cask transporter.
This slide shows a spotter in position
to observe the download,
the spotter was the only person capable of observing
the canister being downloaded during this event.
NRC identified numerous deficiencies involving
the spotter positioning, first,
the training program did not ensure the spotter was capable
of performing a canister download.
Second, procedures did not provide adequate instruction
for monitoring of critical parameters
during download processes.
Third, the August 3rd event was the first time
for the spotter to download a spent fuel canister
into the ISFSI vault, and no supervisory oversight
was available in the lift basket.
Fourth, no cameras were provided for management
and supervisory oversight to observe the download.
Fifth, once the downloading was in progress,
the spotter moved the lift to the side,
where he could no longer directly observe
the canister's progress into the ISFSI vault, and lastly,
the spotter did not know how
to determine the important-to-safety slings for slack.
Communications during the download were informal,
and failed to relay critical information,

for example, during the download, the spotter communicated
that the canister was four feet down.
Management and supervisor incorrectly believed
this meant four feet below the mating device, it did not.
The VCT operator fully lowered
the vertical cask transporter crossbeam, and communicated
that the canister was fully loaded, lowered into the vault.
A radiation protection technician noticed
the dose rates were significantly higher than expected,
and alerted the cask loading supervisor.
Station personnel observed that the slings were slack,
and that the canister was not downloaded.
At the direction of the rigger in charge,
at the direction of the rigger in charge,
the vertical cask transporter operator raised the lift beam
to regain load of the canister.
The canister was properly aligned,
and then lowered into the ISFSI vault.
The canister load was unsupported by lifting equipment
for approximately 53 minutes.
This slide shows a photo of the installed canister
in the ISFSI vault.
Before starting downloads of lowered canisters,
San Onofre trains staff using test equipment.
The training canister was smaller
than the actual canisters used at San Onofre.
The training canister provided about three quarter
of an inch more clearance, this made the lining
and lowering the training canister much easier
than would be experienced
during actual downloading operations.

Staff conducting downloading operations were not trained
on the differences,
when training does not match the actual conditions,
we refer to this as negative training.
During downloading operations,
San Onofre frequently experienced the bottoms
of canisters getting caught on the shield ring.
San Onofre never identified the misalignments
as conditions adverse to quality, consequently,
San Onofre never implemented actions
that would have prevented the August 3rd event.
On August 3rd, the canister made contact,
and rested on the shield ring, if you look closely
at the picture, you can see contact surface wear,
paint scrape, but no deformation of the shield ring.
San Onofre has not inspected the bottom of the canister,
their preliminary analysis indicates negligible wear
on the canister.
The NRC will evaluate San Onofre's analyses,
and San Onofre's plan to monitor the canisters,
as part of their Aging Management Program, when completed.
The NRC does not believe there is
an immediate canister integrity concern, so,
what's been done since August 3rd?
We'll look at San Onofre's activities since August 3rd,
then we'll look at NRC's actions.
We will discuss San Onofre's notification
to the NRC Operation Center, we'll briefly touch
on San Onofre's causal evaluations, and lastly,
we'll touch on San Onofre's proposed corrective actions.
The canister involved
in the August 3rd event was successfully lowered

into the UMAX ISFSI vault, we call this canister MPC 29
because it was the 29th canister loaded at San Onofre.
After MPC 29 was lowered into the ISFSI vault,
San Onofre immediately put a halt
to all spent fuel activities on site.
There was a spent fuel canister
that was being processed in a Unit Two Fuel Building,
that canister was fully processed, meaning it was dried,
helium back-fill operations were completed,
final welding of the closure rings were performed,
and it is currently in the Unit Three Fuel Building.
It is seismically restrained, it is placed
in a transfer cask, and this is a condition
that is acceptable for the canister,
and its spent fuel contents.
NRC's involvement, we were notified of the August 3rd event
on the afternoon of August 6th.
We then initiated daily oversight communications
between San Onofre, NRC headquarters,
and ourselves in the regional office.
On August 7th, San Onofre committed to an NRC review,
before resuming dry cask loading operations.
On August 17th, we decided to conduct a special inspection.
If you go to the Spotlight Section of the NRC website,
our charter is available for review there.
We arrived at San Onofre to initiate our special inspection
on September 10th, we were onsite the entire week,
reviewing procedures, records,
and talking with former and current employees.
The inspection continued offsite until we formally exited
with San Onofre on this past Thursday, November 1st,

which brings us to our findings.
We have two preliminary violations
that are being considered for escalated enforcement,
those being a preliminary violation
for the event itself, San Onofre's license requires
that during downloading operations, the canister, MPC,
be handled with redundant drop protection features
to prevent uncontrolled lowering of the load.
Contrary to the requirement, during MPC transfer,
when loaded with spent fuel, the licensee failed to ensure
the lifting equipment had redundant drop protection features
to prevent uncontrolled lowering.
Specifically, San Onofre inadvertently disabled
the important-to-safety downloaded slings,
when personnel lowered
the vertical cask transporter crossbeam
to the fully seated position, while the MPC was suspended
by the shield ring, approximately 18 feet
above the fully seated position in the vault.
The second preliminary violation being considered
for escalated enforcement is the notification requirement.
10CFR
72.75(d)(1)
requires
that a licensee notify the NRC
within 24 hours when important-to-safety equipment
is disabled, or fails to function as designed.
Contrary to the requirement, San Onofre failed
to make proper NRC notification
of the August 3rd event to the NRC Operation Center,
until September 14th, they were prompted by us
to make the required notification during our inspection.

We are also considering three preliminary violations
of lesser severity level to San Onofre,
a violation for inadequate procedures, a violation
for failing to acknowledge conditions adverse to quality
for entry into the site's corrective action program,
and a violation for inadequate training
of personnel operating important-to-safety equipment.
It is important to note
that management oversight weaknesses contributed to each
of the preliminary violations being considered by NRC.
Southern California Edison
and Holtec have both performed causal evaluations related
to the August 3rd event.
Preliminary root and apparent causes are lack
of adequate procedures, lack of adequate training
to support the procedures, lack
of adequate licensee oversight of contractor activities.
Some of the preliminary corrective actions
at San Onofre revolve around enhancing
the training requirements, procedure enhancements,
and equipment enhancements to give more positive indication
of a loss of load condition.
San Onofre is also looking at improving its performance
in the oversight role.
NRC will perform an inspection at San Onofre
to fully assess its corrective actions,
prior to them resuming fuel handling operations.
A word or two about the event, and its significance.
San Onofre was not required to have a drop analysis
for this type of event because the license required
redundant drop protection features at all times.

That's why this misalignment event is so very significant.
San Onofre provided preliminary analysis
of a canister drop from 19 feet into the vault,
that analysis is still under review by NRC experts.
The San Onofre analysis document
that the canister must still maintain confinement,
and that no breach would occur, however,
the analysis does describe that some fuel assemblies
would likely fail, due to the drop.
However, the San Onofre preliminary analysis describes
that the canister would still be able to perform safely,
it would still meet all thermal, pressure,
criticality, and confinement criteria.
This part of the analysis is still under review.
NRC plans to issue its special inspection report
before the Thanksgiving holiday.
Next steps involve dispositioning
the escalated enforcement findings,
which means moving through the NRC enforcement process,
along with San Onofre,
to disposition with preliminary violations
and severity levels to be assigned.
The timing of that process begins
once we issue the inspection report.
Having moved through the events of August 3rd,
and having discussed NRC and San Onofre's next steps,
I'll hand the presentation back over to Mr. Troy Pruett.
- Thank you, Eric, I'm going to,
I'm going to pause for just a second, and,
and ask a couple of questions to you.
- Okay.
- That, that we've been receiving through the chatroom.

- All right.
- One of the questions involves redundant drop protection,
and so what was the redundant drop protection?
- Okay, as I mentioned earlier in the presentation,
I pointed out two yellow slings,
each of those slings can fully support the weight
of a loaded canister, that is to say,
the weight of a loaded MPC, and since there are two slings,
that counts as redundant drop protection.
Again, they can both completely support the weight
of the loaded MPC, if one fails,
the other one is there to provide that redundant protection.
- Right, so Rachel, could you pull up slide 10?
- There we are.
- Right, so slide 10 is the picture
of the shield cone, and as Eric mentioned earlier,
there's a photo there showing the two yellow slings,
that is the redundant drop protection, so.
- Yes, and the event revolves
around inadvertently disabling both of those slings
by having the crossbeam in the fully lowered position,
while those slings were completely slack.
If there had been, in the event of a drop,
those slings would have been rendered completely incapable
of stopping that drop.
- And then there were another set of questions, was,
just, just how much does one of these canisters weigh?
- Well, they're analyzed to weigh up to 113,000 pounds,
but I think the MPC in question was roughly
around 100,000 pounds, so 50 tons.
- Okay, and then, and then

about how many fuel assemblies does the canister hold?

- Each fuel, each MPC 37, as named,

will hold 37 spent fuel assemblies.

- Okay, thank you, so I'm going to,

I'm going to conclude the, our meeting presentation,

and then we still have some more questions that my staff

that's monitoring the chatroom is sending me,

and we'll jump into the questions in just a minute, so.

So I bet the take aways are,

this event could have been prevented

with effective management and supervisory oversight

of important-to-safety operations performed at San Onofre.

Management oversight weaknesses led

to inadequate training of the staff,

the failure to provide appropriate procedures,

not identifying and correcting conditions adverse

to quality, and not providing appropriate supervision

at job sites, these deficiencies converged

on August the 3rd, resulting in a failure

to provide redundant load drop protection,

during the downloading of a spent fuel canister.

As a result, the NRC has increased the regulatory oversight

at the facility to ensure that the root

and contributing causes are understood,

and that the corrective actions will prevent another loss

of load event, so with that,

that's going to wrap up our formal part of the presentation,

and we're going to transition into responding

to the questions and the comments

that we're receiving in the chatroom.

So one of the,

or many of the questions

and comments involve the retrievability of a canister.
And I know, Patty, this was something we talked
about yesterday, would you like to touch on what the,
is a licensee required to be able to retrieve a canister,
and maybe Eric, you can jump in if you,
if you hear something that needs to be said.
- Well, if you like, I can start off
on this, and-- - Okay, all right.
Fair enough. - Well, 10CFR72
.122(l)
requires that storage systems must be designed
to allow ready retrieval of spent fuel,
high level waste, and reactor related grade
and class C waste for further processing of disposal,
and each licensee must demonstrate the ability
to retrieve a canister, for taking back
into the spent fuel pool, if it's available.
And licensees are also required to demonstrate the ability
to cut open a canister to allow them access
to the spent fuel contents inside.
Now, saying this, I will tell you all that each licensee,
generally, does not have to display the ability
to cut open a canister, we allow for the vendor
to demonstrate the ability to cut
that canister open at their facility, the belief being
that if the licensee ends up in the position
where they have to retrieve a canister,
and take it back into their spent fuel pool,
the vendor can provide them
with the equipment to cut that canister open.
And Holtec has demonstrated

that they can cut open an MPC 37, or an MPC 89 canister,
which are other types of canisters
that are licensed for storage in the UMAX vault.
- And then, and then, Eric, I'm going to send this question
to you, as well. - Okay.
- Was there actual damage to the canister in question?
- We don't believe there was damage
to the canister in question, or at least not to the extent
that its safety features are being disabled, however,
we think that the Aging Management process will be able
to go in and inspect these canisters
because San Onofre is part of the Aging Management,
we will be inspecting the canisters for degradation,
beginning within five years.
- And what, if this canister really dropped,
as a result of this misalignment event,
what do you perceive the consequences would have been?
- Well, as it stands now,
we do not believe the canister would have been breached.
It would have ended up being a question of the contents.
If the contents were designated as undamaged fuel,
certainly everybody who's been looking
at these drop analyses pretty much concedes
that the fuel inside the canister will no longer meet
the criteria of undamaged fuel.
It would end up being a question as to whether we,
they want a license amendment to allow them
to remain in the stored position,
and damaged fuel, or whether or not we would be asking them
to retrieve the canister to remove the spent fuel contents,
to repackaging in a damaged fuel canister.
- Okay.

And isn't, isn't the August 3rd event exactly
the same as the event that happened in July?
- It is not, the event that happened in July,
one of the reasons I think that it did not make its way
into the corrective action program is
because I think that they believed
that during that entire extended time it took them
to download the MPC into the UMAX vault,
for the record, there was an event on July 22nd, where
San Onofre experienced an abnormal delay
in downloading operations, what should have
taken 15 minutes ended up taking an hour and a half
because they failed to get the MPC properly aligned
for downloading for over an hour and a half.
Again, this should have taken place
in 15 minutes or less, during that time,
never was the MPC, or the canister,
not suspended by the slings, every time they attempted
to download, they caught the loss of load condition.
The VCT operator actually caught the loss
of load condition using his monitoring devices
on the vertical cask transporter screen, something
that did not happen on August 3rd, where the VCT operator
was not monitoring these proper parameters
on his vertical cask transporter screen.
So they were always within procedure during this event.
We feel, however, that the event being captured
in what was known as a production traveler,
it should have also been recorded,
and it's part of their corrective action program.
So at no point were the redundant safety features

completely disabled for the July 22nd event,
and they were always in procedure during that event.
- So perhaps you can clarify what we mean by disabled.
So the slings, I mean, the slings were always okay.
- The slings were always okay.
- So what do you mean by a disabled sling?
- What I mean by disabled sling, well,
I wish I had a picture, that you guys could look at it.
Well, if you refer to the picture
that's being displayed on the webinar right now,
you see the MPC is being suspended
by two yellow slings, now,
when those slings are no longer supporting the load,
it's called a slack condition, to use the parlance
of the Holtec procedures.
During the downloading event of July 22nd,
they never completely lost the load from the slings.
- Just a second, Rachel, let's try slide 16.
- Yeah, there we go, so the slings were always supported
in the load for July 22nd event.
Contrasting that event, we don't actually have a picture
of what happened on August 3rd,
but if you can visualize with me,
on August 3rd, the crossbeam that you see
in that picture there was all the way down
in the completely lowered position,
and the slings on either side of that high track canister,
they were completely bunched up on the ground,
supporting no load whatsoever.
And at that time, that MPC was resting
on the shield ring on top of the divider shell inside
of the ISFSI vault.

If that MPC had slipped, or the canister had slipped somehow
because of vibration, or some other mechanism during
that time, those slings, in the completely slack
and bunched up position, were in no condition
to capture and arrest that drop.
That MPC would have dropped to the bottom
of that canister with no slings being enabled
to suspend the load.
That's really what I mean by the July 22nd event.
On the July 22nd event,
the slings were never rendered completely disabled.
- Okay, thank you for that clarification.
And then, earlier you had talked
about a Aging Management, the Aging Management Program.
Patty, is that something you want to talk to?
- Sure. - Okay.
- So Aging Management Program is required upon 20 years,
upon the 20 year license renewal of the storage system.
The licensee's Aging Management Program requires
it will inspect during the, requirements will be inspected
during NRC's routine inspections.
Some licensees have performed in-service inspections
of their canisters as part
of the license renewal applications,
also the Electric Power Research Institute studies
on methods for inspecting,
and through implementing Aging Management Programs.
No breaches of canisters have been identified,
no chlorine induced stress corrosion cracking
has been identified.
So that's the Aging Management Program.

- For, oh, when you, might have, no indications
of cracking have been identified,
that's during the non-destructive exams at other facilities?
- Correct, that's, they usually use
what they call a crawler with a camera, usually,
or other NDE, non-destructive evaluation equipment.
- Okay, thank you for that,
and I think you heard Eric mention earlier that San Onofre
is a little bit different than the rest of the industry.
So other utilities have
to initiate an Aging Management Plan, as part
of license renewal for the ISFSI, which occurs at year 20.
San Onofre actually has an agreement
with the California Coastal Commission,
and they're actually required
to submit their Aging Management Plan for review
by the state, I think it's by 20--
- November, 2020. - November of 2020.
So that's an important distinction at San Onofre.
And then, just to clarify, for the August 3rd event,
there was no damage to any of the fuel assemblies
and the canister,
and there was no damage to the canister itself.
And then we, and we have also had several questions
regarding the drop analysis, and so,
just to clarify one more time what Eric said,
San Onofre was not required by their license
to have a drop analysis
for this condition
that existed on August 3rd, so they're not required
to analyze for 18 foot drop of a canister.
And the reason for that is, is that their license requires

that they provide redundant drop protection
throughout the movement of a canister.
And that's what makes this event so serious, is that,
is that not only did they lose one method
of drop protection, they lost all methods
of drop protection,
so that's what makes this event so serious.
The corrective actions coming out of this will be to,
to beef up the controls at the site to ensure
that they don't lose redundant drop protection
in the future,
and Eric touched on a few of those earlier,
but there are many procedural enhancements
that are taking place, there's additional training,
the workforce that's taking place,
the standards for job site presence by supervisors
and managers and quality assurance are all being revised,
and then there's actually some engineering changes.
- Yep. - That are being considered.
I think there's a possible addition
of a load cell indicator. - Correct.
- And I think there's a couple of more.
- Oh, yeah, they're talking about having alarms
in place when a certain loss of load condition is met,
an unambiguous alarm that will let everyone know
that you need to come back up on the beam
to regain load, they also have cameras
that they're investigating using to assist in the process.
And there's some even somewhat lower tech methods
they're using to make sure, but they are putting
in place procedure enhancements and equipment enhancements

to sort of ensure that they never end up
in this situation again.
- All right, and still more clarifications
on the drop analysis, so when we said,
I think you said, clearly the fuel inside the canister
would no longer meet the undamaged criteria,
but, so, so we're going to have damaged fuel.
What do you mean when you say damaged fuel?
- Well, what I mean, technically damaged fuel is fuel
that, it cannot be moved by normal means.
You can't grapple it with a regular spent fuel
tool, and move it about,
is essentially what it means, I mean--
- I don't think-- - That's about all I--
- I don't think we believe there would be
a complete disintegration of the fuel assemblies,
there would be some rupture of the cladding,
there could be some pellets that are released
in the lower portions of the fuel assembly,
but not a complete destruction
of the fuel assemblies within--
- No, no, not at all.
- And we don't believe there was damage
to the fuel assemblies
because the canister was slowly lowered when it made contact
with the shield ring, and was resting on the shield ring.
So there wasn't a drop of the canister,
such that it made an impact that would have caused damage
to the canister, or the fuel ...
- No, no, not in this unit.
- So Eric, I keep calling on you, but.
- That's fine.

- But how about a little more specificity on the,
when we issued the report, what kind
of timeline are we on for, between today
and let's say the final enforcement action
that might be taken?
- Oh, my goodness, I don't have any sense of that at all.
We enter into the enforcement process,
I think the first bar that needs to be crossed is, I think
San Onofre has to answer as to what route they want
to take with this enforcement action within 30 days--
- All right, I'll help you out,
you want me to help you out with it?
- Yes, please.
- I'll help you out a little bit.
Okay, so, so we have to, we had an exit meeting on?
- November 1st.
- November 1st, and so by our own procedures,
where we have to issue the inspection report
within 45 days. - That's right.
- So that would put us out the mid-December, worst case,
we're targeting some time before the Thanksgiving holidays,
we will issue the report with something,
something we call a choice letter,
and essentially they're going to have a choice of,
of coming in for an enforcement conference,
or for a negotiation
through the alternate dispute resolution process.
They'll have roughly 10 days to make that decision
on what they want to do at that point,
and then we will schedule whichever path
San Onofre wanted to take, the enforcement conference,

or ADR, from the time they make that decision
to the time we actually have that conference,
it's about another 30 days to get to that point.
And then it takes the NRC roughly two to four weeks
to issue a final action, following the conference.
And because we are considering escalated enforcement
for two of the preliminary violations,
that does mean that there is a possibility
of a civil penalty, but that's, that's two
or three or more months down the road,
before we're in a position to make
that final determination ...
Did I miss anything?
- Thank you. - All right.
So Eric, any thoughts on whether
or not this is a generic industry issue?
- Well, this issue, it would only have applicability
at one other site in the United States,
and that's the Callaway Nuclear Station out there
in Missouri because there are only
two Holtec UMAX ISFSIs currently licensed.
So, and I think we were out
at Callaway after this event happened,
and they were already putting corrective actions in place.
There was lots of supervisory oversight,
lots of licensee oversight at
Callaway because everyone was very much aware
of what was going on out at SONGS, so.
The existing body of affected users knows very well
what's going on, and they are very aware of
what they need to do to prevent it
from happening at their site.

- And, and
why was the NRC not notified,
following the event?
- Well, that's a very good question.
I believe that it came down to an interpretation,
and San Onofre simply didn't interpret the event the way
that we did because it took for us to prompt them
before they made the proper NRC notification.
And several times in conference calls
and other venues, we asked them, you know,
why aren't you making a notification?
And it took that prompting to have them to do it.
So I think it boils down to interpretation.
- And then we're, so there's a few more questions
on inspection of the canister itself.
Currently San Onofre is evaluating,
through engineering analysis, the, the,
what needs to be done, in terms of inspecting the canister,
or can they, or immediately, or can they do it as part
of the Aging Management Program.
And we're, we don't believe there's an immediate concern
with the canister, so there's time to allow San Onofre
to do the appropriate engineering review work here,
and then they will turn that, they'll submit
that back to the NRC, and we'll take a look at it,
to see if we agree, or if we think something else needs
to be done, in terms of inspection of that canister.
That's an item that's on our plate
for our future inspection, I think,
so in the future, we're thinking in December timeframe,
before fuel handling is resumed,

the NRC will send a team out, the focus
of that team will be to review the adequacy
of the root and causal evaluations
that have been completed by the licensee
to ensure that the corrective actions have been implemented,
and then to complete our review of the analysis
to support this canister in particular,
the inspection of this canister.
And I don't think, and so,
so fuel loading campaigns won't restart
until we've completed our inspection,
and that inspection won't occur until early December,
at the earliest.
Then there's several questions, Eric, on what,
what are the specific regulatory requirements?
So, like, for the, I don't know if we brought
that with us, so the--
- Regulatory requirements-- - 10CFR.
- Well, all the regulatory requirements exist
in 10CFR part 72, but in particular, what is--
- I think that's what they're looking for,
is the citation, so the failure,
the failure to report-- - Oh, that's,
failure to report is 10CFR, part 72
.75(d)(1), is the particular one we're,
we're considering escalated enforcement on.
- Okay, and the failure
to provide redundant drop protection?
- Well, that goes back to their original licensing.
They are a general licensee,
so that would have been part of the 10CFR 72
212-- - Body of--

- Regulations, I think 212(b)(3) is the one.
- Okay, but they actually had the,
what's referred to as a Certificate of Compliance.
- That's right.
- Which required them to implement provisions
under technical specifications.
- Exactly right.
- And the technical specifications themselves,
I believe that was,
it's Tech Spec 5-- - 5.2. whatever, yeah.
- In section 5.2 of the tech specs,
requires that they maintain redundant load drop protection
during movement of a canister,
that's the specific citations for the redundant load.
And then the procedures, corrective actions
and training program requirements all reside
in 10CFR part 72, there's a specific sub-paragraph
for each and every one of those.
- Yeah, and I can tell you those, that would be 72.150,
72 for the, for the procedure parameter,
72.190, the training requirements,
and 72.172 for the corrective action portion
of their violation.
- And there are some questions
regarding asking clarification
on how was the canister misaligned?
- Well,
and Rachel, if you could go back to the,
the slide that has the picture of the, looking down
into the ISFSI vault, I'd really appreciate it.
- You want this one, or you want--

- No, it's-- - This one?

- There we go. - Slide 8, Rachel.

- Slide 8.

All right, if you look down, at the picture we're looking at now, that's looking down into the UMAX ISFSI vault.

What you see there is a divider shell.

Now, when the MPC, or the canister is moving down into the divider shell, ultimately to rest at the bottom of that cavity,

there's very little clearance, there's about a quarter of an inch clearance on either side of the canister,

so thinking about it, you're putting a round peg in a round hole, but that hole is very close in diameter, the hole is very close in diameter to the round peg, so as you can imagine,

you have to have that round peg lined up pretty good to drop it right into that hole.

Now, luckily you have redundant drop protection that allows you to sort of manipulate things until you get things just right.

This violation revolves around inattentiveness.

They weren't paying attention to what they were doing,

so instead of paying attention, and getting that round peg lined up just so, and down into the hole,

they fell asleep at the switch,

and that round peg ended up resting on that divider shell.

- Figuratively. - Figuratively speaking.

- Right, and so,

and so how do they make the alignment adjustment pad, to get it perfectly centered?

- You know, the VCT operator is key to this

because once you get initial alignment,
there's still some manipulations you typically have to do
because the ISFSI pad isn't completely level.
There's a little bit of a grading of the ISFSI pad,
it's leaning a little bit in each direction
because you want rainwater to run off of it.
So the VCT operator oftentimes has
to position the VCT a little bit to the north,
or a little bit to the south, position a little bit
to the east, or a little bit to the west
to get it perfectly lined up, and in this case,
they thought things were proceeding smoothly,
and you need vigilance, you need the rigger,
or the spotter to be paying attention
to the MPC going down, and you also need the VCT operator
to be vigilant in looking at his indications
because he would notice a loss of load.
You've got two people there, and both
of them failed open in this case.
- So I think there might, Rachel,
there might be a better picture
that shows that alignment, I'm looking real quick.
Maybe slide,
let's try slide 16.
Right, and that kind of shows the stack up
of how, how, in the, the VCT rig,
and how the operator has to position
that entire rig. - That's right.
- To get it perfectly aligned--
- And also, this VCT, the operator,
he can make very fine adjustments

with the vertical cask transporter,
he can bump this thing a half inch,
an inch in one direction, a half inch,
an inch in another direction, you know,
he has a lot of degrees of mobility there,
where they can get these things aligned.
So if you have a good VCT operator,
and someone who's aware of what's going on,
you really shouldn't have a problem downloading these MPCs
into the ISFSI vault.
- Thanks for that, and Patty, are you able
to address chloride stress cracking corrosion, NRC?
If not, we can take it, or I'm trying
to give you a chance here. (overlapping)
All right, so the agency has evaluated the likelihood
of chloride induced stress cracking corrosion.
This is a longterm aging phenomena,
we do not believe it would occur within the first 30 years
of the life of the canister,
that's why we've imposed regulations
to require an Aging Management Inspection Program
to start at year 20.
And one of the specific concerns there is inspections,
non-destructive examination type inspections
that look for chloride stress cracking corrosion sides.
And to date, based on the inspections
that have been done in the industry, we have not encountered
any chloride stress cracking corrosion of a canister,
is that right, Patty? - That's correct.
- Eric, talk more about this canister number 30
that's stored in the Unit Three Fuel Building,
is that allowed? - Yes, it is allowed.

It is an analyzed condition, as they say,
and they can store it indefinitely
in the transfer cask because it's cooled, it is able
to maintain its thermal stability in
that configuration, and it's fine.
- And this actually, this question came
in both during today's webinar, but it was also submitted
through a participant, ahead of the webinar,
and one of the technical staff did some more research on it.
It's actually,
the canister, in a transfer cask, seismically restrained
to the fuel building wall,
is an acceptable condition at San Onofre.
They, the bounding temperature profiles were used
to determine the impacts on the canister,
and the results of that evaluation are all published
in a publicly available section of the FSAR for,
or the Final Safety Analysis Report for San Onofre.
And the numerical results for thermal analyses,
and peak clad temperature, and pressures are all described
in the data tables that go with it.
So this is an acceptable condition for San Onofre.
Do you want to talk about radiation surveys?
- You want me to? - Yeah.
Rachel, can you pull up the slide
on the radiation surveys?
(background noise drowns out speaker)
- There is a schematic of a UMAX lid there.
- Right, so prior, prior to the webinar,
we also received a number of questions regarding
the radiation levels at the San Onofre ISFSI.

This is something, the licensee would periodically do their
own surveys of the ISFSI pad, and the individual vaults,
to make sure radiation levels are consistent
with technical specifications.
What this slide shows is the top of a,
of a UMAX vault, that's the closure lid.
We recently, I think it was two weeks ago,
we had some inspectors out doing
decommissioning inspection activity at San Onofre,
and we decided to perform independent surveys
of each and every ISFSI vault at San Onofre,
the surrounding fence, the beach area,
for those that live out there, the bluff above the ISFSI,
and the parking lot that's also up above the ISFSI.
Every, every reading we took on each and every vault was,
was at least an order of magnitude, if not more,
below the technical specification limit
for radiation levels in the ISFSI area,
and adjacent to the ISFSI, in addition,
San Onofre's required to submit an annual report,
radiological effluents report,
I'm getting a nod of agreement.
And, and they have reported
less than one millirem total exposure to the public,
that's the lowest value you can report in that document.
So again, it's,
the radiological issue of the ISFSI location
at San Onofre is not a significant concern.
- No.
- Not from the actual dose rates
that are present at the, at the site.
And then there's a lot of questions about,

well, what could happen to a canister,
would it be a significant radiological event?
And for an ISFSI, the radiological release concern,
it's a function of the likelihood of a zirconium fire,
and the likelihood of a zirconium induced fire
in a canister goes down, the longer the fuel decays,
the less of a chance there is of a zirconium fire.
These canisters were all helium inerted, so there's,
there's insufficient oxygen to sustain a fire.
And then the zirconium itself is in the wrong form
to support a fire, you really want, to have a fire,
you would want it to be in the powder type form,
and that's not what exists inside the fuel canister.
So again, in order to get that big release
that a lot of people are concerned about,
you really need to get that zirconium fire,
and that's just not a plausible event.
- Yeah, and all this fuel has been cooled
for at least five years in the spent fuel pools.
So you're well outside of the risk range
for a zirc fire event.
- And then I think it's,
and so there's a question on why doesn't
the NRC require realtime radiation monitoring, and,
and that's, so the NRC does require radiation monitoring.
- Right. - It takes place in the form
of exposure monitoring devices--
- TLDs. - TLDs that are,
that are connected to the fence surrounding the ISFSI pad.
So there is realtime radiation monitoring,
but there's not, the NRC doesn't require a,

a digitized type radiation monitoring system,
to where there's the detector,
that then converts that signal,
and then it goes up to a, to a wifi signal
to feed a webpage, or something like that.
The NRC does not require that for ISFSIs,
and I don't know why we don't, I speculate it's
because of a very low radiological hazard presented
by an ISFSI location in the first place.
- Yeah, and don't forget, also, Troy,
ISFSIs are passive mechanisms, they have passive cooling
of a spent fuel, the fuel is getting cooler
and less radioactive over time,
and there's an active surveillance requirement,
where you have to look at each
and every ISFSI vault every day to make sure
that the, the intake screens are clear,
and the outtake screens are clear.
So there's an eye on the ISFSI at all times,
every day, to make sure everything is still in place.
And the radiation monitoring is just added assurance.
- Okay, I'm going to, I'm going to take you back
to canister number 30 again, how is it cooled?
- Natural convection.
You know, all of the fuel in a spent,
in an independent spent fuel storage installation
is cooled naturally, by natural convection currents.
The helium transfers the heat to the MPC shell,
which is then, which is then taken
by the environmental air out into the atmosphere,
it's really simple.
- How does that work if it's in a transfer cask, though?

- The same mechanisms are in place.
- Okay. - In a transfer cask.
It is, you know, there's an annulus that allows heat
to go up, outside of the transfer cask.
- Just scrolling down now, one second.
So there's a question on, Patty, maybe I'll talk,
I'll give you a shot at this.
Can chloride stress cracking corrosion breach a canister
in less time than
the Aging Management Program would detect it?
- No, we don't believe it could.
Stress corrosion cracking takes awhile
to get to a canister, and
we don't think that would, it would.
- Yeah, so what Patty's saying is that the,
in short, the answer is no, it's a,
chloride stress cracking corrosion is a,
takes a long time to occur,
our studies suggest it would take more than 30 years.
Aging Management Programs start at year 20, and,
and that program requires
that the licensee determine the most susceptible containers
for the inspection.
And so we don't believe there would be cracking due
to stress, chloride stress cracking corrosion,
before we detected it was occurring.
(background noise)
I'm scrolling through the questions
that are being sent out to me.
Canister 30.
We do have questions on keeping spent fuel

at San Onofre, and the transfer of fuel
to a permanent nationwide waste storage facility.
- Yeah. - Permanent?
- Yeah.
- Or an interim consolidated--
- Either, something that moves it away from San Onofre,
is that something you can talk to?
- Well, we do have two,
two license applications in
For consolidated interim storage facilities,
one in New Mexico, and one in Texas,
they're actually right across the border from each other.
So we have to review those, those licensing applications.
So there is a possibility for movement there,
if that's what the licensee intends to do,
to move it off of the site.
- And I believe it would, we're still waiting
on some type of Congressional level action
to take place for a permanent repository
for high level waste. - Correct.
We do not have a permanent repository for disposal.
- I'm not sure, I don't think I have
the right people here today to talk about the--
- whistleblower protection?
- Yeah, do you?
I don't think we've inspected that,
you haven't, Eric, have you? - No.
- Yeah, so there's some questions
involving whistleblower protection,
and safety conscious work environment.
So the regulations still apply
and are in effect at San Onofre for,

for employee protection rights,
that would include whistleblower protection rights,
employees, and we do go out,
I don't have the right inspectors up here today
to talk about our last inspection
of the safety conscious work environment program
at San Onofre, but employees do have the right
to bring forward safety concerns, and not be retaliated.
And if they, if they feel that the licensee
has been unresponsive to their concerns,
or they think they've been retaliated in some manner
for raising a concern, they can always reach out to the NRC,
they can call our Headquarters Operations Officer,
they can call anyone in the regional office.
We'll capture that concern, we'll enter it into our process.
So that's always an option for them, that you
could even call our Office of Investigations directly,
if that's what they wanted to do,
if they didn't want to talk to an NRC inspector.
So there's a number, number of pathways, we take those
in the mail, telephone, email, anonymous,
a person's name attached to it,
any form, we'll take that, then we'll,
we'll either inspect it or investigate it as is appropriate.
Okay.
Right, now I'm scrolling through the questions
that are coming in.
- Did I see one about a criticality analysis or--
- That is there, what's the chance of a criticality of?
- Well, the licensee actually provides information
about a criticality event, and in the absence

of water in the cask, and along with the,
with the boron impregnated lattice structure
in the canister, criticality is, cannot happen
in a dry cask, in a dry fuel storage canister.
It is just, you can't get there.
k-effective is so low,
you can't get the multiplication of neutrons,
without water, and with the boron, again,
and the lattice structure of the canister, it's impossible.
- Okay, and there are some followup questions regarding the,
it's with the opening of a canister, once it's been,
once it's been put in a vault,
and then taking it back out and whatnot, that's something,
if a canister had to be opened, or repackaged,
that's not something that's going to take place very quickly.
The first step would be for the licensee
to establish a safe environment
to transfer that canister to, it could be,
most likely it would be a hot cell of some sort,
so if you're at a fully decommissioned facility
where there's no structures left,
like San Onofre will be in the future,
they would likely have to, to either, one,
they would have to figure this out,
and get NRC approval, but they would, one,
have to either build a hot cell,
or a radiological confinement purposes.
It might be something where they could
have a vendor, or somebody construct a new shipping package,
and then just repackage it into a different type of device
for shipment somewhere else.
They, it might be something where you could put it back

into a spent fuel pool, but that would have
to be closely evaluated before something like that's done
because the, the fuel is hot, the canister is, you know,
there is, it is at an elevated temperature.
So you'd want to make sure that you'd carefully analyzed
and studied the impact of a, of a water shock
on the canister before you put it in a water environment.
- And, and to add to that, Troy,
remember, when it comes to radioactive decay,
time is on your side, the longer you wait,
the safer it's going to be. - That's right.
And there's a question, well, if the canister is dropped,
how are you going to get it back out?
And, and again, the licensee isn't required
to analyze for a load drop event,
that's why we put in the license,
the requirement for redundant drop protection at all times.
And again, that's what made the August 3rd event
so significant, was,
was the loss of redundant load drop equipment.
So they don't have to analyze for a load drop,
I don't think anybody's really, and maybe,
Eric, you can correct me-- - I want to say
that San Onofre has demonstrated the ability,
during their dry run operations,
to retrieve a canister. - An undamaged canister.
- An undamaged canister, right.
- Right, and so the question is,
if you dropped it that 18 feet,
and you somehow deformed the canister, which we don't,
right now, our evaluations aren't showing

that there would be a canister deformation
from an 18 foot drop, but hypothetically,
I don't think anybody's analyzed trying
to pull a stuck canister
from a drop out of the bottom of the vault.
I just, I don't think it's been done, and again, it's not,
the NRC doesn't require that type of analysis.
What we do require is redundant load drop protection
features so that you cannot drop the canister.
And again, we don't, just to go back to the consequences
of the August 3rd event, that this canister was,
was lowered in a slow and controlled manner.
It made contact with the shield ring,
and then rested on it, and then the slings were disabled
because they went completely slack,
and therefore, we don't believe there's any damage
to the canister, or to the fuel assemblies inside.
So this would be no different
than if they successfully lowered the canister all the way
to the bottom of the vault, when it finally made contact
with the surface, it would have been an easy,
slow mating of the surface.
So there's, we don't believe there's any fuel damage
whatsoever to the affected canister.
(inaudible)
- You want to talk about that at all?
- Yeah, you can.
- Well, there's a question here about criticality,
due to water entering through a crack.
If there was any evidence of a crack in a canister,
they would have to take immediate actions
to either re-containerize that canister,

or remove the spent fuel contents, or repair.
- And we actually think cracks, when we're talking
about cracks, we're talking about weld cracks,
and that would most likely occur
from a canister in storage, due to some type
of stress corrosion cracking, and again,
the Aging Management Program is set up such
that you detect the early signs of cracking,
and you have the option to, the ability to make repairs
before you would actually have a through wall crack
of the canister, and in San Onofre's case, again,
they're, they have an agreement with the state
of California to have that Aging Management Program
in place by year five, which is well,
well more conservative than what the NRC would require
for a similar equipment.
Now, one of the questions, I see some in here,
Eric, and I know I've asked you,
so they've been, San Onofre's been moving fuel out
to the pad for a long time.
Why isn't this something the NRC, all these weaknesses
with oversight, and procedures, and whatnot,
is this something that the NRC inspectors should have picked
up on from the very beginning?
- Well, you know, and I think me and Troy were talking
about this earlier today, you know,
NRC inspectors, we go out to these sites
where they have to demonstrate for us their ability
to safely load fuel, and while we're out onsite,
and when NRC's there, you're going to have lots
of management oversight out there, also,

you're going to have lots
of supervisory oversight during these activities
because everybody wants to get it right
for the NRC, you know?
I mean, we've talked about some aspects
to them having their A team out there
during these operations, and even for the first loading,
you know, they're going to have their best performers out there
because nobody wants to fail in front of the NRC.
I think what we saw out there at SONGS is,
with time, you have turnover of staff,
the A team leaves and moves on, and you know the amount
of people you have monitoring these operations,
it goes down, in a very real sense,
radiation protection programs don't want a lot
of people out there standing around, soaking up dose
because it's not good for their numbers, you know?
And so you end up having a situation,
what we had out there at SONGS,
you have fewer and fewer people out there,
actually observing the operations.
When we were out there observing dry runs, you had everybody
and their mother out there watching these operations,
but once we left, you know, they get into a little bit
of a battle rhythm, and they start fighting
with things like dose, and oversight falls off.
Instead of having two people up in the man basket
during downloading operations, now you have one.
Instead of having supervisors observing
every little thing you're doing
because NRC's looking over your shoulder,
you have, you know, you have people down

in the low dose waiting area,
just having a little bit of a chitchat, maybe.
And you end up in a situation where we ended up here
on August 3rd, it's unfortunate,
but, I mean, that's what sometimes happens, I believe.
- Yeah, so I think when we inspected during the,
during the dry runs in early,
during the initial loading campaigns, what we observed was,
well-qualified people involved in the evolutions,
and plenty of management oversight
and quality assurance oversight to observe and make sure
that everything was being done correctly.
And so when you have well-qualified people,
and a lot of oversight, you can get by
with procedures that don't prescribe each
and every little thing somebody has to do
because they're knowledgeable of the work
that has to be done.
And then, I think in San Onofre's case,
as they got past the first couple of loading campaigns,
and they started to experience turnover
of the riggers, and some of the contract force
that was available to them, they didn't maintain
that same level of rigor, and rigor and quality
in the training program.
And so now you had people being put out on a job site
that had less knowledge than what the original team had
when they first started.
And then, and so when, and that's okay,
to even do that, but you have to balance these three pieces.
(overlapping)

So if you have people come out, and you put 'em to work,
that have a little bit less knowledge, then,
then the procedures have to go up
to account for that, or you have
to apply even more management supervisory oversight
to monitor all the critical evolutions.
And in this case, what happened was, we ended up with people
that had less qualifications, or less knowledge,
and the oversight piece slowly backed off, and so,
and then the procedures were never updated
to reflect the gap left by a decrease in oversight,
and a decrease in knowledge.
And so, so that's not, for the,
I think for the, we expect the licensees to be able
to manage and balance those three pieces of the puzzle,
and the NRC can't be there every day to do that,
that's why we give these folks a license,
and that's why it's their responsibility
to stay on top of it.
We did not think there needs to be a design change
to the vault storage system at San Onofre,
it is possible that, with the right corrective actions,
and put into place, that provide the critical parameters
and measurements that need
to be made during the downloading evolution,
people with the right knowledge and skills,
and the right level of oversight, you can safely lower
that canister down into the vault
without making a design change to the, to the vault system.
- Right.
- And then, and then there's a question
about the notification, and--

- Do you want me to answer that one?
- And there is a difference between a courtesy call,
and a formal notification
to the Headquarters Operation Center.
That call to the Headquarters Operation Center
starts everything for the NRC,
and it also is a way for the public to get aware of events
that have occurred at a licensee's facility.
But when that call is made to the Headquarters Ops Center,
they're, our operations officer immediately calls
the regional duty officer that's on call,
and that initiates the NRC's response actions.
And so it is significantly different
to have an immediate report to the ops center,
than trying to catch somebody in the regional office,
to let them know that something's going on with the site.
And how about you take external events?
Seismic, do you have that one?
- Sure.
- We have a slide for that, too.
- Yeah, the, the problem I have
with this one is just, it's, well.
- I can take it.
- Okay, you go ahead and take it.
(background noise)
- So, Rachel, can you pull up 39, slide 39?
Seismic and flooding, so there's some questions
on seismic and flooding, I'm going to refer
to that as tsunami, so the ISFSI systems
at San Onofre are evaluated for earthquake,
they are evaluated for a maximum flood height,

and flood velocity, at San Onofre, the,
I'm going to refer to the UMAX system,
but the TN system's a little bit different,
but it's not as,
I don't,
the UMAX has a,
it's designed to withstand ground motions of 2.1 Gs
in the horizontal, and one G in the vertical direction.
The San Onofre design basis earthquake is 0.67 G,
so it's, there's plenty of design margin
for earthquakes at San Onofre,
and then, with respect to flooding,
the UMAX system
is designed to withstand flood levels up to 125 feet,
that's 125 feet, fully submerged.
The Transnuclear system, it's 50 feet, fully submerged.
For those that are out on the West Coast, and have been
by the site, you've been down around the beach,
you've seen the seawall, atop of the seawall,
just as a reference point, is 28 feet.
And the maximum design tsunami wave height
is roughly 27 feet, so there's plenty of design margin
at San Onofre for both flooding, and for seismicity.
And then we're back to the unpacking, so,
of a canister, if required, so that,
San Onofre, nor any other site,
is required to maintain a spent fuel pool,
solely for the purpose of repacking,
or opening a canister, there are other safe ways
to do that, if required, or needed by a facility,
they would have to determine the safe radiological facility
to do that evolution in.

Most likely, it would be, involve some type
of construction of a hot cell to do the work.
But there are other options, again, that would be
on the licensee to figure out the safest option that works
for their facility, and then the NRC would approve that.
But they are not required
to have a fuel pool to do the work.
And then there's a question about evidence,
with respect to damage to the canister,
or other canisters in question,
during the downloading evolution.
That's still something, San Onofre is still analyzing
that question, we've put that to them.
We think there's probably been some metal to metal contact
during downloading at more
than just this canister in question,
but if you go back to the photo,
Rachel, maybe you can remember it, the.
Look, the one with, that says, "Look close."
That one, thank you, Rachel, so if you look,
if you look close at that photo,
you can tell there was contact between the canister
and the shield ring, but,
there, and I think, and we've examined this photo,
and in detail, it,
essentially it's just paint scrape-age off the,
off of the shield ring, off the divider shell.
So we don't think there, if there was some wear marks,
they're not significant wear marks on the canister,
and I believe the acceptance criteria
for wear indication on a new canister is gouges up

to a quarter inch depth, and we certainly don't believe,
at this time, that there would have been gouges
that even come close to a quarter inch depth,
due to a downloading operation.
Therefore, we don't think there's an immediate concern
with the canister, but that said,
we're waiting on San Onofre to complete their analysis
for not only wear marks on the canister in question,
but the other canisters, and what type of impact will
that have on their longterm Aging Management Program.
The other piece with that is,
is these are stainless steel canisters, and even
if you did have scrape-age on the canister's surface,
it's likely you would re-oxidize the stainless steel layer
that was scraped, prior to the onset of some type
of chloride pitting, or stress cracking, so.
But we're still going to wait for the analysis,
and do our full review.
So there's a question on the hot cell, again.
So canisters don't have fast breaking emergencies,
and so, so what would likely happen--
(inaudible)
What would likely happen is, is the,
through the Aging Management Program,
you would identify an indication, or early signs
of cracking of a weld, and you would have the time,
because chloride stress cracking corrosion
is a longterm phenomena, you would have the time
to construct the hot cell, or repackage the canister
for shipment elsewhere, if need be, and do the repair work.
We don't see this as something
where you have an indication one day,

and you must make repairs that afternoon,
that's not the type of scenario we're talking about.
These are long range, lots of time available types
of repairs, okay, we have some questions on shims,
do you want to take shims?
- Rachel, you want to go to 34?
Oops, 34, is that it?
Do you have the shims? - Let's try slide 34.
- Oh, oh. - Or--
- They changed the slides, okay.
- No, there you go.
- That's, that's the one I'm thinking, so in this picture,
it shows the bottom of the shims, so the original design
was called the monolithic shim standoff,
and that's why see on the left hand picture.
And Holtec changed their design
to the shim standoff pins, which are shown
on the right hand of the, the right picture.
The pin design has a possibility
of failing during fabrication process,
and during transportation of the canister,
and since this issue had been identified,
Holtec has ceased application of the pin,
of the pin design, and replaced existing and new canisters
with the original monolithic standoff design.
This change to the shims was the subject
of an NRC inspection done by headquarters,
by my team, out at the Holtec Camden, New Jersey facility.
Results of the inspection are still pending,
we reviewed the thermal analysis
that had been provided by Holtec,

and the agency does not believe there's
an immediate safety issue with any of the four canisters
that were loaded with the shim pins at San Onofre.
So additional information will be available,
once we issue the inspection report,
which we hope will be sometime soon, in the next few weeks.
- If you see something.
- This may be for you to answer...
- Yeah, so I'll, so there was,
there's a question that came in on,
on the NRC doing unannounced inspections.
That's, that is a part of our tool bag,
we do use that, but it's mostly,
mostly at our other materials licensees,
hospitals, radiographers, those types of facilities,
most of those are unannounced.
Of course, our resident inspectors
that are at the operating sites,
most of the work they do is unannounced inspection activity.
We do have that option, and maybe that's something we think
about with our inspection program, is do we announce all
of our fuel loading campaign inspections,
like with our current practice?
Or do we just go out, unannounced?
Part of the problem, at San Onofre,
it'd be a little bit easier because they,
theirs is a longterm fuel loading campaign.
When Fort Calhoun starts next year,
it'll be a many month window, and so we could do that.
But most of the time,
these are short duration type campaigns,
and so we have to coordinate with the licensee

to understand the schedule for, for a fuel loading campaign.
And so it's not that we can't do unannounced,
but it is a closely coordinated activity,
the schedules are, but that's something we can talk
about later. - Okay.
(inaudible)
(inaudible)
- A lot of these questions, people have the same questions.
- Yeah.
So the, the presentation slides are,
are already available on the webinar handout link,
they're available on the NRC Spotlight.
Any slides we use today to answer,
to help support some of the Q&As,
questions and answers, those will be attached
to the meeting summary that'll be published following,
within two weeks of, I think of today's discussion.
The session is being recorded, and we do plan
to upload that to the NRC website,
and the conversation that you hear will all be transcribed,
so you'll have a text version of today's presentation,
as well, for review.
So, and we have a question on,
how do we enforce the licensee's commitment to us,
to cease fuel handling activities.
So the licensee, when they called us on the sixth,
and then again on August the 7th,
verbally committed, that came from the site vice president,
verbally committed to cease all fuel handling activities
at San Onofre until the NRC came out and inspected,
and was satisfied with the corrective actions,

at which point, they would, once we,
once the NRC was satisfied,
they would resume fuel handling activities.
And so for now, we're taking the licensee for their word,
that they're not going to refuel, and to date,
they have not done fuel handling activities
since August the 7th.
If, for some reason, the licensee decided they weren't
going to wait for the NRC, and start moving fuel this week,
once we became aware of that, of course,
we would talk about it internally.
We have the option to impose a confirmatory order,
ceasing fuel handling activities at San Onofre,
if we chose to do that, but for now,
we don't believe the licensee is going to make any attempt
at fuel handling activities, and so we're comfortable
with where we are, and not, and the licensee is comfortable
with waiting on us to do our inspection activity.
In addition, we have at least a,
a weekly phone call with the licensee team,
to talk about their progress with the causal evaluations,
engineering evaluations, implementation
of corrective actions, retraining and qualification
of the staff, so that takes place once a week, so,
so I think we have a pretty good handle
on what they've done, and where they're heading,
and the timeline they're on to be able
to resume fuel handling activities.
And I'll, I don't,
I'm going to have to, I don't know the answer
to this question, maybe one of you guys can send me a note,
but it's, will all questions be made publicly available,

and I don't,
and I'm getting indications from my IT staff
that the chatroom, are we going to make the,
we can make the chatroom publicly available?
Yes. (laughs)
They didn't want to, they didn't want to be heard,
though I got a thumbs up, yes. (laughs)
And again, the NRC doesn't require drop testing
because the load drop event's not supposed to happen.
We require redundant load drop protection,
we require that, the load drop protection to be tested,
so those slings have to be tested,
they have to meet industry codes,
lifting equipment has to meet industry codes,
and if you implement that program, as we required it,
you would not have the drop event, so.
Therefore we don't require drop testing.
There are, there is some drop analysis that is done
because you do have to lift the canister a certain height
in order to move it from one location to the other.
Those heights are small, they're on the order
of one to two feet, and licensees do have
to do drop analyses for those distances,
or heights, if you will.
So this, so there's a question,
would this event be possible with a standard,
above ground ISFSI, so there are some sites
where, where they do some of the cask,
the transfer cask loading in a pit that does require a lift,
not to the same height as the UMAX storage vault,
where you have that 18 foot vulnerability,

but there are some where it's more than,
more than a one or two foot lift to, of a canister.
So, and those sites, well, at all the sites,
they're required to have the same, they're required to meet
the redundant drop protection we require at all sites.
- Right.
- So it's not, it is directly applicable
to the UMAX design, but there are some sites,
because of the configuration of their fuel building,
where they have to make a similar type of lift,
and they're required to have the redundant drop protection.
I think we've addressed all, did you,
I haven't seen, I think we addressed--
- No. - All right.
(inaudible)
Hmm?
And, and we've asked ourselves that same question, do we,
should we make licensees have a drop analysis
in their final safety analysis report,
given this event, and we've talked about that,
and the answer is no, we need to make sure licensees comply
with the redundant drop protection feature.
Had San Onofre complied
with the redundant drop protection features,
there would have never been a near-miss event.
- Hmm, that's an interesting question.
- And so the other one is, did we,
should we require Holtec, or San Onofre,
or other licensees to use, on this,
we're going to talk specifically about San Onofre.
So should San Onofre's training canister be full size?
So you heard Eric talk earlier

about there being an additional three quarter
of an inch clearance, it's okay for the actual,
for the equipment used in training
to be different than what's actually in the field,
but the training program has to teach the workers
what those differences are, and how
to compensate for that difference in the field,
during actual conditions, so we don't have plans
to require a full size canister be used during dry runs
at San Onofre, but we do expect the training program to--
- Acknowledge the differences.
- Acknowledge, and train on the differences.
- Exactly.
- And I think, and we'll re-answer this question.
So San Onofre, the question involves
removing a canister from the vault,
and San Onofre has the capability
to remove a canister from a storage vault.
Just, the canister in question did not drop,
so we don't think, so, so there's no damage
to that canister, no damage to the fuel.
Had it dropped,
the early analysis suggests
that there would not have been a sufficient deformation
to the canister, such that we would not have been able
to remove it, but in any event,
it didn't drop, so that's, that's
not something we have to consider today.
"Why are two slings on the same device redundant?"
- Well, you want me to answer that one?
- You can, you can say it out loud.

- Okay, why are two slings
on the same device considered redundant?
Because two slings on the same device are redundant.
If one of the slings would have failed,
the other sling would be there to carry the full weight
of the canister with a lot of margin,
with some margin included.
Unfortunately, as I've stated earlier,
this is sort of an extraordinary event,
where the vigilance of two individuals both failed
open at the same time,
and that's a very unfortunate situation,
it is really, in essence, why we're here right now today,
discussing the event, and why San Onofre is put
in the position to ensure that this,
an event like this can never happen again.
- The slings are attached to different points, as well.
- Oh, yeah, yeah. - Yeah.
- Each sling is attached to a different point at a canister.
So any given sling could fail,
and the other sling would be able to support the load.
- And I don't, maybe you know this one, too,
any, the differences between Callaway's system, and,
and San Onofre's, the vault?
- There are subtle differences between the two systems,
but for all intents and purposes, they are the same.
You know, San Onofre has a somewhat longer fuel
than Callaway, Callaway has a shorter canister,
SONGS has a longer canister.
So there are those differences,
Callaway's MPC is slightly more narrow
than the MPC being used out at SONGS,

but those differences are as far as it goes.
It's still the same stack up configuration,
it's still the same downloading operation at both locations.
It's just that, I think the real difference is
that San Onofre, it was in the production mode
of loading numerous canisters,
and Callaway has only been involved
in six, in 12 cask campaigns so far.
Far less than were loaded out at SONGS,
and so SONGS had a much more of a opportunity
to have an event like this happen, so.
Yeah, and the shield ring, it can,
at Callaway, is actually further down into the ISFSI vault,
further down on the divider shell than it is at SONGS.
So by the time you make it that low
in the Callaway divider shell,
you're probably fairly well aligned,
whereas when you're up that high,
when you encounter the shield ring at SONGS,
you're probably, and the evidence bears it out,
you aren't very aligned at all.
It's more of a, more of a nuanced approach they have
to do out there when they're downloading than at Callaway.
- Rachel, can you pull up slide 35, please?
There's a question specifically regarding canister 29,
radiation levels, and if you look in the bottom right corner
of this slide, we actually have the gamma radiation levels
from canister 29 on the slide,
the lid was .015 millirem per hour,
and the outlet vent was 0.12 millirem per hour.
It just, it just happened that canister 29 was the,

had the lowest radiation level readings
of all the storage vault, UMAX storage vaults at San Onofre,
and it was the canister involved in the event,
which gives us a,
kind of reconfirms that we don't believe there was damage
to any of the fuel assemblies,
or any damage of significance to the canister, as well.
And then, is it, is a horizontal vault more safer
than a vertical vault, or vice versa, and I think
we believe they're equally acceptable, equally safe.
And then
the VCT operators, were they,
were they around during the July event,
or were they new since the July event?
Do you have a perspective?
- This particular VCT operator involved,
in the August 3rd event,
was present onsite during the July 22nd event,
however, there was no communication or no,
no operational experience passed on
from that VCT operator to this one.
It is actually one of our biggest concerns
at the San Onofre site, is that,
depending upon who you spoke to,
there was a vastly different amount of experience
and amount of knowledge, given one person versus another,
in our interviewing of people out at SONGS.
And that was one of our findings, was that a lot
of this operational experience wasn't being fed forward
to other cast members, it wasn't being shared freely
among all of the workers onsite,
and it really should not be that way.

Everyone should have the benefit
of all of the experience that's going on on a site,
but out at San Onofre, this was not taking place.
- And Patty, I had a couple of questions coming in
that I think are going to be your territory, right?
So the, for the proposed interim storage facilities,
do you know, are they being proposed as vertical,
or horizontal, or is it too early to know?
- So one of the, one of the license applications
is actually UMAX, the Holtec one that's in New Mexico.
And then the other one is,
is
multiple, I mean, it can be the horizontal,
I believe they can, they're also proposing
that they can handle other ones, like the HISTORM
that's just up on the pad, vertical.
- Vertical or horizontal?
- Vertical or horizontal, but not,
I don't think they're proposing, you know, beneath grade.
- And then the, and then just a canister
life,
right, from, so I know we initially licensed for 20 years,
but can you get a perspective on the beyond 20?
- I can actually give a little bit of perspective on that,
because canisters, at least the Holtec UMAX components,
they have a license life of 20 years.
And they have a design life of 60 years,
and they have actually a service life of 100 or more years,
with proper maintenance and surveillance activities.
So that goes into the designing
of the dry cask storage systems.

- Okay, and then they, they're,
they have to come in for license renewal,
prior to year 20?
- Right, they have to come in for license renewal,
prior to year 20, and then they,
their renewal can be up to 40 years.
- Okay.
And then
there's a question on the radiation reports
and measurements that we took,
and it's my plan to have the staff document, in the next,
well, they're writing, in that decommissioning
and inspection report now, as we speak,
and we plan to attach all our surveyed measurements
and data tables to support the work of my two inspectors
that were out at the site, so that will be included
in an inspection report.
And, and so there's a question on
when the canister was aligned with its weight shifted,
doesn't this warrant the canister being opened
to inspect the fuel, and so I'm going to go back
to the picture that shows the transfer cask
on the vault door.
And I wish I had a dimensional slide,
I know Eric's pulling it up, which one?
- It's this one.
- I think the one, that one right there, that top one, no.
- This one? - What is that?
- 11. - 11, slide 11, Rachel.
So the canister's inside the transfer cask.
What you see here is the transfer cask,
and if we could look down on top,

and see a cutaway, it's a pretty,
the tolerances are pretty small,
between the canister and transfer cask.
And so what we believe happened is,
when the canister was lowered and it made contact
with the, with the shield ring, it most likely tilted,
but it wouldn't have tilted very much at all.
And maybe you have a perspective on that,
I know I don't have a real perspective.
- Well, it'll tilt probably at the order
of maybe one to two inches, but that's all.
And when it tilts like that, it is completely suspended.
- Right.
- Unless something happens to jostle it.
(overlapping)
- Well, it wasn't suspended, it was resting
on the shield ring, but it wouldn't have been a,
a sudden, it hit the shield ring, and then slammed over
into the transfer cask, that wouldn't have happened.
It would have rested, it would have rested gently
on the shield ring, and then gently made contact
with the transfer cask. - Side of the transfer cask.
- So the inside of the transfer cask,
and so there's not enough force
or stress being placed on the canister at that time
to give us concern about the integrity of the contents.
- Right, the downloading process is a very gradual process.
They come down with the lift beams
on the vertical cask transporter
in a very slow and methodical fashion.
- And, and Patty, I don't know the answer to this.

It involves warranties of the UMAX system,
versus the warranty of a canister, I don't--
- I'm not sure what they mean by warranty.
- Okay, I don't, Eric, do you have any idea?
- I don't know. - All right.
So we're going to, that's one that we'll take away,
and maybe Lee, in the back, you can make note
of that one, and then we'll do some research on that.
We have, on the NRC Spotlight page,
we have posted some FAQs on that page,
and we'll take a look at this,
and depending on what kind of answer we get,
we'll put that back on our FAQ, on the NRC Spotlight.
And what's the structural rating of the shield ring?
That's something that,
that, as I mentioned before, the licensee's evaluating the,
the drop analysis of the, what would it,
what would have happened, had there been an actual drop?
And I think that's something the,
the capability of the shield ring to support the weight, and
that's something that we still
have asked some questions about.
- That's right, according to Holtec,
the shield ring can support the full load
of a dry cask storage canister, however,
that's not what it's designed for, so, I mean.
In that regard, if we understand that's not
what it was designed for, and so they get no credit
for having the analysis showing it would support the MPC,
because that's not what it was designed for.
- And,
and we asked this question earlier today,

or yesterday, we were talking about it.
So, if at the end of the first,
the initial 20 years, the licensee says,
we're done, we're not going to renew.
- Yeah, okay, so if they say they're done,
and not going to renew, so it depends on who's saying that.
So you've got the certificate holder,
with all their general licensees,
who are using their systems, and if they decide
that they, they aren't going to renew the certificate,
the licensee can actually renew the certificate,
if they choose to, so that they can remain,
continue to, to have their spent fuel
in that, their, that cask system.
If it's a specific licensee, they would have to have a plan
on how they were going to exit out of that, so.
That's the answer, they, I mean.
- And the, and I would think that the NRC can always impose,
through orders of requirements
that would replicate a renewal period.
- Right. - It's, right.
To ensure that there was longterm safe storage,
so the, the licensee, ultimately,
is still responsible for the safe storage of that.
The NRC has legal options we could pursue
to make sure that takes place.
Eric, what's the shield ring actually designed for?
- You know, there are a lot of good aspects
to a lot of these dry cask storage designs.
For instance, the shield ring, in and of itself,
helps to reduce radiation dose out there

on the ISFSI pad, so it's saving dose for workers,
sort of at the expense of downloading your MPCs.
The same way the cone that we showed you on top
of the MPC, that's also designed
to help reduce, I mean, reduce radiation dose
to the workers, so it's a good idea.
- And then there's a question along structural integrity,
regarding the MPC 37 canister, just in general.
And these are robust canisters, they're,
I think the bottom surface is almost three inches thick.
- Yeah, it's three inches thick,
the top lid is nine inches thick,
and the shell itself is five eights of an inch.
- Five eights, so well, so over a half inch thick,
and this is all high grade stainless steel,
so we do not have issues or concerns with,
with the structural integrity
of the multipurpose canister 37 design, very robust,
highly capable of maintaining the integrity
and the confinement barrier.
And the shield-- (overlapping)
Rachel, can you go back to the shield cone picture?
- Yeah, you see the green slings?
You probably missed it in my initial discussion,
but those green slings are there
for retrieval of the shield cone because it,
it's going to be used again with the next MPC
that is downloaded, so the shield cone comes out,
along with the yellow slings, and the MPC lift cleats,
something we hadn't discussed too much,
all come out after the canister has been installed
in the ISFSI vault, that way they can be used again

on the next canister.
- And then they put another, another lid on top
of all that, to seal it up, the vault up.
- That's right. - Right.
- That's right.
"...MPC Guide. - With the sole purpose
of helping to guide the canister into the hole. It's not a shield ring."
- Well, honestly--
- Let's read the question out loud.
- Oh, I'm sorry, you read the questions for me, and I'll.
- Okay, so there's a question regarding the, the
guide ring
versus a shield ring,
so is it, is it really something
that helps guide the canister,
or is it providing shielding, or is it a little bit of both?
- Rachel, if you could go back
to picture, slide number eight?
So,
those guides that you discussed in your question,
they're actually the gussets that are on top
of the shield ring, and they are there
to help guide the MPC into the storage vault.
But the shield ring, in and of itself,
as I mentioned earlier, is there
to provide radiation shielding
for the MPC while it's in storage,
and should reduce radiation dose to workers,
and out on the cask.
So we're sort of talking about the same thing,
and they are part of one another,

but the shield ring and the guides are connected,
but separate, so. - Okay.
And then, and then the cables, the slings,
and the yellow ones, is there,
is there a required inspection program for those,
and what does that involve?
- Yeah, the slings are actually, they're,
the guidance that you follow when,
when designing and making slings is ASME,
that's the American Society of Mechanical Engineers,
30.9, and it spells out all the requirements for slings, in,
in the design.
- Do they have to be load tested?
- Yeah, load tested requirements,
how much of a dynamic load you're going to impose,
in addition to the load rating,
and all the slings out at SONGS,
they're actually load tested to twice their rated capacity.
- And the yellow covers on the slings,
are those removed for inspection, or how does that work?
- Well, actually, they're actually areas
on the slings where you inspect them.
Now, we don't have a picture of this,
but if you look at a sling up close,
they'll have a little bitty tell-tale on it.
And any time that tell-tale begins to move inside
of the sling, it's an indication
that the slings are wearing.
And so if that tell-tale disappears, it's time for you
to get rid of the sling, and purchase a new one.
- And is that something they would inspect
before each lift, or-- - Absolutely.

Yes, the slings are inspected before each lift,
when they're being installed on the MPC.
- Rachel, can I get you to go back to
that other slide on the vault?
That one, so, so earlier, we talked about the,
the spotter said, said it was four feet down.
- Right. - Right?
And we said, and how there was some confusion about,
was that four feet below the shield ring, or whatnot,
about how far down is the shield ring from the, from the--
- The top? - From the top?
- About four feet. - About four feet?
- Yep. - Okay.
So that would be somebody standing on top,
with a camera, could easily take that,
zoom in on it, it wouldn't be an issue for,
for that, right? - No, no.
- And that's an empty vault there?
- That's right, that's right, and I took that picture.
- And Eric says he actually took that picture, so.
- I took them all.
- So there's a question that says, if they have gussets,
are there to guide the canister into the storage vault.
Why is the fact that they actually fail
to do what they are designed to do not being addressed
by the inspection report? - You know,
that is something that we are addressing,
as part of our special inspection.
And it's, it's the,
there's an important nuance here.
When you guys look at the shield ring,

and you look at the gussets that are there
to guide the MPC into the canister,
there is a little bit of an offset
in a lot of these shield rings and gussets,
where the gusset does not go flush
with the interior surface of the shield ring.
And that's actually a,
an engineering enhancement that they actively made out
at the Callaway site, to address those gussets
in the fabrication of their divider shells.
We had questions during our inspection,
why weren't any of these enhancements fed forward,
out to the divider shells used at SONGS?
And the fact of the matter is simply
that the divider shells at SONGS were all manufactured long
before Callaway got out to perform their,
their vendor inspections out at Holtec,
and had those enhancements put in place.
So there is, those gussets aren't perfect,
is what I'm saying, there's still a little bit
of a lip inside of that gusset,
about a quarter of an inch, on a lot of these shield rings,
and that's unfortunate.
- Yeah, the key factor here is
to make sure you have the correct alignment
from the beginning, before the canister gets
to that part of the shield ring,
before it starts to approach the shield ring,
so that you don't have the challenge
of the canister making contact
with the shield ring in the first place.
- Right.

- And, and we don't believe there's any plans to,
to enhance the gussets used at San Onofre.
So there's a question about the radiation levels
during loading, and being concerned
about the amount of radiation during loading,
if you have to have folks go to a low radiation area.
So just as a good ALARA,
as low as reasonably achievable practice,
you want, you want the staff involved, and working
in radiological areas to minimize their exposure.
One way to do that is to take advantage
of the distance from the source of the radiation,
and so many licensees will adopt a low dose waiting area,
or low dose area during any job site type of evolution,
and so it, it was appropriate for San Onofre
to designate a low dose waiting area, but you have
to balance that with maintaining the right level
of oversight at the job site
to ensure quality standards are maintained, and so.
And I think the, during the downloading, there's,
there is one part of the downloading
where there is a radiation streaming effect
from the canister. - There is.
- And those levels are about--
- Well, at San Onofre, those levels can go as high as
three and a half R per hour, and actually,
what ends up happening during downloading operations, most
people will post the area immediately around the VCT,
during downloading, as a locked, high radiation area,
which requires special dispensation
to be able to enter into that area,

and so they restrict a lot of people.
Everyone but who is absolutely necessary
will not be in that high, locked high radiation area.
But in this case, I think they could have found
a better area to have staged themselves,
where they could still observe downloading operations,
and not have an obstructed view,
as they did in their low dose waiting area.
There are other areas on top of the ISFSI pad,
for instance, where they could have gone,
and not been in a locked, high radiation area.
- Yeah, and just to put it in perspective,
a locked high radiation areas are greater
than 1,000 millirem per hour.
- That's right, one R per hour.
- And so it's acceptable to work
in the locked high radiation area.
You do want to provide
the appropriate rad engineering controls for workers
that are in, that work in those kind of spaces, and
I do think, and that's why there's shielding provided
for the VCT operator, so that they're not exposed.
The spotter is up in a man lift,
so they're above that high, high radiation area,
so they're, and then the issue here was,
everybody else was moved to that low dose area.
As Eric mentioned, there were probably other places
on the pad that provided an unobstructed view
of the operation, and you could definitely leverage cameras,
video capability, to assist
in the oversight monitoring role.
- Absolutely.

- And I'm not sure, so going back to that,
Rachel, can you go back to the shield ring picture again?
And the question is, it looks like there's a gap
between the shield and the canister wall.
- Well, actually,
there has to be a gap between the shield ring
and the canister because you want the hot air,
that's being heated by the MPC, to be able to rise
to an exit through the top of the UMAX vault.
If you go to the lid picture, Rachel, if you don't mind.
You see the lid there, you have inlet vents
on the outer periphery of the lid
on all the low corners, those are inlet vents,
and they feed air to the outside of the divider ring,
that's cool air coming in.
That cool air travels down, it enters
into the MPC cavity, underneath the shield ring.
That air is heated by the MPC,
and it exits up, out through the top vent there,
and that's essentially the cooling
for the spent fuel in the storage canister,
while it's in the UMAX ISFSI vault.
So a gap is an integral part of that design.
- And, I don't, so the question, is turnover related
to radiation exposure at the site?
And I don't believe that's the case.
- I don't believe that to be the case, either.
Most of these, most of these people want to work,
and they mostly enjoy going to work.
So I don't think radiation's an issue out at,
for workers out at San Onofre,

I don't think that's a disincentive to, no.

- And it's said, there's a comment
about inspectors avoiding radiation
of downloading the canister into the vault,
and that was a consideration at San Onofre,
was the, was moving people to a low dose area.
I'm going to think inspectors here--

- Oversight.

- This actually refers to San Onofre,
or Holtec oversight staff.
And again, they want to minimize exposure, but you need
to minimize exposure while maintaining the correct level
of job oversight, so there's a balance between the two.
My inspectors, when they go out and watch these,
they're asked to go to the low dose waiting area,
but they go over there with the VCT operator,
and observe the downloading evolution up close
and personal, that's what they do, so,
to get a good understanding of what's going on,
and talk to people while they're doing the task.
And then we're back to the, hey, Rachel,
can you go back to the vault photo again?
So there's another comment about the quarter inch there,
where the gusset is. - I saw that.

- Yeah, so that is, that's just a fact of life
for San Onofre, there is a quarter inch,
about a quarter inch space there at the end of the gusset.
They need to account for that, train the staff,
and make sure that they're knowledgeable of it,
and do a better job aligning the canister,
before they do the download, and I think,
and at Callaway, they actually brought that gusset out

to the edge, so that, so that you didn't have
that same vulnerability, both designs are acceptable.
At Callaway, I think there's more forgiveness
to the, to the operators, at San Onofre,
you have to be more vigilant,
to make sure you get the initial alignment
of the canister correct, and that is definitely something
that's achievable and doable.
So there's a question about, is there any type
of quantifiable requirement by NRC
for qualifications of workers
and supervisors performing the work, so, in 10CFR72,
point, the qualification requirement, which is, what is it?
(overlapping)
Yeah, one of these, which one--
- It's 190. - 190.
So 10CFR72.190 requires a qualification program
for all individuals involved with important-to-safety tasks,
so these frontline workers here, that would involve the--
- VCT operator. - Okay.
- The guy responsible
for making sure the MPC is being downloaded properly.
- The spotter?
- The spotter into the vault, and it actually goes
onto other operations during fuel processing
inside of the fuel building.
So it's not just activities out on the ISFSI pad,
it's all of the quality related activities,
which includes things like welding,
on the placement of the fuel assemblies into the MPC,
into the lattice basket inside of the MPC.

All of these jobs are quality related, in dry fuel storage.

- Okay, and then if it's okay to use workers
that haven't completed the qualification process,
but they have to be directly accompanied by an individual
that has completed the qualification process.

- Correct.

- So, and that's why we, one of the reasons why we chose
to go with the qualifications violation,
was because you have people doing a task for the first time,
where the training program didn't get them
where they needed to be, and there wasn't a
supervisor, or somebody with the appropriate quals
right there with them during the job.
So Eric, I think one last time,
we'll talk about metal to metal contact,
and what our thoughts are on the significance
of that on a canister.

- Well, metal to metal contact isn't the best thing
to happen to a canister, however,
realize that in the case of MPC contact
with the divider shell ring, there is paint there,
that's designed to take these kind of scuffs,
and absorb some of that impact.
And Holtec is going to provide us with an analysis,
to give us the bounding conditions,
as far as scrapes and scratches that they think this
MPC number 29, installed in their ISFSI, experienced.
And I think that could be considered
to be a bounding analysis for all the other canisters,
because all the other canisters,
while they experienced a little bit of scuffing,
and a little bit of contact going into the ISFSI pad,

none of them actually hung up as MPC 29 did.
So, and then moving forward, we'll see how
that informs San Onofre's Aging Management Program,
how far they intend to go, as far as evaluating all
of their canisters for future degradation,
because, again, a scratch today isn't that big of a deal,
however, as time goes on, that could be a point
where stress corrosion cracking could initiate,
but again, those are all longterm concerns
on these canisters.
There are absolutely no immediate concerns regarding the
condition of the MPCs, and their ability
to perform their confinement function.
- And there's a question regarding radiation being an issue
to the folks that live within 50 miles of San Onofre,
and again, we'll just, one last time, the,
we don't think there's a radiological concern
with the ISFSI being located at San Onofre,
and as the fuel inside the canisters continues
to decay, there's less and less risk
of a zirconium fire, that's the principal driver to
what would be a radiological release,
and we don't think the conditions exist within a canister
to have a zirconium fire, because of the lack
of oxygen, and the wrong form of zirconium,
to propagate a fire, so we don't--
- And-- - Yeah?
- There's also another requirement
that San Onofre has to abide by,
and they've been abiding by this requirement for years.
It's the publishing

of a radiological environmental monitoring program report,
each and every year,
where they have TLD monitoring stations,
effluent monitoring stations,
monitoring stations onsite, as well as offsite.
And they're actively measuring the radiation impacts
of their facility on the surrounding environment,
and those reports are available in ADAMS,
they're publicly available in ADAMS,
and anyone in the Southern California area,
or anyone in the United States can go
to our agency-wide document system, and find these reports,
they are there, it's a requirement.
- And so there's a question about are, if,
whether or not San Onofre is going to use cameras
in the future to see into the vault during the downloading?
- All indications right now are yes,
but we'll see, when we perform our next inspection,
and see how they're engineering enhancements
and procedure enhancements are truly being borne out.
But all indications now are yes, they will be using cameras.
- And there's a question on, back on,
Rachel, slide 21, just so I have it for reference.
And there's a question about, what's actually paint?
Are the canisters painted?
- The canisters are not painted, however,
the divider shell that you're looking at in the webinar,
that is a painted surface, and if you look closely,
you can see, the paint has been scuffed off
by the contact this divider shell made with the canister.
- Yeah, so the canisters are stainless steel,
and then the divider plate is?

- Coated carbon steel.
- Coated carbon steel, okay. - I believe.
- All right. (inaudible)
Okay.
And there's a question about, why not have two spotters?
- That's a very good question, I think,
probably, moving forward, you're going to find certainly more
than one spotter, or more than one person
who has a vantage point out on the ISFSI pad,
during future downloading operations at San Onofre.
- All right, and if they, if they leverage cameras,
then you would be able
to have multiple people spotting the downloading evolution,
depending on the number and placement of the cameras.
So that, so there's a question
on the transfer cask cooling system,
so there's not a cooling system,
if you will, for the transfer cask.
This is for, so the fuel is maintained cool--
(overlapping)
We're talking about MPC 30 now, the one in the field,
though, so heat goes from the fuel assembly
to the helium gas to the canister wall--
- It's radiated out to the--
- It's radiated out to the transfer cask inner wall.
- And then to the environment.
- And then that's transferred through
the transfer cask shell, and then just the normal air
surrounding the transfer cask shell is
what dissipates that to the environment.
- Yes. - Okay.

And there's a question on the bottom of the canister,
and whether or not the weight of the canister,
sitting on that half inch gusset did more than scrape it,
it seems like there'd be a deformation at the bottom
of the canister, and that's one
of the key engineering evaluations we're waiting
to be provided with from San Onofre.
So we haven't, we haven't ruled out deformation,
but we're waiting to see the engineering analysis.
Our own experts think, if there was deformation,
it would be very minimal,
this is a three inch thick bottom lid,
and it would be minor deformation at most,
which would not have an impact on the canister integrity.
- So where do we find monitoring reports,
can you direct them to ADAMS, or?
- Yeah, so the licensee does the annual filing of the--
- Regional environmental--
- Of the environmental reports,
those should be available in a search of our,
of our public library, ADAMS, and you should be able
to pull that up, and in the prior years.
Is there an outside agency that monitors radiation levels,
or is only, or is it only left to Edison
to measure and report levels to the public?
- Well, there's one agency
that monitors radiation levels, it's the EPA,
they have their Environmental Radiation Monitoring Program,
however, the EPA program is sort of a voluntary program,
where they partner with universities,
and local interest groups, and they'll provide you
with a realtime radiation monitoring system.

Again, talk to your, whatever EPA region you're in,
and you can find out from them
where their closest monitoring station is.
It's actually called the ERAM system,
so maybe if you search on the EPA website for ERAMS,
you can find it, and it's a realtime monitoring system.
- And then, and then, just to make sure that,
that San Onofre is doing the right radiological surveys,
and monitoring, we have inspectors that go out,
and that's one of the things they look at each year,
they check those, the reports, the accuracy
of the reports, and they actually go out
with the technicians at the station,
and make sure they're actually taking the right measurements
from the right locations.
So that is, that process is validated and verified
by the NRC through direct inspection each year.
And then,
so the question is, the divider plate,
we keep talking about the vault picture, that's for
which location? - What do you mean?
- Which vault was that, vault number, do you remember?
- Oh, that was a picture I took during the dry runs out
at SONGS, September, 2017, just,
it's whatever vault they were downloading
into during the dry run when we were there.
- Okay, and the one with the paint scrape-age on it?
- That is the actually vault number 22.
- And that was for canister 29.
- For canister number 29.
- And if the canister was in there,

then how were we able to take a picture of that?

- That picture was taken by staff out at San Onofre.

- Okay.

- And they would have been able to take it

from the surface of the ISFSI?

- Yeah, and they can, they can take,

they can get a boom, and put a selfie stick or something--

- And zoom in on it. - Oh, yeah.

- Yeah. - Yeah.

- Okay.

- Or they could just have someone stand there.

- And so there's a question about cracking,

and cracking would allow oxygen to enter the canister,

again, we would expect the Aging Management Program

to detect, early detection of signs of cracking,

and then the cracks would be mitigated.

So we don't believe, and then, if it was a crack,

we're talking a very, very small opening.

If it did exist, it'd be small quantities of oxygen,

and you still don't have the right form of zirconium

to cause that spontaneous combustion, and have a,

to have that type of fire.

And there's a question about the,

when the canister was leaning onto the side

of the transfer cask, it's not three inches thick there,

it's something less. - Well, if.

Go ahead.

If you think about it, when the canister is leaning,

it is leaning, the very top edge

of the canister is going to be in contact

with the wall of the transfer cask.

And at that location, there's several layers of weld,

and actually, a nine inch thick shield plug,
which is the MPC lid, resting there.
So they're really, we really don't have
that many concerns about the confinement at that location.
- Yeah, where, it would have been leaning against the side
of the transfer cask, it's actually thicker than where it is
on the bottom of the MPC? - Yes.
(overlapping)
- And so there's a question, back on slide 21,
it seems to be our favorite slide today.
- Oh, okay.
- If, where's the canister, in relation
to where that picture was taken?
- Isn't that picture--
- You know, if you back up, that's right,
if you back up the slide, thank you, Patty,
if you back up to slide number 20, there's the canister.
- There's the canister, so you can see,
that is canister number-- - 29.
- 29, loaded,
and that's the gusset in question,
is directly above it, and that's about,
what is that, how many feet is that,
from the canister to the gusset?
- I couldn't tell you, but it looks like,
probably about a foot and a half.
- Okay. - Maybe.
- And then you could take that--
(overlapping)
- It's probably six to eight inches.
- All right, and you could take a picture of that,

either standing from the side, or from up above.

- You absolutely can because,

we're there when they're welding,

this lid that you're looking at right now, we're there

when they're welding that in, and we stand directly over it

to observe the welding operations,

and the NDE, when they install that.

Now, radiation levels can be very high there,

but you can go in and take a picture fairly quickly,

you don't have to linger around for too long.

And, again, that is absolutely the thickest portion

of this canister, it's nine inches thick,

just to provide shielding for those operations of welding.

- And then if, again, if there were early signs

of crack propagation, or crack indications,

we think the licensee would have time

to develop a repair strategy, and if it required removal

of the canister, it would be able to do that,

they'd have plenty of time to do that

before there was a significant impact on the canister.

- That's about right.

It's probably closer than that.

Go ahead (inaudible). - Yeah, and,

and I don't think today's panel is in a position to,

I wish we could give you an exact value

on the distance from top of the,

of the--

- MPC canister, to the top of the--

- To the lid, I just don't, yeah, we just don't have that.

This is one, I'm going to have Lee, who's one of my inspectors,

I'm going to have him flag that comment,

about how, you know, the shield ring to the top,

and the shield ring to the top of the canister,
and we'll see if we can't put something
in one of the FAQs about, that provides dimensions
of the storage vault.
There's a question on high burn up fuel, and how long it has
to stay in the pool before you can move it out, and I think.
- Those, those lengths of time have been changing,
it's new studies, I don't have that information.
- So will we get back to them for that one, too?
- No, I think there's, I'm not sure
what we prescribed, I think that the reference here is,
high burn up fuel require longer cooling time
than five years, before putting in the dry storage, and,
and I think five years is sufficient time
for decay purposes, prior to loading the, an MPC.
So I think that's okay, and in San Onofre's case,
they ceased operations (overlapping)
more than five years, it's been more than five years
since they've ceased operations, so they're okay
to move high burn up fuel into an MPC.
"If Slide 21 is of the
actual problem vault, why don't we see the canister,"
but we showed the canister.
- Yeah, and so, there, we received a lot
of questions throughout the course of the presentation,
on how long does it, how much time do you need
to build a hot cell, I don't have an answer for you.
That's something the licensee would have to do,
but there are, there are different ways
to do it, it could be brick and mortar,
it could be, you could move it into a,

a building, and then compensate with lead shielding,
and that would take less time,
so there's different alternatives out there,
so I don't, I can't give you a direct answer
on how long it takes to build a hot cell,
so it's very case dependent.
And any idea on the skin temperature
of a canister, loaded canister?
- We've seen it get close to 300 degrees,
a loaded canister, but that's, albeit,
after welding activities have taken place.
I think the hottest canister I've seen
on surface, maintaining the temperature,
is probably at 200, 235, 240 degrees, and--
- But what would be the hottest point of the canister,
would it be radially, or would it be top,
bottom, do you have a?
- Well, when I'm on top of the can,
it's usually at the welding point.
- Right.
- That's really hot, so I really couldn't tell you.
- Okay.
- And I haven't seen
fuel loaded at the top end of what's allowed, either.
- Right. - So.
- But normally, you'd see something in the 250
to 300 degree range? - Oh, yeah, yeah.
- And Patty, we have a question,
you talked about the shims before, right,
and so San Onofre does have four, I think it's four--
- It's four canisters--
- Canisters with the shim pins?

- Correct.
- So there's a question about those,
the canisters with the defective stand off shim pins.
Will they, will they withstand the weight
of a fully loaded can?
- Not really holding weight.
So the shim pins are on the shims, which are the,
they're along the,
okay, so the basket has a lot of square pieces in it,
and then there's, the canister is round,
so in those areas. (overlapping)
Oh, there we go. - Oh, there we go.
(overlapping)
- Basket in there, tight, so then we move around,
the shims, the
stand off pins are at the bottom of that,
to hold it off the bottom of the canister,
to leave some air space for the circulation
of the helium through the whole basket system.
- And, just to confirm, we were talking
in degrees Fahrenheit, not the.
- Not Celsius.
- Not Celsius, degrees Fahrenheit.
So,
are those scratches on the CEC,
with canister 29, and what's the whitish looking material?
- That's actually not the CEC, and,
it gets a little confusing when we begin
to talk about all these different terms,
and dry cask storage, especially with the UMAX ISFSI
because a storage vault actually consists of,

you mentioned the CEC, the cavity enclosure container.
That is the
stainless steel hole
that's in the concrete pad, inside of that hole,
they insert a divider shell, which provides the conditions
for continual cooling of the MPC.
So the divider shell is what we were looking at,
when we're looking at the scrapes and scratches.
The CEC is actually the outer wall, outside,
on the outside of that inner divider shell there.
- That white powdery material right there, what's--
- Oh, that's just--
- That's what we're talking about.
- Oh, that's just, that's residual cleaning fluid,
left over from the developer.
That white stuff you see on top of the MPC there,
that's probably left over developer
that wasn't properly cleaned completely off
of the welding when they performed the,
the NDE testing, if you look around the inside
of the ring there, there's an outer ring,
I can't explain this well for you
because I don't have a pointer.
But that is probably just cleaning
that was done incompletely, that's right, that's right.
That's what that white stuff, that's what it looks like
to me, but I wouldn't be concerned about that at all.
- That's something that they would eventually clean off,
before they put the closure lid on?
- I don't think so, in this case, no.
- All right, okay.
While we're waiting for more questions

from my staff back there, for those
that are still, still with us on the webinar, if you,
that have hung in for I guess almost two and a half
or so hours now, if you have comments regarding
the webinar itself, and did it help you be a,
participate in learning more about this event,
and the NRC activities, if you want to provide feedback
on that, that'd be great, if you could just add them
to the, to the chatroom,
and then we'll take that feedback, and
see if we can't make the next one better.
So there's a question about, about the NRC allowing
promises, I'm not going to, or commitments, I'll say,
from a licensee, to figure out how to inspect,
repair, retrieve fuel, and inspect fuel,
to be a strong regulatory framework.
And so we've established a regulatory framework
that we think, that we believe provides
for the safe storage of spent fuel at San Onofre,
and we think the requirement,
to have the Aging Management Program,
goes a long way, in the early detection of,
of deficiencies that allows sufficient time
to complete the repair, and so we think
that provides an appropriate regulatory framework
for the licensee.
And so I have, I have,
there's a question regarding comparing procedures
at San Onofre with that of other licensees,
or training programs, and
I have two inspectors in Region IV, Eric and Lee,

and that's one of the things that they do,
when they go from site to site,
is they're able to compare and contrast the adequacy
of different programs, from one licensee to another.
- And I can tell you that the real difference is not
in the quality of the procedures from site to site,
the true difference in a dry cask storage program is
how the licensee, that is the utility,
how engaged they are in dry cask loading operations,
how engaged they are,
are they out performing deck plate oversight,
or are they sitting back in an office someplace, you know?
That's the real difference in dry cask loading operations,
is just how involved the licensee is going to be,
how intrusive they're going to be.
NRC is only going to be there for one can
of a loading campaign. They are there
for all the cans, and they need
to be out there providing deck plate oversight,
looking over the welders' shoulders
when they're doing welding, they need
to be out there watching dry cask storage operations out
on the pad, or when they're downloading into a HISTORM,
or any other type of overpack, that is the difference.
That is the difference between a good program
and a program that doesn't perform so well,
that is the difference, in a nutshell, and that is
what we see when we're out inspecting these licensees.
- And there's a question on, again, on
requiring licensees to do drop analysis,
and,
and how the public can intervene

to require that a licensee does some type of drop analysis,
and so, so as of now, the NRC believes
that the drop analysis is not required,
not for this type of event, that exists at San Onofre,
because the ultimate requirement is
to maintain the redundant load drop protection.
And so we don't plan to require a change
to the final safety analysis report
to include the, a load drop event.
That said, that the public always has the right
to petition the NRC, through the petitioning process, to
impose additional requirements on licensees.
And if you choose to do that, you can,
you can follow the NRC's program for that,
and ask the NRC to reconsider their decision
on when a drop analysis is required.
And then the question on how can the licensee inspect,
or monitor canisters?
- Oh, (inaudible) inspect or monitor the canisters?
So I had mentioned,
I don't know, it's,
EPRI, the Electric Power Research Institute,
did some studies to kind of help industry figure out methods
of doing their Aging Management inspections,
and they put, what I mentioned before,
these crawlers that you see they have,
either keep, you know, (inaudible) for a camera,
or other non-restrictive
examination equipment to go,
depending on what kind of system it is,
you know, the cases around the canister,

to be able to go through close to, like,
the annulus to go through and see,
or there's other probes, not maybe crawlers all the time,
and they were testing these, they did a few tests
that the NRC sent, we sent one inspector,
and one technical reviewer to,
to watch their testing, and they did.
We've also gone out to a number of facilities
that were preparing for their renewals,
and they did, they brought out whatever pieces
of equipment that they were going, that they were planning
on using in their Aging Management Program,
just to test those out, to see if those were going to be useful
when they actually had
to do their Aging Management inspections.
So usually, it has to do with some sort of probe,
or crawler that goes along the annulus,
and looks at sides of the canister.
- And this, and the use of robotic technology
to do non-destructive examinations
at nuclear power plants, and else,
and other industries, that's, that's not new technology,
that's been around for awhile,
and so we're just taking advantage of the technology
that already exists in the US,
and applying it to multipurpose canisters.
There is no requirement to do an inspection
on the inside of the multipurpose canister,
these are all inspections that are done external
to the surface of the canister.
And I know we're getting a lot of comments
about hot cell construction,

and the NRC does not require licensees to maintain a pool,
or to maintain a hot cell structure for,
for retrieving fuel from a multipurpose canister,
or some other canister, should the need arise.
They do have to have the ability to,
to perform that, and we don't think that it's a,
an immediate or rapid type of inspection to meet.
So you would have early detection,
you have the ability to construct the facility you need,
and there'd be ample opportunity to,
to make those repairs, and at this time,
we don't have any requirements imposed
on licensees to maintain either type of facility,
pool or hot cell, again,
I understand that there are probably a wide assortment
of views on whether that should be imposed
on licensees, and that, and if you feel strongly about that,
this is where'd you want to avail yourself
of the NRC's petition process, and,
and send it to the NRC for consideration.
So there's a question that says,
given that Edison created this fuel under the impression
that there would be a national repository,
would you consider it fair for Edison
and other companies to be getting national assistance
for help for maintaining safe procedures
and monitoring systems for this fuel?
And.
- So that,
so those that were required to,
the acceptance of, for the disposal of the fuel was,

was Department of Energy's task,
and yes, they do not currently have a repository
for disposal, I believe there are some facilities
that are tapping DOE for some funding,
for some of the operations that they're doing,
with their spent fuel, I'm not certain, as I'm not,
I don't look at that directly,
but I'm not certain what they've been approved
to get funding for, but it's up to the Department of Energy,
and whatever their responsibilities were,
and what the licensee is doing,
whether those items could be reimbursed or not.
- Right, right-- - So there is a small part,
that they are getting reimbursed--
- Okay, and of course, with the appropriate legislation,
Congress could dictate that that happen, as well.
- Correct, yeah.
- And says, how much longer will loading take at San Onofre?
- Probably another year, once they start,
a year or less, is my best guess.
- And then there's a comment that says,
in the case of San Onofre, there's no room
for cameras, or other actual ability to do any other checks,
after loading into the vault?
And so, and so I think actually San Onofre is looking
into that, and there is, my understanding is,
the robotic technology is such that you can get a crawler
into the storage vault, and do the inspections at,
of a canister at San Onofre.
And it's also my understanding
that the robotic technology being deployed today
is using the, an eddy current testing methodology,

and that that's, that has,
that's proving to be sufficient at checking
for crack initiation,
and that's why we,
the testing has been going on with EPRI at some
of the sites, to fine tune and work out a solution
for everybody to follow.
And then there's a question
about how involved has Edison been
in the oversight of moving waste.
- Well, one of their corrective actions is,
they're going to be much more involved than they were,
prior to this event, that's for sure.
- That, one of our concerns that we've communicated,
and it's been identified in the root causal evaluations
by San Onofre, is they weren't as involved
in the contractor oversight at the facility
as they should have been, they recognized that,
and many of their corrective actions that they're,
that they're developing now involve
building up that contractor oversight.
So it's important to us that they get it right
for Holtec during the, when they resume fuel handling,
and it's important that they get it right
for their decommissioning contractor, before they
start significant decommissioning work at the site.
- That's a good question.
- And so I'm going to skip down the, Patty,
if the shim pins all break, in the affected canister,
would there still be adequate cooling of the canister,
if the shim pins were all snapped off?

- I don't know if we have an analysis of that.
- A final analysis?
- Yeah, a final analysis.
- Yeah, I think the early analysis said
that there was adequate cooling of the canister,
even with broken shim pins-- - Right.
- For the fuel that's currently loaded,
affected-- - For the fuel
in the affected canisters. - That's right.
- That we believe that there's still adequate cooling
of the canister,
so, but I also recognize
that there's more engineering evaluation continuing
on that question, but we didn't believe
that there was an issue, based on our own evaluations.
And so there's a question, I guess, I don't know.
(inaudible)
And so there's a question on, if the canister dropped,
and the containment boundary breached,
what's the worst case, and again,
for the scenario at San Onofre,
if this canister had dropped the distance of 18 feet,
into the storage vault,
we don't believe there would have been a major loss
of the containment boundary.
So there wouldn't have been
a significant radiological impact from a canister drop.
So the worst case scenario
would be some cracking
of the weld of,
of the MPC,
and the release,

via cracking of a weld of an MPC, if,
would be marginal, it would be very small.
So I don't think there would be
a significant radiological hazard, that,
that keep, with that said, that is one of those evaluations
that we are waiting for, giving the licensee the opportunity
to complete that, and then,
and then we're going to take a look at that,
do our own independent engineering look at
that evaluation, and reach our own assessment
of what the consequences could have been.
I think we're in the five minute range,
left on the webinar, is that about right,
in the back of the room, okay.
So why is the mesa not being discussed for safer storage?
- You mean the big bluff overlooking the ISFSI--
- No, mesa, on the other side of the freeway, where the,
where the training building, there were some warehousing,
over on the other side of the freeway,
why isn't that being considered,
why wasn't that considered for the ISFSI pad location?
- Well, actually, the NRC doesn't decide
where it's going to be, it's the licensee who decides.
They propose, they give us all of their analysis,
and we review that, so it's based on what,
where they were identifying it would go.
- Okay, and so, and then our role is to,
when presented with the location that they wanted,
is it a safe location, we determined
that met our requirements for, for placement
of an ISFSI pad, so.

So there's a question about,
what are the internal mechanisms in the NRC
to identify opportunities for improvement
from this and other situations,
where licensee has multiple violations?
Who's in charge of thinking about those questions,
and how do corrective action programs occur
within the NRC itself?
So the,
in the San Onofre case,
what we've done is, we've taken the learning
from our inspection activities at San Onofre,
and what actually happened,
and we've been providing operating experience
and knowledge management,
knowledge transfer briefings throughout the NRC.
And one of the next steps we have to do is
to take the presentation we've provided today,
and offer it up to the other regional offices
and program offices at headquarters,
and brief them on the event, our learnings,
and where we think there might be areas
to improve within the inspection program.
So that's done, at least within my division,
that's done as a matter of routine.
If we go out and find significant issues
with the licensee, we come back,
we talk about it with the whole division,
and if we think those learnings are generically applicable
to the inspection program, we seek inspection program change
to get it right.
Is what, is the ISFSI site for indefinite use?

I think Eric, talk--
- It's safe for indefinite use.
- I think Eric talked about this before,
so it's initially licensed for 20, and--
- Can be re-licensed for 20 or 40 years.
- 20 or 40, we think it's good to go
for up to 100 years-- - The canister.
- The canister. - The canister.
- Yeah. - Yeah, for 100 years.
And, and the NRC believes that,
that there'll be a, within the next 100 years,
there'll be a solution for longterm waste disposal
of high level waste.
And I think we're down to a couple of minutes,
I do want to thank those that have hung on this long
to participate, I really appreciate the use
of the chatroom features, and all the dialogue
and questions that came into the chatroom for the,
for the panel to respond to.
We do plan to go back through the chatroom comments
and questions, and scrub them some more,
and where we find things that we didn't address today,
or we don't think we did a good enough job addressing,
then we'll collect those, we'll likely add those
to our frequently asked questions document
on the NRC Spotlight, underneath the San Onofre tab.
So the dialogue is, I view this as,
the dialogue has just begun,
this is not a one and done opportunity.
If you think this forum was useful,
we'd like to do it again, we have another inspection activity

and corrective actions coming up
in early mid-December timeframe,
I think, you know, this is-- - If all goes to schedule.
- You know, if desired, this,
that might be a good opportunity to,
to use this forum again, to brief out to the public
on what we found, and why, you know, if we make a decision
to resume fuel loading, that we can communicate
that with you, what the basis of our decision is.
- That's the last question.
Is it over?
- Okay, so I think we're going to,
to wrap up the webinar, again, thanks to everybody
that joined and participated, have a good evening.
- Thank you.

EXHIBIT 14

Dr. Kris Singh

CEO Holtec International

Event: Southern California Edison's Community Engagement Panel (CEP)

Location: San Juan Capistrano, CA

Date: 2014-10-14

31:04 to 34:30

Panel Member Gene Stone: Yes, so, another question I had was, on your map you showed that you had your products being used in several different countries. Do any of the European countries, or Asian countries, you know, are they using a, are your materials that are underground, are they covered by a building as well, to protect from external weather conditions?

Dr. Singh: Yeah, in Europe there's a misconception. Europeans put their casks inside buildings. The reason they so that, it's been a historical practice, because, they don't have, you know, huge land mass sites. Here you go to a nuclear plant it's bigger than Luxembourg, some sites. You know . . .

Chairman David Victor: Not to disparage Luxembourg.

Dr. Singh: You go to Europe and you see people living in apartments, you know, right outside the fence. So they, to deal with people, people's sensibilities, they put a structure around it. Most of these structures are not seismically qualified to Californian earthquakes. There are cranes that they use are not single failure proof cranes. They basically, it's more of an optical protection than it's a safety protection. And that's the practice that's been in Europe forever. It's not a, this is not something that we need to be copying here. You don't really gain anything. Yeah, of course we should not go inside the canister. You don't breach the confinement integrity to be monitoring for breach of confinement and integrity. But there is, there is a, a direct way, at least in our canister, to see if you if you are getting any, getting any breach of the wall. The canister, and you saw, in the slide, the helium circulates, and it makes the lid hot. This lid on our canister is quite hot. We imbed a thermocouple, in the lid, and you can see the temperature fluctuation. If you had loss of helium, that temperature will drop. So…

Chairman David Victor: I bet you learn a lot from the temperature.

Dr. Singh: You learn just by metal temperature, not by air temperature. Metal temperature is very sensitive. And in our thermally circulating, helium circulating canister there's a direct way to measure what's going on, on the inside, without breaching the wall.

Well, in, in my personal belief, it's not practical to repair a canister, if it were damaged. If it had a through-wall damage, first you prevent it, but, in the most unlikely circumstance, if that canister were to develop a leak, let's be realistic, you have to have find it, that crack, where it might be, and then find the means to repair it. You will have, in the face of millions of curies of radioactivity, that is coming out of the canister, we think it's not [unintelligible]. However, let, let me, uh, you can easily, easily isolate the canister in a cask that keeps it cool and basically you've provided a next confinement boundary, and you're not relying on the canister. So, that it a practical way to deal with it, and that's the way we advocate for our clients.

EXHIBIT 15

MIKE LEVIN
49TH DISTRICT, CALIFORNIA

WASHINGTON, DC 20515
(202) 225-3906

Congress of the United States

House of Representatives

Washington, DC 20515–0549

June 11, 2019

The Honorable Kristine Svinicki
Chairwoman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Svinicki,

I write to follow up on my letter to you dated April 15, 2019, calling for a full-time inspector to be assigned to the San Onofre Nuclear Generating Station (SONGS). The letter, sent nearly two months ago, was signed by both of California's Senators and five Members of Congress whose constituents are directly impacted by your oversight responsibilities at SONGS. We have yet to receive a written response from you or any other Nuclear Regulatory Commission (NRC) official. This lack of response is particularly concerning in light of the Commission's May 21, 2019, determination allowing Southern California Edison and Holtec International to resume spent fuel loading.

On June 7, 2019, the House Oversight Committee held a hearing that I participated in examining federal spent nuclear fuel policies and safety at SONGS. NRC Region IV Administrator Scott Morris testified on behalf of the Commission. During the hearing, Administrator Morris confirmed that the following facts about occurrences at SONGS over the last year:

- The August 2018 "near-miss" incident at SONGS was caused by deficiencies in Southern California Edison's training, equipment, procedures, and oversight.
- Southern California Edison's staff at SONGS were not properly trained, certified, and supervised.
- Southern California Edison failed to formally report the August 2018 "near-miss" incident within the timeframe required by the NRC.
- A similar event had previously taken place at SONGS, but Southern California Edison did not take corrective action to ensure such an event would not happen again.
- The August 2018 "near-miss" and reporting deficiencies led to the NRC assessing Southern California Edison with a Level II violation.
- It is not common for NRC licensees to receive Level II violations.
- Southern California Edison inspected only eight of the 29 canisters that have been downloaded into the independent spent fuel storage installation (ISFSI) at SONGS.

Administrator Morris's testimony further illustrated the extraordinary record of non-compliance at SONGS. Southern California Edison's violation stemming from its failure to report the August 2019 "near-miss" in a timely manner demonstrates that the Commission cannot rely on its licensee to self-report. As such, periodic inspections are inadequate to provide local communities the level of safety and transparency that they deserve. With this in mind, I reiterate my call for a

full-time inspector to verify that all spent fuel loading activities at SONGS comply with NRC safety requirements.

Additionally, I was disappointed to learn that Southern California Edison and the NRC visually assessed only eight of the 29 loaded canisters at SONGS. The facility's location presents unique environmental threats and elevated hazard to canister integrity, including seismic activity and corrosive ocean air. Southern California Edison has informed me that it costed approximately $400,000 in total for the eight visual inspections. The cost of additional inspections is a small price to pay for greater certainty about canister conditions, especially given the $4.7 billion price tag for the decommissioning of SONGS.[1] I urge you to immediately require the visual inspection of the remaining 21 canisters.

Please provide a response to this letter no later than June 24, 2019. Thank you.

Sincerely,

Mike Levin

MIKE LEVIN
Member of Congress

[1] Sforza, Teri. 30 April 2018. "How much should it cost to pay for San Onofre nuclear plant's shutdown? Here's how you can weigh in." *The Orange County Register*.

CC: Scott Morris, Administrator, Region IV, U.S. Nuclear Regulatory Commission

MIKE LEVIN
49TH DISTRICT, CALIFORNIA

1626 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-3906

Congress of the United States
House of Representatives
Washington, DC 20515–0549

June 21, 2019

The Honorable Kristine Svinicki
Chairwoman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Svinicki,

Thank you for agreeing to meet with me in the coming weeks regarding the San Onofre Nuclear Generating Station (SONGS), located in my Congressional district. I look forward to a thorough discussion of the Nuclear Regulatory Commission's (NRC) decisions regarding safety at SONGS. While I am sure that our conversation will be valuable, it is my understanding that Southern California Edison (SCE) may plan to resume the loading of spent fuel canisters prior to our meeting. With this in mind, I feel it is important that I voice my concern with the NRC's repeated decisions that fail to maximize safety and transparency at SONGS.

The NRC's mission statement clearly affirms that the Commission has a responsibility to provide "adequate protection of public health and safety."[1] As I look back at recent incidents at SONGS, I see a record that demands greater NRC intervention. That record includes the following:

- Falsified fire safety recordkeeping.[2]
- Failed backup power systems.[3]
- Backlash against employees who reported poor safety practices.[4]
- An NRC review that found SCE's corrective actions had "not resulted in sustained and measurable improvement" of human performance onsite.[5]
- Unexpected degradation of new steam generators, an incident that was incorrectly dismissed as minor.[6]
- A radioactive leak that resulted in the shutdown of a reactor.[7]
- The discovery of loose bolts in spent fuel canisters.[8]

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[1] About NRC. *U.S. Nuclear Regulatory Commission.* https://www.nrc.gov/about-nrc.html.
[2] Woodall, Bernie. 14 Jan. 2008. "So. Calif. nuclear plant worker faked fire checks." *Reuters.*
[3] Douglass, Elizabeth. 31 July 2008. "San Onofre under scrutiny." *Los Angeles Times.*
[4] Sisson, Paul. 17 Nov. 2008. "SAN ONOFRE: Workers allege retaliation for raising safety concern." *San Diego Union-Tribune.*
[5] Bermudez, Esmerelda. 5 Feb. 2012. "San Onofre nuclear power plant incidents draw attention." *Los Angeles Times.*
[6] Sewell, Abby and Ken Bensinger. 13 July 2013. "How San Onofre's new steam generators sealed nuclear plant's fate." *Los Angeles Times.*
[7] Bermudez, Esmerelda. 5 Feb. 2012. "San Onofre nuclear power plant incidents draw attention." *Los Angeles Times.*
[8] Sforza, Terry. 29 Mar. 2018. "Here's how the bolt on the container of nuclear waste at San Onofre may have been shaken loose. *Orange County Register.*

- A "near-miss" incident that could have resulted in the 18-foot drop of a spent fuel canister.[9]

These incidents still loom large in the consciousness of my constituents who live near SONGS. They hear about how the most recent "near-miss" was caused by deficiencies in SCE's training, equipment, procedures, and oversight, and they see how the incident fits into a larger pattern of behavior.

I would like to be able to tell my constituents that they should be comforted to know that the NRC is genuinely committed to protecting their safety. However, a review of your recent record fails to provide that comfort. After you found SCE had committed a Level II violation, a violation level that NRC Region IV Administrator Scott Morris called "uncommon," you only assessed a $116,000 civil penalty on a company with assets totaling more than $56 billion.[10] In response to unplanned scratching on the surface of the spent fuel canisters at SONGS, you required SCE to visually inspect only eight of the 29 loaded canisters onsite, despite the minimal incremental cost of additional inspections.[11] Finally, you have decided it is unnecessary to assign a full-time inspector to SONGS while being aware of the dubious record at the site and knowing how such an action would help to rebuild the public trust.

Further, your justification for refusing to assign a full-time inspector to SONGS does not seem to account for the unique loading campaign that SCE intends to conduct. In your June 17, 2019, letter to me, you state that canister loading activities "are usually limited in duration." However, NRC Region IV staff has confirmed that SCE will be carrying out an ongoing, accelerated decommissioning that is significantly different than the process by which most utilities transfer spent fuel. NRC Region IV staff has acknowledged that the accelerated decommissioning presents unique challenges and can be more difficult than a standard decommissioning.[12]

Given the noteworthy nature of the spent fuel transfer campaign at SONGS, I urge you to assign an inspector to SONGS at all times that fuel transfer activities are taking place. Please respond to the following questions related this proposed inspection regime:

- Do you have the statutory authority to assign an inspector to SONGS at all times that fuel transfer activities are taking place? If you do not, please describe the authorities you would need in order to do so.
- Do you have funding available to assign an inspector to SONGS at all times that that fuel transfer activities are taking place? If you do not, please provide the estimated cost of this inspection regime.

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[9] Nikolewski, Rob. 10 Aug. 2018. "Incident with waste canister at San Onofre nuclear plant prompts additional training measures." *San Diego Union Tribune.*
[10] 2018 Annual Report. *Edison International.* https://www.edison.com/content/dam/eix/documents/investors/corporate-governance/eix-sce-2018-annual-report.pdf
[11] NRC Region IV Phone Call with Congressional Staff. *31 May 2019.*
[12] Ibid.

Each incident at SONGS listed in this letter was thought to be the last after they became public. You have a responsibility to take every action available to minimize the chance of future incidents. I would be incredibly disappointed if history repeats itself.

I look forward to further discussion at our meeting.

Sincerely,

Mike Levin

MIKE LEVIN
Member of Congress

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

CHAIRMAN

July 16, 2019

The Honorable Mike Levin
United States House of Representatives
Washington, DC 20515

Dear Congressman Levin:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your letters of June 11 and June 21, 2019, expressing concerns related to the San Onofre Nuclear Generating Station (SONGS).

I very much appreciated the opportunity to meet with you on July 11th to discuss in greater detail your concerns. I agree with you on the importance of accountability to ensure the safety of the people in the communities surrounding SONGS, and am committed to continued communications with you on this issue.

As I mentioned during our conversation, I am confident that the NRC's inspection plan for the SONGS decommissioning process is the most effective approach to ensure the safe decommissioning of the site. We have extensive experience and a proven record with performing inspections at decommissioning sites, and the NRC's inspectors who perform this function are experts with extensive experience in this area. In addition, I want to assure you that we will not hesitate to devote the inspection resources necessary to ensure the safe decommissioning of SONGS.

Thank you again for your time and the opportunity to discuss the NRC's inspection and oversight of these activities. Please feel free to contact me or have your staff contact Eugene Dacus, Director of the Office of Congressional Affairs, at 301-415-1776 if you have additional questions or need more information.

Sincerely,

Kristine L. Svinicki

EXHIBIT 16

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

August 17, 2018

MEMORANDUM TO: Eric J. Simpson, CHP, Health Physicist
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

W. Chris Smith, Reactor Inspector
Engineering Branch 1
Division of Reactor Safety

Marlone X. Davis, Transportation & Storage Safety Inspector
Inspections & Operations Branch
Division of Spent Fuel Management

THROUGH: Janine F. Katanic, PhD, CHP, Chief /RA/ LLH for
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

FROM: Troy W. Pruett, Director /RA/
Division of Nuclear Materials Safety

SUBJECT: INSPECTION CHARTER TO EVALUATE THE NEAR-MISS LOAD DROP EVENT AT SAN ONOFRE NUCLEAR GENERATING STATION

A special inspection has been chartered to review the licensee's follow-up investigation, causal evaluation, and planned corrective actions regarding the near-miss drop event involving a loaded spent fuel storage canister at the San Onofre Nuclear Generating Station (SONGS) Independent Spent Fuel Storage Installation (ISFSI) on Friday, August 3, 2018. (License Nos. NPF-10 and NPF-15, Docket Nos. 50-361, 50-362 and 72-41).

CONTACT: Janine F. Katanic, PhD, CHP, FCDB/DNMS
(817) 200-1151

BACKGROUND AND BASIS

On Friday, August 3, 2018, at approximately 1:30 pm (PST), SONGS was engaged in operations involving movement of a loaded spent fuel storage canister into its underground ISFSI storage vault (HI-STORM UMAX storage system). As the loaded spent fuel canister was being lowered into the storage vault using lifting and rigging equipment, the licensee's personnel failed to notice that the canister was misaligned and was not being properly lowered. The licensee continued to lower the rigging and lifting equipment until it believed that the canister had been fully lowered to the bottom of the storage vault. However, a radiation protection technician identified elevated radiation readings that were not consistent with a fully lowered canister. The licensee then identified that the loaded spent fuel canister was hung up on a metal flange near the top of the storage vault, preventing it from being lowered, and that the rigging and lifting equipment was slack and no longer bearing the load of the canister.

In this circumstance, with the important to safety (ITS) rigging and lifting equipment completely down in the lowest position, the ITS equipment was disabled from performing its designed safety function of holding and controlling the loaded canister from a potential canister drop condition. The licensee reported that the canister was resting on a metal flange within the storage vault. It was estimated that the canister could have experienced an approximately 17-18 foot drop into the storage vault if the canister had slipped off the metal flange or if the metal flange failed. This load drop accident is not a condition analyzed in the dry fuel storage system's Final Safety Analysis Report (FSAR).

In response to the discovery that the canister was not fully lowered, the licensee took immediate actions to restore control of the load to the rigging and lifting devices. The estimated time the canister was in an unanalyzed credible drop condition was approximately 45 minutes to 1 hour in duration. The licensee regained control of the load, repositioned the canister, and lowered the canister into the storage vault. The licensee halted all dry fuel storage movement operations in order to fully investigate the incident and develop corrective actions to prevent a recurrence. In addition, the licensee has shared the operational experience with another site with a similar dry fuel storage system.

Region IV became aware of the SONGS "near-miss" incident on Monday, August 6, 2018, when the licensee provided a courtesy notification and described it as a "near-miss" or "near-hit" event. The reporting requirements of the incident are still being evaluated by the Region and discussed with the licensee.

On August 7 and 16, 2018, Region IV and NMSS representatives participated in conference calls with licensee representatives in order to gather additional facts regarding the circumstances of the incident and the licensee's investigation. Region IV is evaluating the information provided by the licensee and is coordinating with the Division of Spent Fuel Management, NMSS.

The NRC is chartering this special inspection pursuant to Management Directive 8.3, "NRC Incident Investigation Program," and NRC Inspection Manual Chapter 0309, "Reactive Inspection Decision Basis for Reactors."

The purpose of the inspection is to investigate the occurrence; interview personnel; observe equipment; and review relevant documentation, including the results of the licensee's investigation and causal analysis, and development and implementation of actions to prevent

recurrence. The licensee has committed to not resume fuel loading operations until after this special inspection and associated reviews are complete. Once the licensee has confirmed its plans to resume fuel loading operations, inspectors will also observe the loading operations to ensure that the corrective actions are adequate. These observations may be conducted as part of this special inspection or as an independent inspection activity, as directed by regional management.

SCOPE

The inspection should seek to address the following items at a minimum:

1. Identify and review all pertinent records, documents, and procedures related to the licensee's downloading operations at the ISFSI pad including but not limited to: worker training and qualifications; rigging equipment qualification, testing, and preventative maintenance; and lifting equipment qualification, testing, and preventative maintenance. Evaluate the adequacy of the above noted procedures, worker training and equipment testing and preparation.

2. Evaluate the adequacy of the loading procedure(s) with respect to verification of MPC movement, centering the MPC over the ISFSI vault, lowering the MPC, and positioning the MPC within the ISFSI vault. Interviews with personnel involved in the ISFSI loading operations should be conducted to evaluate licensee and contractor communications between crane/VCT operators, rigging and spotting staff, cask loading supervisors, radiation protection staff, and licensee oversight personnel. Evaluate the adequacy of pre-job briefings that may have taken place prior to fuel loading operations.

3. Review and evaluate the licensee's immediate corrective actions taken after the event for adequacy of notifications to the licensee and safety assessments performed immediately following the event. Review the licensee's inspection documentation and/or analysis to determine whether the vault's divider shell experienced any damage that would inhibit the component from performing its designed safety function.

4. Based on the review of procedures and interviews of personnel involved with loading operations, evaluate the adequacy of procedure adherence.

5. Interview personnel associated with the event to develop a timeline to ensure the licensee's investigation contained all necessary information to identify all contributing factors and develop adequate corrective actions.

6. Review the licensee's root cause investigation results, to determine whether the review thoroughly identified all contributing factors and that final corrective actions will be adequate to prevent reoccurrence. Evaluate whether prior operational experience relating to complications or issues associated with canister downloading operations was identified and considered as part of the licensee's root cause investigation and corrective action development.

7. Review the licensee's planned actions that will address the point loading condition that was experienced by the affected canister. If applicable, review the licensee's analysis that demonstrated the canister will continue to perform as designed for continued storage OR review licensee's inspection plan to safely remove or lift the canister from the vault to support inspection of the bottom of the canister to demonstrate the canister did not

receive any damage that would inhibit the component from continuing to perform as designed.

8. Investigate the licensee's procedures for reportability to the NRC and determine if the licensee made the correct decision regarding notifications made to the NRC for this event.

9. As directed by regional management, observe resumption of fuel loading operations to verify that corrective actions were effective in addressing deficiencies that contributed to the event. This should include evaluation of procedure and/or equipment enhancements; review or observation of training and briefings provided to riggers, crane operators, spotters and observers, supervisors and other personnel involved in fuel loading operations.

10. Determine if the inspection should be elevated to an AIT and promptly notify regional management of any recommendation to escalate the special inspection to an AIT.

GUIDANCE

The NRC is chartering this special inspection pursuant to Management Directive 8.3, "NRC Incident Investigation Program," and NRC Manual Chapter 0309, "Reactive Inspection Decision Basis for Reactors." The Manual Chapter and Management Directive identify Inspection Procedure 93812, "Special Inspection," for specific use in reviewing events. Planned Dates of Inspection are September 10-14, 2018.

This inspection should emphasize fact-finding in its review of the circumstances surrounding the near-miss canister drop event. Safety concerns identified that are not directly related to near-miss drop event should be reported to NRC management for appropriate action.

Daily briefings with NRC management should occur to discuss the team's progress and preliminary observations.

In accordance with Manual Chapter 0610, a report documenting the results of the inspection should be issued within 30-45 days of the completion of the inspection.

This Charter may be modified should NRC inspectors find significant new information that warrants review. Should you have any questions concerning this charter, please contact Janine F. Katanic at 817-200-1151.

INSPECTION CHARTER TO EVALUATE THE NEAR-MISS LOAD DROP EVENT AT SAN ONOFRE NUCLEAR GENERATING STATION – DATED AUGUST 17, 2018

DISTRIBUTION:
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AMoreno, OCA
JWeil, OCA

ADAMS ACCESSION NUMBER: ML18229A203

■SUNSI Review By: LLH	ADAMS: ■ Yes ☐ No	☐ Non-Publicly Available ■ Publicly Available	■Non-Sensitive ☐ Sensitive	Keyword: NRC-002

OFFICE	DNMS:FCDB	DNMS:DD	DNMS:D
NAME	JFKatanic	LLHowell	TWPruett
SIGNATURE	*/RA/ LLH for*	/RA/	/RA/
DATE	8/17/18	8/17/18	8/17/18

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EXHIBIT 17

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

March 25, 2019

EA-18-155

Mr. Doug Bauder, Vice President
and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: NOTICE OF VIOLATION AND PROPOSED IMPOSITION OF CIVIL PENALTY - $116,000 AND NRC SPECIAL INSPECTION REPORT 050-00206/2018-005, 050-00361/2018-005, 050-00362/2018-005, 072-00041/2018-001

Mr. Bauder:

This letter refers to the special inspection conducted on September 10-14, 2018, at your facility in San Clemente, California. The inspection was conducted in response to the misalignment of a loaded spent fuel storage canister as it was being downloaded into the storage vault at the San Onofre Nuclear Generating Station (SONGS) on August 3, 2018. A final exit briefing was conducted telephonically with Mr. Thomas Palmisano and members of your staff on November 1, 2018, and the details regarding two apparent violations were provided in the subject inspection report dated November 28, 2018, NRC's Agencywide Documents Access and Management System (ADAMS) Accession ML18332A357. An errata to this inspection report was issued on December 19, 2018, ADAMS Accession ML18341A172.

In the letter transmitting the inspection report, we provided you with the opportunity to address the apparent violations identified in the report by either attending a predecisional enforcement conference (PEC) or requesting alternative dispute resolution (ADR). On December 10, 2018, SONGS staff informed the NRC that they requested a PEC. On January 24, 2019, a public PEC was conducted in the Region IV office with you and members of your staff to discuss the apparent violations, their significance, their root causes, and your corrective actions.

Based on the information developed during the inspection and the information that you provided during the PEC, the NRC has determined that two violations of NRC requirements occurred. The violations are cited in Enclosure 1, Notice of Violation and Proposed Imposition of Civil Penalty (Notice), and the circumstances surrounding them are described in the subject inspection report. Violation A involved the failure to ensure that important-to-safety equipment was available to provide redundant drop protection features for a loaded spent fuel canister during downloading operations. Violation B involved the failure to make a timely notification to the NRC Headquarters Operations Center for the August 3, 2018, disabling of important-to-safety equipment.

The NRC considers that Violation A could have resulted in a significant safety consequence because an important-to-safety feature was disabled during a spent fuel canister downloading operation. Therefore, this violation has been categorized in accordance with the NRC Enforcement Policy at Severity Level II. The NRC considers that Violation B impacted the NRC's ability to perform its regulatory oversight function. Therefore, this violation has been categorized in accordance with the NRC Enforcement Policy at Severity Level III.

Because Violation A was associated with a Severity Level II violation, the NRC considered whether credit was warranted for *Identification* and *Corrective Action* in accordance with the civil penalty assessment process in Section 2.3.4 of the NRC Enforcement Policy. The NRC determined that *Identification* credit was not warranted because Violation A was identified through a self-revealing event.

Your corrective actions included: (1) a revised corrective action program that encompasses all dry cask storage operations at SONGS with a defined threshold for problem identification and entry; (2) additional staff training and resources to implement Southern California Edison Company's (SCE's) revised and more intrusive contractor oversight of dry cask storage operations; (3) additional equipment to provide load indications and visual indications for defense-in-depth to prevent a future disabling of important-to-safety downloader slings during spent fuel canister downloading operations; (4) a revised SONGS-specific training program for all dry cask storage workers to ensure that workers understand and know how to perform their assigned roles and responsibilities; (5) revised procedures that provide qualitative and quantitative means to ensure that important steps for dry cask storage operations have been accomplished; and (6) a commitment to enhance future management and executive management oversight through the above programs, policies, and procedures.

During the NRC's follow-up inspections, several weaknesses were identified by the inspection team related to the above-noted corrective actions. The three most significant weaknesses included failures to: (1) establish measures to ensure appropriate quality standards were specified in design documents for the new load monitoring equipment used in the downloading process; (2) ensure that newly-installed load monitoring equipment conformed to the procurement documents; and (3) conduct spent fuel handling operations within established design basis seismic criteria when moving loaded transfer casks from the site's spent fuel buildings to the independent spent fuel storage installation.

In addition, SCE's corrective actions did not adequately address a change to the design and performance requirements for certain structures, systems, and components described in the Holtec UMAX Final Safety Analysis Report (FSAR). At the time of the August 3, 2018, incident, the version of the Holtec UMAX FSAR in effect (i.e., Revision 4) stated that "there is no risk of scratching or gouging" on a canister during downloading operations into the UMAX vault. Following the special inspection, the FSAR was revised to allow scratches on the canisters during downloading operations. Southern California Edison Company used the Title 10 of the *Code of Federal Regulations* (10 CFR) 72.48 process to implement the FSAR change. The NRC determined that SCE's calculations and evaluation did not contain an adequate basis to support the change to the FSAR. As a result, SCE initiated corrective actions to reperform the 10 CFR 72.48 evaluation. The NRC will review SCE's subsequent evaluation to determine if the FSAR design change to allow scratches is acceptable.

Based on the overall assessment of SCE's corrective actions, the NRC has concluded that *Corrective Action* credit is not warranted for Violation A.

Since neither *Identification* credit nor *Corrective Action* credit are warranted for Violation A, the NRC Enforcement Policy provides for a civil penalty that is twice the base civil penalty amount of $58,000 for a total of $116,000.

Because Violation B was associated with a Severity Level III violation and your facility has not been the subject of an escalated enforcement action within the last 2 years, the NRC considered whether credit was warranted for *Corrective Action* in accordance with the civil penalty assessment process in Section 2.3.4 of the NRC Enforcement Policy. Your corrective actions included: (1) making the required notification to the NRC; (2) providing training to shift managers on the NRC reporting requirements; (3) revising your reporting procedures; and (4) establishing biennial refresher training on reportability. We have determined that these actions are sufficiently comprehensive and appropriate. Therefore, the NRC determined that *Corrective Action* credit was warranted, which would not result in a civil penalty for this Severity Level III violation.

Given the above, to emphasize the importance of identification and comprehensive correction of violations, I have been authorized, after consultation with the Director, Office of Enforcement, to issue the enclosed Notice of Violation and Proposed Imposition of Civil Penalty (Notice) in the amount of $116,000 for the Severity Level II violation (Violation A). In addition, issuance of this Notice constitutes escalated enforcement action that may subject you to increased inspection effort.

If you disagree with this enforcement sanction, you may deny the violation, as described in the Notice, or you may request ADR with the NRC in an attempt to resolve this issue. Alternative dispute resolution is a general term encompassing various techniques for resolving conflicts using a neutral third party. The technique that the NRC employs is mediation. Mediation is a voluntary informal process in which a trained neutral mediator works with parties to help them reach resolution. If the parties agree to use ADR, they select a mutually agreeable neutral mediator who has no stake in the outcome and no power to make decisions. Mediation gives parties an opportunity to discuss issues, clear up misunderstandings, be creative, find areas of agreement, and reach a final resolution of the issues. Additional information concerning the NRC's ADR program can be found in Enclosure 3 and at http://www.nrc.gov/about-nrc/regulatory/enforcement/adr.html.

The Institute on Conflict Resolution at Cornell University facilitates the NRC's program as a neutral third party. If you are interested in pursuing this issue through the ADR program, please contact: (1) the Institute on Conflict Resolution at 877-733-9415, and (2) Dr. Janine F. Katanic at 817-200-1151 within 10 days of the date of this letter. You may also contact the Institute on Conflict Resolution for additional information about ADR. Your submitted signed agreement to mediate using the NRC's ADR program will stay the 30-day time period for payment of the civil penalties and the required written response, as identified in the enclosed Notice, until the ADR process is completed.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. In particular, you should address actions you have taken or plan to take to improve your corrective actions. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's ADAMS, accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the public without redaction. The NRC also includes significant enforcement actions on its Web site at http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions.

If you have any questions concerning this matter, please contact Dr. Janine F. Katanic of my staff at 817-200-1151.

Sincerely,

Scott A. Morris
Regional Administrator

Docket Nos. 50-206; 50-361; 50-362; 72-041
License Nos. DPR-13; NPF-10; NPF-15

Enclosures:
1. Notice of Violation and Proposed Imposition of Civil Penalty
2. NUREG/BR-0254, Payment Methods
3. NUREG/BR-0317, Enforcement Alternate Dispute Resolution Program

NOTICE OF VIOLATION
AND
PROPOSED IMPOSITION OF CIVIL PENALTY

Southern California Edison Company
San Clemente, California

Docket Nos. 050-00206, 050-00361, 050-00362, 072-00041
License Nos. DPR-13; NPF-10; NPF-15
EA-18-155

During an NRC inspection conducted September 10-14, 2018, two violations of NRC requirements were identified that were considered for escalated enforcement. (Note: three other Severity Level IV violations were identified and documented in the NRC special inspection report.) In accordance with the NRC Enforcement Policy, the NRC proposes to impose a civil penalty pursuant to Section 234 of the Atomic Energy Act of 1954, as amended (Act), 42 U.S.C. 2282, and 10 CFR 2.205. The particular violations and associated civil penalty are set forth below:

I. Violation Assessed a Civil Penalty

A. 10 CFR 72.212(b)(3) requires, in part, that each cask used by the general licensee conforms to the terms, conditions, and specifications of a Certificate of Compliance listed in 10 CFR 72.214. 10 CFR 72.214 includes a list of all the approved spent fuel storage casks that can be utilized under the conditions specified in a specific Certificate of Compliance, including Amendment 2 of Certificate of Compliance 072-01040. Certificate of Compliance 072-01040, Amendment 2, Condition 4, "HEAVY LOADS REQUIREMENTS," requires, in part, that lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Technical Specifications, Appendix A, Section 5.2.

Technical Specifications, Appendix A, Section 5.2.c.3 requires, in part, that the transfer cask, when loaded with spent fuel, may be lifted and carried at any height during multi-purpose canister transfer operations provided the lifting equipment is designed with redundant drop protection features which prevent uncontrolled lowering of the load.

Contrary to the above, on August 3, 2018, the licensee failed to ensure that the redundant drop protection features were available to prevent uncontrolled lowering of the load during multi-purpose canister transfer operations. Specifically, the licensee inadvertently disabled the redundant important-to-safety downloading slings while lowering canister 29 into the storage vault. During the approximately 45-minute time-frame, the canister rested on a shield ring unsupported by the redundant downloading slings at approximately 18 feet above the fully seated position. This failure to maintain redundant drop protection placed canister 29 in an unanalyzed condition because the postulated drop of a loaded spent fuel canister is not analyzed in the final safety analysis report.

This is a Severity Level II violation (NRC Enforcement Policy Section 6.3.b.2).
Civil Penalty - $116,000 (EA-18-155)

II. Violation Not Assessed a Civil Penalty

B. 10 CFR 72.75(d)(1) requires, in part, that each licensee shall notify the NRC within 24 hours after the discovery of an event involving spent fuel in which important-to-safety equipment is disabled or fails to function as designed when: (i) the equipment is required by Certificate of Compliance to be available and operable to mitigate the consequences of an accident; and (ii) no redundant equipment was available and operable to perform the required safety function.

Contrary to the above, from August 6 to September 14, 2018, the licensee failed to notify the NRC within the required time period after the discovery of an event involving spent fuel in which important-to-safety equipment was disabled or failed to function as designed when: (i) the equipment was required by Certificate of Compliance to be available and operable to mitigate the consequences of an accident; and (ii) no redundant equipment was available and operable to perform the required safety function.

Specifically, the licensee failed to notify the NRC within the required time period after an event that occurred on August 3, 2018, in which the licensee inadvertently disabled the redundant important-to-safety downloading slings while lowering spent fuel canister 29 into the storage vault, which resulted in the canister resting on a shield ring unsupported by the redundant downloading slings at approximately 18 feet above the fully seated position for approximately 45 minutes. These slings are required by Certificate of Compliance 072-01040, Amendment 2, Condition 4, and Technical Specification 5.2.c.3 to be available and operable during canister transfer operations, and no redundant equipment was available and operable to perform the required safety function.

This is a Severity Level III violation (NRC Enforcement Policy Section 6.9.c.2).

Pursuant to the provisions of 10 CFR 2.201, Southern California Edison Company (SCE) is hereby required to submit a written statement or explanation to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, with a copy to the Document Control Desk, Washington, DC 20555-0001, and the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV within 30 days of the date of this Notice of Violation and Proposed Imposition of Civil Penalty (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA-18-155" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance will be achieved.

Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, the NRC may issue an order or a Demand for Information requiring you to explain why your license should not be modified, suspended, or revoked or why the NRC should not take other action as may be proper. Consideration may be given to extending the response time for good cause shown. Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

You may pay the civil penalty proposed above, in accordance with NUREG/BR-0254 (Enclosure 2) and by submitting to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, a statement indicating when and by what method payment was made, or may

protest imposition of the civil penalty in whole or in part, by a written answer addressed to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, within 30 days of the date of this Notice.

Should SCE fail to answer within 30 days of the date of this Notice, the NRC will issue an order imposing the civil penalty. Should SCE elect to file an answer in accordance with 10 CFR 2.205 protesting the civil penalty, in whole or in part, such answer should be clearly marked as an "Answer to a Notice of Violation; EA-18-155" and may: (1) deny the violations listed in this Notice, in whole or in part; (2) demonstrate extenuating circumstances; (3) show error in this Notice; or (4) show other reasons why the penalty should not be imposed. In addition to protesting the civil penalty in whole or in part, such answer may request remission or mitigation of the penalty.

In requesting mitigation of the proposed penalty, the response should address the factors in Section 2.3.4 of the Enforcement Policy. Any written answer addressing these factors pursuant to 10 CFR 2.205, should be set forth separately from the statement or explanation provided pursuant to 10 CFR 2.201, but may incorporate parts of the 10 CFR 2.201 reply by specific reference (e.g., citing page and paragraph numbers) to avoid repetition. Your attention is directed to the other provisions of 10 CFR 2.205, regarding the procedure for imposing a civil penalty.

Upon failure to pay any civil penalty which subsequently has been determined in accordance with the applicable provisions of 10 CFR 2.205 to be due, this matter may be referred to the Attorney General, and the penalty, unless compromised, remitted, or mitigated, may be collected by civil action pursuant to Section 234c of the Act, 42 U.S.C. 2282c.

The responses noted above, i.e., Reply to Notice of Violation, Statement as to payment of civil penalty, and Answer to a Notice of Violation, should be addressed to: Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, with a copy to the Document Control Desk, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 and the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 1600 E. Lamar Blvd., Arlington, TX 76011-4511. Your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, it should not include any personal privacy or proprietary information so that it can be made available to the public without redaction.

If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information).

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

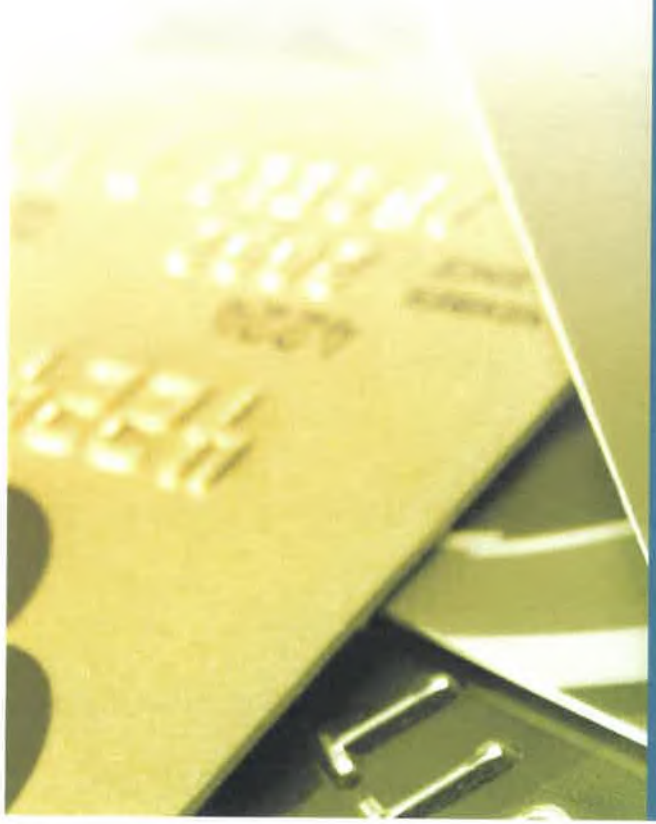
Dated this 25th day of March 2019.

QUESTIONS?

If you have questions, please visit https://www.nrc.gov and search for "License Fees."

Questions may also be directed to the NRC Accounts Receivable Help Desk by e-mail at FEES.Resource@nrc.gov, by phone at (301) 415-7554, or by writing to the address below:

U.S. NUCLEAR REGULATORY COMMISSION
OCFO/DOC/ARB
Mail Stop T9-E10
Washington, DC 20555-0001



U.S. NUCLEAR REGULATORY COMMISSION
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Mail Stop T-9-E10
Washington, DC 20555-0001
PH (301) 415-7554

NUREG/BR-0254, Rev. 8
February 2018

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U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Payment Methods

ENCLOSURE 2

APPROVED BY OMB: NO. 3150–0190

Estimated burden per response to comply with this voluntary collection request: 10 minutes. This brochure provides information about available payment methods. Forward comments about to burden estimate to the Records Management Branch (T6-F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0190), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

NRC accepts the methods described below.

PAYMENT BY AUTOMATED CLEARINGHOUSE

To pay by Automated Clearinghouse / Electronic Data Interchange (ACH/EDI), provide a copy of NRC Form 628 to your financial institution. You may obtain a copy of NRC Form 628 by calling the NRC Accounts Receivable Help Desk at (301) 415-7554.

PAYMENT BY CREDIT CARD

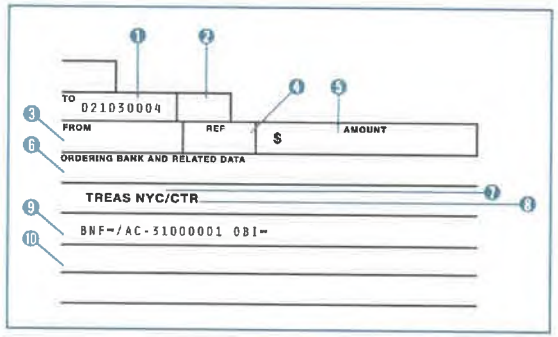
The NRC is currently accepts credit card payments of up to $24,999.99. For payment by credit card, go to Pay.gov, search for "U.S. Nuclear Regulatory Commission Fees" and enter the required information.

You may also mail or fax NRC Form 629 following the directions on the form. To obtain a copy of NRC Form 629 go to http://www.nrc.gov and search for "NRC Form 629" or call the NRC Accounts Receivable Help Desk at (301) 415-7554.

PAYMENT BY FEDWIRE DEPOSIT SYSTEM

The NRC can receive funds through the U.S. Department of the Treasury (Treasury) Fedwire Deposit System. The basic wire message format below complies with the Federal Reserve Board's standard structured third-party format for all electronic funds transfer (EFT) messages.

See the sample EFT message to Treasury below. Each numbered field is described below.



❶ **RECEIVER-DFI#** – Treasury's routing number for deposit messages is 021030004.

❷ **TYPE-SUBTYPE-CD** – The sending bank will provide the type and subtype code.

❸ **SENDER-DFI#** – The sending bank will provide this number.

❹ **SENDER-REF#** – The sending bank will insert this 16-character reference number at its discretion.

❺ **AMOUNT** – The transfer amount must be punctuated with commas and decimal point; use of the "$" is optional. The depositor will provide this item.

❻ **SENDER-DFI-NAME** – The Federal Reserve Bank will automatically insert this information.

❼ **RECEIVER-DFI-NAME** – Treasury's name for deposit messages is "TREAS NYC". The sending bank will enter this name.

❽ **PRODUCT CODE** – A product code of "CTR" for customer transfer should be the first item in the reciever text field. Other values may be entered, if appropriate, using the American Bankers Association's options. A slash must be entered after the product code.

❾ **AGENCY LOCATION CODE (ALC)** – THIS ITEM IS OF CRITICAL IMPORTANCE. IT MUST APPEAR ON THE FUNDS TRANSFER DEPOSIT MESSAGE IN THE PRECISE MANNER AS STATED TO ALLOW FOR THE AUTOMATED PROCESSING AND CLASSIFICATION OF THE FUNDS TRANSFER MESSAGE TO THE AGENCY LOCATION CODE OF THE APPROPRIATE AGENCY. The ALC identification sequence can, if necessary, begin on one line and end on the next line; however, the field tag "BNF=" must be on one line and cannot contain any spaces. The NRC's 8-digit ALC is: BNF=/AC-31000001

❿ **THIRD-PARTY INFORMATION** – The Originator to Beneficiary Information (OBI) field tag "OBI=" signifies the beginning of the free-form third-party text. All other identifying information intended to enable the NRC to identify the deposit—for example, NRC annual fee invoice number, description of fee, 10 CFR 171 annual fee, and licensee name—should be placed in this field.

The optimum format for fields 7, 8, 9, and 10 using an 8-digit ALC is as follows:

TREAS NYC/CTR/BNF=/AC-31000001 OBI=

The optimum format, shown above, will allow 219 character positions of information following the "OBI=" indicator.

If the licensee's bank is not a member of the Federal Reserve System, the nonmember bank must transfer the necessary information and funds to a member bank, which then must transfer the information and funds to the local Federal Reserve Bank.

For a transfer of funds from local Federal Reserve Banks to be recorded on the same day, the transfer must be received at the New York Federal Reserve Bank by 4 p.m., EST. Otherwise, the deposit will be recorded on the next workday.

PAYMENT BY CHECK

Checks should be made payable to the U.S. Nuclear Regulatory Commission with the invoice number, Enforcement Action number, or other information that identifies the payment, written on the check. Mail the check to the following address:

U.S. Nuclear Regulatory Commission
U.S. Bank
P.O. Box 979051
St. Louis, MO 63197-9000

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U.S. Bank Government Lockbox
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1005 Convention Plaza
St. Louis, MO 63101

TAXPAYER IDENTIFICATION NUMBER

You must file your Taxpayer Identification Number (TIN) with the NRC. Use NRC Form 531 to provide your TIN. You may obtain NRC Form 531 from the NRC Web site at http://www.nrc.gov by searching for "NRC Form 531" or by calling the NRC Accounts Receivable Help Desk at (301) 415-7554.

Mediation Location and Duration

The parties usually hold the mediation at or near one of the NRC's offices. However, the parties may agree on any alternate location. Mediation sessions are usually no longer than 1 day. In some cases, the mediation may take longer with the mutual consent of the parties.

The NRC Mediation Team

The responsible NRC senior manager (i.e., Office Director, Regional Administrator, or his or her designee) will serve as the principal negotiator for the NRC in cases that involve wrongdoing and technical issues. When a case involves discrimination, the Director of the Office of Enforcement will serve as the principal negotiator. The other members of the NRC mediation team typically include an enforcement specialist, an attorney, and a staff representative who is familiar with any technical issues under discussion.

The Confirmatory Order

A CO is a legally binding document that includes the terms of the AIP. The NRC will issue a CO only with the prior written consent of the other party and with a waiver of the right to a hearing. After the entity or the individual has completed the terms of the CO, the NRC will verify that the terms of the CO have been satisfied in a timely manner. Because the CO is legally binding, failing to comply with its terms exposes the entity or individual to additional enforcement action.

Although the substance of the mediation session remains confidential, the details of the settlement will normally be made public via a press release and the publication of the CO in the *Federal Register*.

Timeliness Goals

The timely resolution of issues is one of the goals of the enforcement ADR program. Accordingly, the NRC expects timely progress of a case at each stage of the mediation process. In cases where the parties achieve settlement, the NRC expects to issue a CO within 90 calendar days of the date of the agency's letter offering the ADR option to the other party.

Additional Sources of Information

More information about the NRC's ADR program is available from the following:

- Cornell University's Scheinman Institute on Conflict Resolution
  Toll-Free Number: (877) 733-9415

- The NRC's ADR Program Manager in the Office of Enforcement
  Toll-Free Number: (800) 368-5642 or (301) 287-9527

- The NRC enforcement ADR program on the agency's Web site at www.nrc.gov/about-nrc/regulatory/enforcement/adr.html

NUREG/BR-0317 Rev. 2
May 2018

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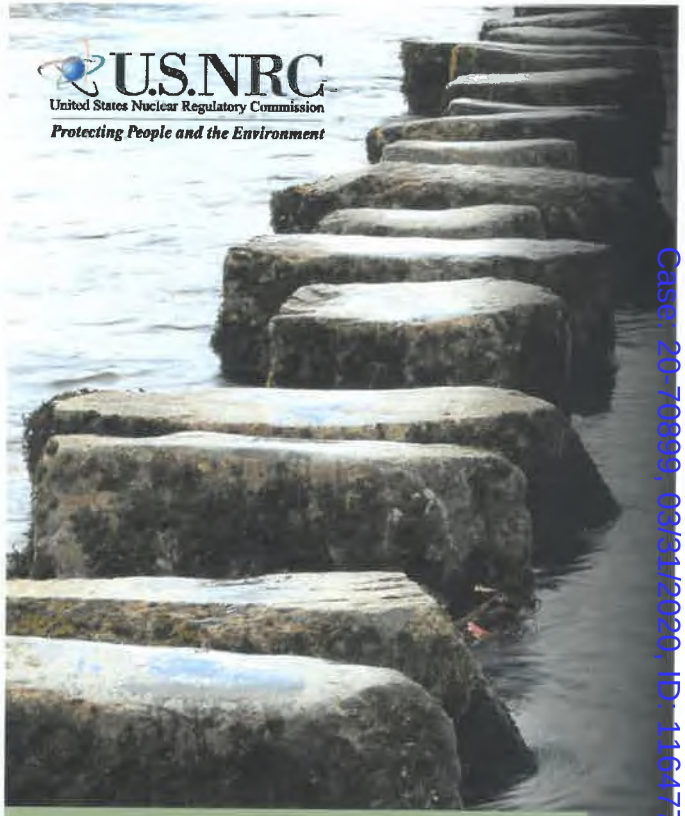
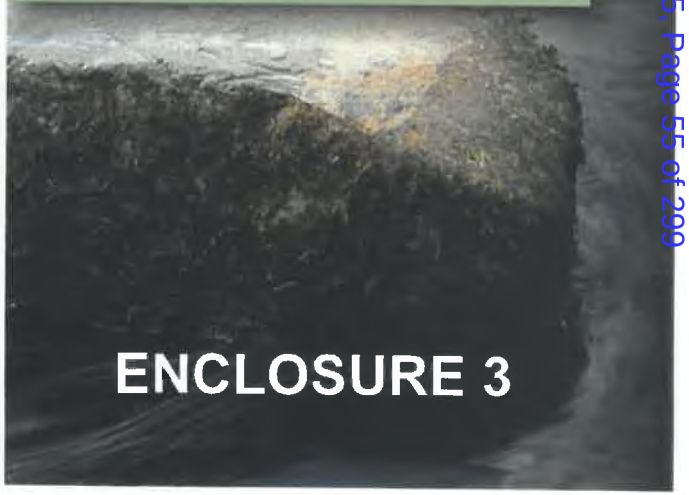


Enforcement Alternative Dispute Resolution Program



ENCLOSURE 3

The Program

The U.S. Nuclear Regulatory Commission's (NRC's) enforcement alternative dispute resolution (ADR) program, formerly referred to as "post-investigation ADR," provides an amicable process for resolving enforcement matters. It is intended to produce more timely and effective outcomes for the NRC and an entity (e.g., an NRC licensee, certificate holder, or contractor of an NRC licensee or certificate holder) or an individual who is subject to an enforcement action, through mediation.

The NRC established the post-investigation ADR program in 2004. In 2015, the NRC expanded its scope to include certain types of enforcement cases that do not involve an investigation. Accordingly, the name of this program was changed from "post-investigation ADR" to "enforcement ADR."

Enforcement ADR includes two distinct case types: (1) discrimination cases or other wrongdoing and, (2) nonwillful (traditional) enforcement cases with the potential for civil penalties (not including violations associated with findings assessed through the Reactor Oversight Process). For discrimination cases or other wrongdoing, mediation is used after the completion of an investigation by the NRC Office of Investigations.

As long as the enforcement matter is within the scope of the program, the NRC normally offers enforcement ADR at each of the following stages of the enforcement process: (1) before an initial enforcement action, (2) after the initial enforcement action is taken, typically upon issuance of a notice of violation, and (3) when a civil penalty is imposed but before a hearing request.

Mediation is an informal process in which a trained and experienced mediator works with the parties to help them reach a resolution. The parties are the NRC and the entity or individual in the mediation. The mediator focuses the attention of the parties on their needs and interests rather than on their stated positions. Mediation gives the parties an opportunity to discuss issues, clear up misunderstandings, identify creative ways to address issues, find areas of agreement, and resolve their dispute.

Participation in the program is entirely voluntary. The NRC and the entity or the individual may withdraw from the mediation process at any time.

The Program Administrator

The NRC has a contract with the Cornell University Scheinman Institute on Conflict Resolution (Cornell) to serve as the program administrator for the enforcement ADR program. Cornell manages the logistics associated with enforcement ADR, including working with the parties to select a mediator from Cornell's roster of mediators. Cornell uses a network of independent and experienced mediators who help the parties find areas of agreement and settle their dispute.

The Mediator

The mediator is an experienced neutral individual who is mutually selected by the parties. He or she has no stake in the outcome of the mediation or any power to make decisions that may bind either party. The role of the mediator is to facilitate communication between the parties and to provide an environment where the parties can address their differences. The mediator uses consensus-building skills and knowledge of negotiation to help the parties find ways to overcome any misunderstandings and find areas of agreement. The mediator does not act as legal counsel or provide legal advice. Each party should consult an attorney for legal advice as appropriate.

The Mediation Process

Historically, most enforcement ADR mediations have occurred at the first stage of the enforcement process (i.e., before an initial enforcement action). In those cases, the NRC presents the entity or the individual with the opportunity to engage in mediation with the agency before it makes an enforcement decision. If the entity or the individual elects ADR, Cornell will help the NRC and the entity or the individual, jointly select a mediator. After selecting a mediator, the parties, in coordination with the mediator, set a date and place for the mediation. Typically, the mediator holds a premediation teleconference with the parties to discuss logistics or any special needs.

During the mediation, the mediator will give the parties an opportunity to discuss their views on the issue. Often, the mediator will meet privately with each party to develop a clear understanding of the party's perspective and explore and assess options. Although the mediator does not have any power to make decisions that may bind either party, he or she may ask questions intended to help the parties assess the merits of their positions, help them converse in a respectful atmosphere, and identify potential settlement options.

If the parties reach a settlement agreement during the mediation session, they will typically document the terms of their agreement in writing by developing an agreement in principle (AIP) document. The AIP is not enforceable by either party against the other, but it is the basis on which the NRC drafts a confirmatory order (CO). The CO is a legally binding document used to confirm the commitments made in the AIP. However, if the parties do not reach a settlement agreement, the traditional enforcement process resumes—that is, the enforcement process continues as it would have if the parties had not engaged in ADR.

Confidentiality

Although the terms of an ADR settlement become publicly available through the issuance of the CO, with certain exceptions, the substance of the discussions during the mediation session is confidential. The mediator is prohibited from discussing the mediation proceedings, testifying on anyone's behalf concerning the mediation, or submitting a report on the substance of the discussions.

Cost

The NRC and the entity or individual, equally share the fees and travel expenses of the mediator and any meeting room fees. However, each party is responsible for its own expenses, such as travel, lodging, and legal representation.

NOTICE OF VIOLATION AND PROPOSED IMPOSITION OF CIVIL PENALTY - $116,000 AND NRC SPECIAL INSPECTION REPORT 050-00206/2018-005, 050-00361/2018-005, 050-00362/2018-005, 072-00041/2018-001 DATED - MARCH 25, 2019

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ADAMS ACCESSION NUMBER: ML19080A208

☒SUNSI Review: By: JGK | ADAMS: ☒ Yes ☐ No | ☐ Non-Publicly Available ☒ Publicly Available | ☒Non-Sensitive ☐ Sensitive | Keyword:

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EXHIBIT 18

SAN ONOFRE DECOMMISSIONING
COMMUNITY ENGAGEMENT PANEL MEETING
STATE OF CALIFORNIA, COUNTY OF ORANGE

TRANSCRIPT OF VIDEOTAPED PROCEEDINGS
LAGUNA HILLS, CALIFORNIA
THURSDAY, MARCH 22ND, 2018

Reported by:
Katherine Magner
CSR No. 14083
Job No. 2846039

COMMUNITY ENGAGEMENT PANEL MEMBERS:
DR. DAVID G. VICTOR
CEP CHAIRMAN

JERRY KERN
CEP SECRETARY
DAN STETSON
VICE CHAIRMAN

BILL HORN
SAN DIEGO COUNTY SUPERVISOR
(Not Present)

TOM CAUGHLAN
CAMP PENDLETON

MARNI MAGDA
SIERRA CLUB, ANGELES CHAPTER
TED QUINN
AMERICAN NUCLEAR SOCIETY

STEVE SWARTZ
CITY OF SAN CLEMENTE
GARRY BROWN
ORANGE COUNTY COASTKEEPER

MARTHA MCNICHOLAS
CAPISTRANO UNIFIED SCHOOL DISTRICT
CAPTAIN MEL VERNON
SAN LUIS REY BAND OF MISSION INDIANS

SERGIO FARIAS
MAYOR, SAN JUAN CAPISTRANO
DONNA BOSTON
ORANGE COUNTY SHERIFF'S DEPARTMENT

TOM PALMISANO
VICE PRESIDENT, DECOMMISSION
CHIEF NUCLEAR OFFICER AT SONGS

RICH HAYDEN
CALIFORNIA STATE PARKS

them you need to tell me how you're going to remediate this, and they came back and said we want to go back to the older design.

CHAIRMAN DR. VICTOR: People are going to want to know about these four canisters. Why not take eight or ten days and move them back into the pool, and unload them and reload them? Help us understand. I know, it's early days. 19:05:32

MR. PALMISANO: Sure.

CHAIRMAN DR. VICTOR: Help us understand what the logic process is going to be there. 19:05:45

MR. PALMISANO: Yeah. And let me just -- because I faced this issue back in the mid '90s at the Palisades Nuclear Plant with a loaded canister that had a potential weld defect and got into this very discussion. 19:05:58

So nobody has unloaded a commercial canister, either a bolted cask or a welded cask or canister. Okay. It is possible. What you would do is basically have a mechanism, either to do it in a fuel pool or do it in a dry transfer facility. It's possible either way. 19:06:15

You would take the canister back in. And the first thing you would do is reconnect the valves and find a way to purge the helium and refill its hole with water. Okay.

The biggest technical issue that we've looked at 19:06:29

in the industry over the many years -- not just related to SONGS -- is the thermal transient to actually reintroduce water into a -- let's say a canister with hot fuel, 200-300 degrees C. And the thermal transient that you put the fuel through. Okay. 19:06:44

So once you get it reflooded, cooled down, you would then put that similar machine on, grind out the weld, take the lid off. That's just the mechanics. That's certainly doable.

The real challenge as we would understand it today, and nobody has had to do it yet, is the reflood. Certainly, technically possible. What I would tell you is just I was back in Washington with the NRC last week, if you were just to brainstorm, this would probably be a two- to three-year project to develop the techniques, pile up the techniques. The NRC would want to have explicit approval on this because of the radiological hazards. 19:06:54 19:07:09

CHAIRMAN DR. VICTOR: To the workers?

MR. PALMISANO: Well, to the workers, yeah. 19:07:20

So when you think about this, you have a canister that has intact fuel rods inside of a sealed canister. This pin problem doesn't affect the canister itself. Okay. So you've got that condition.

You've got to weigh that condition -- if this 19:07:34

EXHIBIT 19

Application No.: 18-03-XXX
Exhibit No.: SCE-03
Witnesses: Jose L. Perez
Nicholas Capik

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(U 338-E)

Testimony On The 2017 Decommissioning Cost Estimate for SONGS 2&3

PUBLIC VERSION

Before the

Public Utilities Commission of the State of California

Rosemead, California
March 15, 2018

SCE-03: Testimony On The 2017 Decommissioning Cost Estimate for SONGS 2&3

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SCE-03: Testimony On The 2017 Decommissioning Cost Estimate for SONGS 2&3

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I.

INTRODUCTION

The purpose of this testimony is to demonstrate the reasonableness of the 2017 Decommissioning Cost Estimate for San Onofre Nuclear Generating Station Unit Nos. 2&3 (2017 SONGS 2&3 DCE). The 2017 DCE estimates that the total cost to decommission SONGS 2&3 will be $4,479 million (100% share, 2014 $), an increase of approximately 1.5% over the 2014 SONGS 2&3 DCE. The Commission-approved 2014 DCE estimated that the total cost to decommission SONGS 2&3 would be $4,411 million (100% share, 2014 dollars).

Chapter II of this testimony provides a summary of the 2017 DCE. Chapter III provides testimony from ABZ Incorporated (ABZ), a third-party consultant who performed an independent review of the 2017 DCE. Chapter IV provides a detailed reconciliation of the 2017 DCE to the 2014 DCE. Chapter V concludes SCE's testimony.

II.

SUMMARY OF 2017 SONGS 2&3 DECOMMISSIONING COST ESTIMATE

A. Methodology and Description

SCE and the other SONGS participants[1] began accumulating funds for the eventual decommissioning of SONGS 2&3 early in the units' operating lives. Because the units were licensed to operate for several decades,[2] decommissioning fund accumulations were based on conceptual cost estimates.[3] These conceptual DCEs were developed by third-party vendors using proprietary estimating algorithms consistent with recognized industry guidelines such as AIF/NESP-036, "Guideline for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates" and the Department of Energy (DOE) Decommissioning Handbook.[4] These estimates were updated periodically to reflect changes in regulations, technology, and economics; additions and deletions to the nuclear facilities;

---

[1] San Diego Gas & Electric Company and the City of Riverside own 20% and 1.79% shares of SONGS 2&3, respectively. On December 29, 2006, SCE acquired the City of Anaheim's ownership share of SONGS 2&3. Under the Anaheim Settlement Agreement adopted by the Commission in D.06-11-025, however, the City of Anaheim retained a pro-rata share of the SONGS 2&3 decommissioning obligation as shown approximately in the table below:

Decommissioning Obligation		
	SONGS 2	SONGS 3
SCE	75.7363%	75.7475%
SDG&E	20.0000%	20.0000%
Anaheim	2.4737%	2.4625%
Riverside	1.7900%	1.7900%
	100.00%	100.00%

[2] On March 9, 2000, the U.S. Nuclear Regulatory Commission issued Amendment No. 166 to Facility Operating License No. NPF-10 and Amendment No. 157 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station (SONGS) Units 2 and 3, respectively. These amendments revised the expiration dates of the SONGS 2 and SONGS 3 operating licenses from October 18, 2013, to February 16, 2022 and November 15, 2022, respectively.

[3] In this context, "conceptual" means that the decommissioning cost estimates were developed based on Unit Cost Factors coupled with the Critical Path Method, using the best-available current information, for projects that were not expected to commence until several years or decades into the future. These "conceptual" cost estimates were not intended to be executable decommissioning project plans or schedules.

[4] *See* Decommissioning Cost Estimate for SONGS 2&3 Prepared for SCE by ABZ Incorporated, dated December 14, 2012, page 5. From 2001 to 2013, SCE utilized ABZ, Incorporated to develop the decommissioning cost estimates for SONGS 2&3. Prior to 2001, SCE utilized TLG Services, Incorporated to develop the decommissioning cost estimates for SONGS 1 and for SONGS 2&3.

updated site radiological assumptions; lessons-learned from other nuclear decommissioning projects; and other related information necessary to complete accurate cost estimates.

On July 22, 2013, after SCE announced its decision to permanently retire SONGS 2&3, SCE notified the Commission that it intended to prepare a new DCE for SONGS 2&3 after the development of a site-specific decommissioning plan.[5] SCE informed the Commission that this new estimate would be included in the Post Shutdown Decommissioning Activities Report (PSDAR) that SCE was required to submit to the NRC.[6]

SCE retained the consortium of Energy*Solutions* and Chicago Bridge & Iron Company (ES/CBI) to develop the 2014 SONGS 2&3 DCE, which included the total estimated cost for the decommissioning project. SCE and SDG&E submitted the 2014 DCE to the Commission in Application (A.) 14-12-007. The Commission adopted the 2014 SONGS 2&3 DCE in Decision (D.) 16-04-019.

As required by the California Nuclear Facilities Decommissioning Act of 1985[7] (Decommissioning Act), SCE is required to periodically update the SONGS 2&3 DCE. Therefore, in 2017, SCE engaged The Kenrich Group (Kenrich)[8] to prepare the 2017 SONGS 2&3 DCE. This DCE is consistent with the guidance provided in NRC Regulatory Guide 1.202, "Standard Format and content of Decommissioning Cost Estimates for Nuclear Power Reactors." The 2017 DCE presents the total estimated project cost, including recorded costs to date, to allow for comparisons to the 2014 DCE. That is, the 2017 DCE includes recorded costs from project inception through September 30, 2017, and estimated costs from October 1, 2017 through assumed project completion in 2051. The 2017 DCE estimates that the total cost to decommission SONGS 2&3 will be $4,479 million (100% share, 2014 $). The 2017 DCE uses the same Work Breakdown Structure (WBS) that was used in the 2014 DCE, and includes the following new and updated information:

- The pricing for the contract awarded to Holtec International, Inc., (Holtec) for the Independent Spent Fuel Storage Installation (ISFSI) expansion and the transfer of spent fuel from the SONGS 2&3 spent fuel pools to the ISFSI;

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5 A.12-12-013, Exhibit SCE-06, page 1.

6 *Id*.

7 Pub. Utilities Code § 8321 et. seq.

8 *See* Exhibit SCE-01, pages 17-18.

- The pricing for the contract awarded to SONGS Decommissioning*Solutions* (SDS) for the decontamination and dismantlement (D&D) of SONGS 2&3, and the removal and disposal of radiological, hazardous, and non-hazardous waste;

- Recorded costs through September 30, 2017;

- Revised DOE spent fuel acceptance date to reflect DOE's continued failure to perform its contractual obligations to pick up fuel from commercial nuclear reactors during the four years since the 2014 DCE was completed;

- Revised environmental review costs and approval dates based on the current permitting strategy and the requirements of the California State Lands Commission (CSLC), the California Coastal Commission (CCC), and the U.S. Department of the Navy (Navy);

- Revised project execution strategy, including the deferral of the start of substructure removal until 2046;

- Updated undistributed cost projections based on historical recorded costs and revised projections;

- Updated ISFSI demolition costs to reflect the final design of the Holtec ISFSI; and

- Other project costs not previously identified.

Significant components of the 2017 DCE are now based on competitively bid contracts, as well as three additional years of experience managing a decommissioning plant and overseeing decommissioning personnel. Where new information was not available, Kenrich worked with third-party consultants and SCE personnel to validate and refine the cost and schedule assumptions for 2017 SONGS 2&3 DCE.

B. <u>2017 DCE Assumptions</u>

The 2017 DCE includes the following assumptions that have not changed from the 2014 SONGS 2&3 DCE:

- SONGS 2&3 will be decommissioned using the prompt DECON decommissioning methodology;

- All fuel assemblies will be transferred from the SONGS 2&3 spent fuel pools to the ISFSI by mid-2019;

- A dry transfer facility will not be necessary to transfer the spent fuel canisters to DOE transport canisters;

- Decommissioning will be performed by a decommissioning general contractor (DGC) with oversight by the SONGS Participants;

- SONGS 2&3 major D&D activities will be completed by the end of 2028;

- All onshore substructures and offshore conduits will be removed; and

- ISFSI decommissioning, NRC license termination, and site lease termination will be completed by the end of 2051.

In addition, the 2017 DCE is based on the following updated assumptions:

- SONGS 2&3 D&D will commence in January 2019 based on expected completion dates of environmental reviews and approvals; and

- The DOE will commence accepting spent fuel from U.S. commercial nuclear facilities in 2028, which results in the DOE removing the last spent fuel from the SONGS ISFSI in 2049.

C. Contingency

Contingency is applied to cost estimates to account for unknown or unplanned occurrences during the performance of a project. "Contingency" is defined in the American Association of Cost Engineers *Project and Cost Engineers' Handbook* as, "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating to estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The consensus in the industry literature, including sources from the DOE[9] and the Association for the Advancement of Cost Engineering International,[10] is that a contingency factor for cost estimates in this stage of development should fall within a range of 15% to 30%.

In its decision for the 2005 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP), the Commission ordered the Utilities (SCE, SDG&E, and PG&E) to serve testimony in the next NDCTP

[9] Chapter 11 of U.S. Department of Energy (DOE) Decommissioning Implementation Guide DOE, G 430.1-1, March 28, 1997.

[10] Association for the Advancement of Cost Engineering International, Recommended Practice No. 18R-97, at page 2 of 9.

that demonstrates they have made all reasonable efforts to conservatively establish an appropriate contingency factor for inclusion in the decommissioning revenue requirements.[11]

To comply with this Commission order, in the 2009 NDCTP,[12] which occurred at a time when the Utilities still believed that decommissioning would not begin until decades in the future, PG&E prepared a paper titled, *Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion in the Decommissioning Revenue Requirements*. Based on industry and regulatory documents, the position paper concluded that it is appropriate to add a 25% contingency factor to estimated decommissioning costs because it provides reasonable assurance for unforeseen circumstances[13] that could increase decommissioning costs, and should not be reduced or eliminated simply because foreseeable costs are low. In that proceeding, SCE agreed based on its own independent research that the 25% contingency factor was conservative and appropriate.[14] Consistent with this assumption, each of the DCEs submitted by the Utilities in that proceeding contained a 25% contingency factor. The Commission found that each such DCE was reasonable.[15]

Later, an Independent Review Panel (Panel) examined the definition and role of contingency factors in DCEs.[16] The Panel identified that DCEs should consider four types of risk or uncertainty, including: (1) performance risk; (2) scope risk; (3) regulatory risk; and (4) financial risk.[17] The Panel found that the DCEs prepared by third-party vendors on behalf of the Utilities typically only addressed performance risks by including 17%-22% contingency, and that the Utilities' adjustments to target their DCEs' overall contingency to 25% was intended to capture all risks, and was consistent with the

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[11] D.07-01-003, Ordering Paragraph 8.

[12] A.09-04-007 and A.09-04-009.

[13] For example, some activities in the remaining decommissioning work are less familiar activities in the industry. To terminate the easement with the Navy, SCE may be required to perform extensive site restoration work that is unique to the SONGS site.

[14] D.10-07-047, page 23.

[15] *Id*., Conclusions of Law 4, 5, 6, 7, 13, and 14. Also see D.11-07-003 at page 25.

[16] Report on Nuclear Decommissioning, February 28, 2011, For The California Public Utilities Commission, Prepared by Nicholas Capik, Geoffrey Griffiths, and Bruce Lacy, at pages 40-42.

[17] *Id*., at page 40. Financial risk is typically addressed through conservative assumptions for cost escalation and fund earnings rates.

contingency value normally used by the NRC.[18] The Commission also approved SCE's decommissioning cost estimates in the 2012 NDCTP and SCE's 2014 SONGS 2&3 DCE, each of which also included a 25% contingency factor.[19]

In the 2017 SONGS 2&3 DCE, SCE did not apply contingency to the $1,156 million (100% share, 2014 $) of SONGS 2&3 decommissioning costs that were recorded between June 2013 and September 2017. For work scopes that have been contracted or are well defined in the 2017 DCE, SCE applied lower contingency factors. Kenrich and knowledgeable SCE personnel reviewed each DCE line item, giving consideration to the technical complexity, contracting status, estimating approach, and timing of each work scope, and applied an appropriate contingency factor. For decommissioning activities in the 2017 DCE that will not be performed until decades in the future when their scopes become better defined, SCE applied a 25% contingency factor as approved by the Commission in the past several NDCTPs.

[18] *Id.*, see Footnote 37.

[19] See D.14-12-082 at page 38, Findings of Fact 13, and Conclusions of Law 17, 22, 23, and 24; and D.16-04-019 Conclusion of Law 1.

Table II-1 below identifies the range of contingency factors utilized for each 2017 DCE cost category:

Table II-1
Contingency Factors Applied in 2017 DCE

2017 DCE Category	Contingency Factor
Recorded Costs Through September 2017	0%
Service Level Agreements	10%
Undistributed Labor	10%
ISFSI & Fuel Transfer Operations	[redacted]
Undistributed Non-Labor	15%
[redacted]	[redacted]
ISFSI Aging Management	20%
Plant Easement/Lease Renewals	20%
Other Projects	15-20%
GTCC Waste Storage	25%
Offshore Conduit Removal	25%
Substructure Removal	25%
ISFSI Demolition	25%
Final Site Restoration	25%

The composite contingency factor included in the 2017 DCE is approximately [redacted] of the base costs.

III.

INDEPENDENT REVIEW OF 2017 SONGS 2&3 DCE

A. Introduction

This testimony describes ABZ, Incorporated's (ABZ) independent review of the 2017 San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 Decommissioning Cost Estimate (DCE), and the conclusions reached by ABZ in that review.

Nick Capik was the project manager and principal author of the ABZ review of the 2017 SONGS 2&3 DCE. In this testimony, he describes the scope of ABZ's review and the conclusions reached during that review.

B. ABZ Background And Experience

ABZ was founded in 1986 to provide consulting and engineering services to the nuclear power industry. ABZ supports nuclear decommissioning projects in a number of ways including cost estimating, licensing, project management, due diligence, and litigation. ABZ has been engaged from conceptual design of decommissioning through implementation and site restoration.

ABZ has also prepared or reviewed 43 decommissioning cost estimates covering 63 nuclear plants. This includes preparing DCEs for SONGS 2 & 3 from 2001 through 2014. These SONGS cost estimates were accepted by the California Public Utilities Commission (CPUC) as reasonable and formed the basis for ratemaking for decommissioning collections. In addition, I participated as the ABZ representative in an Independent Review Panel established by the CPUC to examine decommissioning cost issues as part of Decision (D.) 10-07-047. As part of this work, ABZ evaluated the 2008 SONGS 2&3 DCE in comparison to Pacific Gas and Electric's Diablo Canyon estimate, the Palo Verde Nuclear Generating Station estimate, and the estimates for four other similar nuclear power plant sites. Significant areas of focus included cost and financial assumptions, waste management approaches, state requirements for site restoration, severance costs, and use of actual industry performance and cost data.

In addition to cost estimating, ABZ has performed direct oversight of decommissioning activities for several nuclear power plant decommissioning projects, including Zion, Trojan, and Shoreham. ABZ

staff has provided additional support for decommissioning at Connecticut Yankee, Maine Yankee, Yankee Rowe, Fort St. Vrain, Millstone, and others.

ABZ has participated in litigation associated with decommissioning in several venues, including the U.S. Court of Claims, U.S. Tax Court, and State proceedings. Finally, ABZ has performed due diligence reviews of decommissioning plans, efforts, and costs as part of two nuclear plant sales.

C. ABZ Independent Review

1. Scope

ABZ performed an independent review of the 2017 SONGS 2&3 DCE. This review was conducted in several phases as the DCE was being developed such that responses to ABZ comments and questions could be evaluated and incorporated into the final DCE. ABZ's review focused on key assumptions, scope and cost of decommissioning projects, project schedules, and undistributed costs, including staffing, and contingency.

2. Review Process

ABZ reviewed the draft DCE and supporting information over a seven-month period in 2017. ABZ performed distinct reviews at 60 percent complete, 90 percent complete, and just prior to issuance of the final DCE. ABZ's intent was to assess the reasonableness of the DCE assumptions, project scopes, costs, and schedule. ABZ provided comments addressing the scope of the estimate compared to previous SONGS estimates and industry experience, estimated costs, work completed to date, and assumptions used in preparing the estimate.

ABZ started by reviewing the key assumptions of the DCE for reasonableness. ABZ evaluated these assumptions in light of similar assumptions made at other decommissioning projects.

ABZ then evaluated the projects included in the DCE to ensure that the collective scope of activities was sufficient to terminate the NRC license and restore the SONGS site. ABZ evaluated the costs of these projects against previous estimates and with comparable industry costs. In parallel with its review of projects, ABZ evaluated the schedule for these projects to ensure that sufficient time was allocated for successful performance, and to evaluate the ability to adjust the planned schedule to accommodate potential delays.

Separate from its review of decommissioning projects, ABZ evaluated undistributed costs in the DCE, including both staff costs as well as non-staff costs to ensure that all such costs were included and that the estimated costs were reasonable.

Finally, ABZ reviewed the contingency included in the DCE and the basis used to allocate contingency. ABZ evaluated the change in contingency from previous DCEs as well as the basis for such changes.

D. ABZ Findings

1. Key Facts And Assumptions

The 2017 SONGS 2&3 DCE contains a number of key facts and assumptions. ABZ reviewed these key facts and assumptions and concluded that the facts represent known conditions and that the assumptions are reasonable.

2. Scope

The SONGS DCE includes two major fixed-price contracts that cover a large portion of the work to remediate radiological hazards and reduce the footprint of the NRC license to that required to store spent fuel, and to transfer spent fuel on-site to a dry storage facility. Beyond these two major contracts, the DCE includes continued management of spent fuel until accepted by DOE, demolition of uncontaminated structures, and restoration of the site. ABZ reviewed this scope of work against previous SONGS DCEs including the 2014 DCE performed by Energy*Solutions* as well as previous ABZ estimates.

ABZ verified that the 2017 DCE included all identified activities needed to terminate the NRC operating license and restore the site consistent with the end-state assumptions.

3. Schedule

ABZ reviewed the schedule for decommissioning activities, identified critical path activities, and ability to manage delays in performance of major activities. ABZ compared this schedule to previous SONGS schedules and evaluated the proposed activity lengths to relative to recent decommissioning projects. ABZ concluded that the schedule allowed adequate time to complete required activities.

4. Risk Mitigation

ABZ reviewed both the contingency included in the 2017 SONGS 2&3 DCE as well as the schedule to determine whether and how uncertainties could be accommodated without an increase in project cost or duration. ABZ concluded that the schedule provided sufficient flexibility to allow for a delay in completing critical path activities while still maintaining the overall project schedule and keeping costs within the estimate total. Further, ABZ evaluated the overall contingency compared to the current state of the SONGS decommissioning project and concludes that the contingency is reasonable for the current project state.

E. Conclusion

ABZ concludes that the scope of the 2017 SONGS DCE is sufficient to terminate the NRC license and restore the site; that the projected schedule allows sufficient time for completion of all required activities; that the cost is reasonable for performance of those activities; and that sufficient risk mitigation has been included.

IV.

RECONCILIATION OF THE 2017 DCE TO THE 2014 DCE

A. Overview

In D.16-04-019, the Commission found reasonable the 2014 SONGS 2&3 DCE of $4,411 million (100% level, 2014 $). The 2017 SONGS 2&3 DCE estimates the total cost to decommission SONGS 2&3 will be $4,479 million (100% share, 2014 $). There are several variances between the 2014 and 2017 DCEs that net to small 1.5% increase in the 2017 DCE, as shown in Table IV-2 below.[20] At a high level, the increase is due to new scope not included in the 2014 DCE including ISFSI Aging Management Project and GTCC waste storage; the remaining variances essentially net to a zero change.

[20] Appendix C provides a table which shows the differences between Table 2 of the 2017 SONGS 2&3 DCE and this Table IV-2. SCE made these changes to be able to provide better description of the activities and variances.

Table IV-2
Reconciliation of 2017 DCE to 2014 DCE
(100% Share, Millions of 2014 $)

	Description	2017 DCE Total (2014 $)	2014 DCE Total (2014 $)	Variance
1	**Distributed Projects**			
2	ISFSI & Fuel Transfer Operations	$ 270.2	$ 405.1	$ (134.9)
3	Final Site Restoration	6.9	57.4	(50.5)
4	ISFSI Aging Management	36.5	-	36.5
5	Decontamination, Demolition, and Disposal	[redacted]	1,208.2	[redacted]
6	Substructure Removal	273.0	303.8	(30.8)
7	Other Projects	99.6	72.9	26.7
8	GTCC Waste Storage	26.6	-	26.6
9	Plant Easement/Lease Renewals	27.1	1.4	25.7
10	Offshore Conduit Removal	91.6	96.0	(4.4)
11	ISFSI Demolition	19.2	21.1	(1.9)
12	Completed Projects	123.3	98.1	25.2
13	**Distributed Subtotal**	**$** [redacted]	**$ 2,264.0**	**$** [redacted]
14				
15	**Undistributed Activities**			
16	Contracted Services	$ 225.2	$ 34.6	$ 190.6
17	Service Level Agreements	168.2	-	168.2
18	DGC Staffing	[redacted]	423.6	[redacted]
19	Labor-Staffing	986.2	1,029.4	(43.2)
20	All Other Non-Labor	623.6	659.6	(36.0)
21	**Undistributed Subtotal**	**$** [redacted]	**$ 2,147.2**	**$** [redacted]
22				
23	**Total**	**$ 4,478.6**	**$ 4,411.2**	**$ 67.4**

B. Distributed Projects

1. ISFSI & Fuel Transfer Operations

SCE retained Holtec as the vendor to construct sufficient additional dry spent fuel storage capacity for the fuel currently stored in the SONGS 2&3 spent fuel pools, and to transfer the fuel to dry storage. Holtec's ISFSI & Fuel Transfer Operations work scope includes the following activities:

- Design and license a seismically designed dry storage system for the 2,668 fuel assemblies that remain in the SONGS 2&3 spent fuel pools
- Excavate and install the foundation base mat
- Fabricate, transport, and install the 75 vertical canister enclosure containers (CECs)

- Install a perimeter form surrounding the CECs and backfill with concrete
- Install a protected area security perimeter around the new ISFSI
- Fabricate and transport 75 multi-purpose canisters (MPCs) and seal lids, two shielded transfer casks, canister sealing equipment, and cask transfer equipment to the SONGS site
- Re-certify the spent fuel pool cranes to ensure safe lifting of the fully loaded MPCs and transfer casks
- Perform dry-run testing of fuel loading, canister sealing, and canister drying in the spent fuel pools
- Perform dry-run testing of fully loaded MPCs/transfer casks from the SONGS 2&3 spent fuel pools to the ISFSI
- Load each MPC with up to 37 spent fuel assemblies and install MPC lid and drain line
- Remove each fully loaded MPC/transfer cask from spent fuel pool, decontaminate, weld MPC lid and leak test, dehydrate MPC interior and fill with helium, weld vent and drain ports and closure ring
- Transfer each fully loaded MPC/transfer cask from the spent fuel pool to the ISFSI
- Lower each MPC from the transfer cask into its CEC
- Install the closure lid on each CEC
- Construct stand-alone ISFSI security building

Based on SCE's contract with Holtec,[21] the cost to complete the ISFSI and Fuel Transfer Operations project is estimated in the 2017 DCE to be $270.2 million[22] (100% share, 2014 $). In the 2014 DCE, SCE estimated that the cost to expand the SONGS ISFSI and transfer all remaining fuel from the SONGS 2&3 spent fuel pools to the ISFSI was $405.1 million (100% share, 2014 $). Thus, the 2017 DCE reflects a decrease of $134.9 million. This decrease is attributable to the lower cost of the

[21] SCE selected Holtec after a competitive procurement process.

[22] *See* 2017 DCE, Appendix C, Table 2, line 37.

competitively bid Holtec contract relative to the 2014 DCE. Because SCE negotiated a substantial reduction relative to the previously estimated ISFSI and Fuel Transfer Operations costs, the Commission should find that the estimated cost is reasonable.

2. Final Site Restoration

The 2017 DCE includes the following scope for Final Site Restoration: (1) remove railroad tracks, gunite slope protection, site access roads, and parking lots; (2) perform final site grading and re-vegetation; and (3) perform any other work required by the Navy real estate authorization, which is expected to include end state requirements for the SONGS site.

The estimated cost for Final Site Restoration work in the 2017 DCE is $6.9 million[23] (100% share, 2014 $). The estimated cost for Final Site Restoration in the 2014 DCE was $57.4 million (100% share, 2014 $). This resulted in a cost decrease of $50.5 million (100% share, 2014 $). This cost decrease occurred because SCE consolidated two previously planned dewatering campaigns that would have been separated by nearly two decades into a single campaign that will occur near the end of the decommissioning schedule after SCE will have secured the final real estate authorization from the Navy and will know the Navy's final site restoration requirements. Final site restoration is a necessary part of the decommissioning process, and therefore, the Commission should find that these estimated costs are reasonable.

3. ISFSI Aging Management

The ISFSI Aging Management Program (AMP) project was established to develop inspection and maintenance programs for both the Areva and Holtec spent fuel dry storage systems.[24] The project also includes the cost to renew the NRC Certificates of Compliance (CoCs) for the storage systems. Areva and Holtec currently hold 20-year CoCs for their spent fuel dry storage systems used at SONGS. The Areva and Holtec CoCs will expire in 2023 and 2035, respectively. Under 10 C.F.R. § 72.240, the CoC holder may apply for renewal of the CoC for a term not to exceed 40 years. The CoC renewal applications must include Safety Analysis Reports (SARs) that provide descriptions of the

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[23] *See* 2017 DCE, Appendix C, Table 2, line 251.

[24] In September 2014, NEI 14-03 [Revision 0], *Guidance for Operations-Based Aging Management of Dry Cask Storage* was issued.

AMPs and time-limited aging analyses demonstrating that the structures, systems, and components important to safety will continue to perform their intended functions for the requested period of extended operation.

The estimated cost for the ISFSI Aging Management Program in the 2017 DCE is $36.5 million[25] (100% share, 2014 $). The 2014 DCE did not include a specific line item for the ISFSI Aging Management Program. This resulted in a cost increase of $36.5 million (100% share, 2014 $). As discussed above, these costs include initial cask testing, inspection equipment and licensing costs for dry cask CoC renewals and SAR updates for the Holtec and Areva AMPs.[26] These estimated costs are necessary to renew NRC required CoCs and therefore should be deemed reasonable by the Commission.

4. Decontamination, Demolition, and Disposal

The Decontamination, Demolition, and Disposal cost category includes many activities that will be performed by the DGC. As such, the pricing of these activities is primarily based on the executed SDS contract, which was achieved through a competitive procurement process that included multiple experienced contractors.[27] The work included in this category encompasses the removal and disposal of the necessary structures, systems, and components, as well as the removal of radiological and non-radiological contaminants necessary to meet the approved license termination plan. This category has been subdivided into the following major projects, consistent with the Milestone Framework:

- Initial D&D Activities – includes modifying the units' containment access to support future decommissioning activities; removing the missile shields and reactor heads; constructing an electrical ring bus for the site; and executing the necessary waste disposal contracts
- Reactor Vessel Internals (RVI) Segmentation and Disposal – includes designing and procuring the necessary RVI segmentation equipment; testing the specially

[25] *See* 2017 DCE, Appendix C, Table 2, line 163.

[26] SCE will also incur undistributed non-labor costs for the ISFSI Aging Management Program for periodic maintenance and inspections of the spent fuel dry storage systems. Those costs are discussed in Section IV.C.5 below.

[27] *See* Exhibit SCE-05 for additional information regarding the DGC selection process.

engineered equipment and installing the equipment within containment; performing RVI segmentation; packaging GTCC waste; and disposing non-GTCC waste

- Spent Fuel Systems and Equipment Removal and Disposal – includes removing the spent fuel pool racks; installing a water processing system; and draining the spent fuel pools
- Steam Generator Removal and Disposal – includes removing the steam generators (two per unit); and segmenting, packaging, and disposing of the steam generators
- Non-Essential Systems Removal and Disposal – includes removing systems in multiple maintenance buildings, administration buildings, and warehouse buildings; and removing injection systems, condenser tubes, and auxiliary transformers
- Large Components Removal and Disposal – includes removing and disposing of reactor vessel insulation; and segmenting, packaging, and disposing of the reactor vessels, pressurizers, and turbine gantry cranes
- Initial Plant Buildings Demolition and Disposal – includes procuring building demolition equipment; and then demolishing the auxiliary control/radwaste building, full flow condensate polishing demineralizer and turbine buildings, emergency diesel generator buildings; transformer pads, administration/warehouse/shop (AWS) building, and numerous other support structures
- Buildings Decontamination – includes removing the remaining radioactive materials embedded within the concrete and steel surfaces, walls, and floors of the buildings in the SONGS radiological control area; and performing decontamination verification surveys to validate the effectiveness of the decontamination work performed
- Final Plant Buildings Demolition and Disposal – includes demolishing the buildings in the central area of the plant, (i.e., the fuel handling and penetration buildings); and removing the protective area pavement

- Offshore Conduits Diffusers and Risers Removal – includes preparing hydro-geological analysis; and removing specified vertical diffusers and risers from the two offshore intake conduits and the two offshore discharge conduits
- Containment Buildings Demolition and Disposal – includes de-tensioning and removing the containment building post-tensioning cables; and demolishing the containment and safety equipment buildings
- Site Backfill, Compaction, etc. – following the demolition of structures, systems, and components, backfilling and compacting the site to a specified grade to meet the interim end-state
- Final Site Radiological Survey and NRC License Termination (for Partial Site Release of SONGS 2&3 Site) – includes performing the final radiological site status survey in accordance with NRC guidelines; and developing and supporting the License Termination Plan
- Waste Taxes (pass-through)[28] – per the DGC contract, the SONGS Participants are responsible to pay the DGC for the actual waste taxes and fees invoiced to SDS based on the actual waste disposed

The estimated costs for Decontamination, Demolition, and Disposal activities are shown in Table IV-3 below:

[28] These costs are not included in the SDS contract, but have been estimated in the 2017 DCE. In the 2014 DCE, applicable waste taxes were included with the estimated costs for each distributed project.

Table IV-3
2017 SONGS 2&3 DCE
Decontamination, Demolition, and Disposal Costs
(100% Share, Millions of 2014 $)

	Description	2017 DCE Total (2014 $)
1	**Decontamination, Demolition, and Disposal**	
2	Initial D&D Activities	$ [redacted]
3	Reactor Vessel Internals Segmentation and Disposal	[redacted]
4	Spent Fuel Systems/Equipment Removal and Disposal	[redacted]
5	Steam Generator Removal and Disposal	[redacted]
6	Non-Essential Systems Removal and Disposal	[redacted]
7	Large Components Removal and Disposal	[redacted]
8	Initial Plant Buildings Demolition and Disposal	[redacted]
9	Building Decontamination	[redacted]
10	Final Plant Buildings Demolition and Disposal	[redacted]
11	Offshore Conduit Diffusers/Risers Removal	[redacted]
12	Containment Buildings Demolition and Disposal	[redacted]
13	Site Backfill, Compaction, etc.	[redacted]
14	Final Site Radiological Survey and NRC License Termination	[redacted]
15	Waste Taxes (pass-through)	[redacted]
16	**Decontamination, Demolition, and Disposal Total**	**$** [redacted]

In the 2017 DCE, the estimated cost for Decontamination, Demolition, and Dismantling activities is $[redacted][29] (100% share, 2014 $). In the 2014 DCE, the estimated cost for these activities was $1,208.2 million (100% share, 2014 $), resulting in an increase of $[redacted].[30] The primary reason for the increased cost is the addition of activities expected to be performed that are currently outside the scope of the SDS contract. [redacted]

[29] *See* 2017 DCE, Appendix C, Table 2, lines 8 and 50, 57, 66, 70, 75, 86, 108, 121, 130, 132, 134, 144, 149, and 153.

[30] SCE is not providing a line-by-line comparison and variance analysis of DGC contract values to the 2014 DCE, because such an analysis would not provide meaningful information given how the DGC contract values were determined. The SDS contract reflects negotiated terms and conditions regarding the contract pricing and timing of payments agreed to between SCE and SDS. The SDS contract also assumes a grouping and sequencing of work different than assumed in the 2014 DCE. Although a line-by-line variance analysis is not possible given these issues, SCE is able to compare the total costs of the scope included in the SDS contract to the same scope of work included in the DCE.

[redacted]. However, this increase in distributed project costs is more than offset by a $[redacted] (100% share, 2014 $) decrease in undistributed DGC staffing costs.[32] The combined variance of these two cost categories resulted in a net cost savings of $[redacted] (100% share, 2014 $) achieved by SCE through the competitive bidding process for the DGC contract. All of these activities are required to decommission SONGS 2&3. The Commission, therefore, should find that these estimated costs are reasonable.

5. Substructure Removal

As briefly described above, the removal of remaining non-contaminated substructures, which is now estimated to occur during 2046-2049, will be a large-scale project that will require the expertise of a qualified third-party vendor. SCE estimates that the cost to perform this work scope, including the disposal of waste materials, will be lower than the cost assumed in the 2014 DCE.

The 2017 DCE assumed the cost would be $273.0 million[34] (100% share, 2014 $), whereas the 2014 DCE assumed the cost for the Substructure Removal project would be $303.8 million (100% share, 2014 $), a decrease of $30.8 million. The decrease is due to the identification of a closer waste disposal location.

6. Other Distributed Projects

The Other Distributed Projects cost category includes many distributed cost activities that either were not included in the 2014 DCE or for which the work scopes were determined to have changed substantially between the 2014 DCE and the 2017 DCE.

Examples of such activities include:

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31 [redacted]

32 For further discussion of DGC Staffing and the variance against the 2014 DCE, see Section IV.C.3 below.

33 [redacted]

34 *See* 2017 DCE, Appendix C, Table 2, line 224.

- GTCC Disposal – Under the DOE Standard Contract, the DOE is obligated to accept and dispose of "spent nuclear fuel" and "high level waste." The courts have determined that GTCC is "high level waste," which DOE is obligated to accept and dispose of under the DOE Standard Contract, but have stated that that does not mean that the government will have to bear the cost of GTCC waste disposal alone. The courts have not provided a disposal cost.[35]
- Cyber Security Modifications – Under 10 C.F.R. § 73.54, SCE was required to develop a cyber security plan that addressed eight milestones to ensure certain digital assets, such as computer and communication systems and networks, are secure and protected.
- California Environmental Quality Act (CEQA) – Under CEQA, the CSLC, as lead agency, is required to evaluate the SONGS decommissioning project and prepare an Environmental Impact Report (EIR) in response to SCE's application to modify and extend the existing CSLC lease regarding the offshore conduits. The CEQA process began in 2015. The CSLC is expected to certify the EIR in late of 2018. The CCC is then expected to review an application for a CDP for SONGS decommissioning based on the EIR, as well as its own additional analysis. The CCC is expected to consider SCE's CDP application by the end of 2018. Following the receipt of the CDP, physical decommissioning of the plant can proceed.
- Mesa Site Turnover – SCE's Mesa lease from the Navy consists of five parcels.[36] Parcel 5 is on the west side of U.S. Interstate Highway 5 (I-5) and includes a security station to control access to Parcels 6 and 7. Parcels 6 and 7 are located on the east side of I-5 and along with Parcel 5 comprise the area known as the Mesa site. Parcels 8 and 9 include a parking lot and lay-down area on the west side of I-5 and abut the SONGS site. SCE currently estimates that Parcels 5, 6, and 7 will be returned to the

[35] *Yankee Atomic Electric Co. v. U.S.,* 536 F.3d 1268, 1278 (Fed. Cir. 2008).

[36] *See* Appendix E for map of the parcel locations.

Navy in 2021, and Parcels 8 & 9 will be retained until the end of decommissioning. As part of the process to return Parcels 5, 6, and 7 to the Navy, SCE must first assess the property and remediate SONGS-caused contamination to the extent necessary to obtain "No Further Action Letters" from the California Department of Toxic Substances Control (DTSC) indicating the property is available for unrestricted use.[37]

- Substructure Removal Contractor Procurement – In 2044, SCE will begin efforts to procure a contractor for the removal of SONGS substructures and placement of permanent backfill. Because the dewatering, shoring, excavation, removal, and backfilling of the substructures will be a very large and specialized work scope, SCE will incur the cost to undertake a competitive procurement process to identify and select a specialty vendor to perform this work.
- Coastal Development Permit Extensions – SCE holds a CDP for the storage of SONGS 2&3 spent fuel in the Areva ISFSI system until November 2022, and a separate CDP to store SONGS 2&3 spent fuel in the Holtec ISFSI system until 2035. Therefore, the 2017 DCE assumes SCE will need to obtain CDP extensions from the CCC for the Areva and Holtec ISFSI systems prior to the expiration of the permits in 2022 and 2035, respectively.
- ISFSI Coastal Development Permit (CDP) Settlement – In August 2017, SCE reached a settlement agreement with parties who challenged the CDP, wherein SCE agreed to incur up to $4.3 million (100% share, 2014 $) on commercially reasonable efforts to identify an offsite location for SONGS spent fuel storage.
- Future DCE Updates – Under the Decommissioning Act, SCE is required to periodically revise the DCEs to include descriptions of changes in regulation, technology, and economics affecting the estimate of costs; and of additions and

[37] On April 24, 2017, the DTSC issued a No Further Action Letter for Parcel 5. The efforts to assess and remediate contamination for Parcels 6 and 7 are ongoing. SCE continues to hold Parcel 5 because it provides access to Parcels 6 and 7.

deletions to nuclear facilities.[38] SCE submits such DCE updates to the Commission in NDCTP proceedings.

- North Industrial Area (NIA) Sump Modifications – The NIA sump (located on the site formerly occupied by SONGS 1) currently discharges to the SONGS 2&3 dilution water system. The SONGS 2&3 dilution water system will be retired by SDS, and therefore the discharge pathway for the NIA sump will need to be modified.

The estimated costs for the Other Distributed Projects category are shown in Table IV-4 below:

Table IV-4
Reconciliation of 2017 DCE to 2014 DCE
Other Distributed Projects
(100% Share, Millions of 2014 $)

	Description	2017 DCE Total (2014 $)	2014 DCE Total (2014 $)	Variance
1	**Other Projects**			
2	GTCC Disposal	$ 40.7	$ 50.6	$ (9.9)
3	Cyber Security Modifications	9.4	1.9	7.5
4	CEQA	7.9	2.7	5.2
5	Mesa Site Turnover	20.3	17.8	2.6
6	**Previously Included Project Subtotal**	**$ 78.3**	**$ 72.9**	**$ 5.4**
7				
8	Substructure Removal Contractor Procurement	$ 7.0	$ -	$ 7.0
9	Coastal Development Permit Extensions	5.2	-	5.2
10	ISFSI CDP Settlement	4.3	-	4.3
11	DCE Update	3.7	-	3.7
12	NIA Sump Modifications	1.1	-	1.1
13	**New Projects Subtotal**	**$ 21.3**	**$ -**	**$ 21.3**
14	**Other Projects Total**	**$ 99.6**	**$ 72.9**	**$ 26.7**

The total estimated cost for these Other Distributed Projects in the 2017 DCE is $99.6 million (100% share, 2014 $). The estimated cost for such Other Distributed Projects in the 2014 DCE was $72.9 million (100% share, 2014 $). Thus, the 2017 DCE includes a $26.7 million increase for the Other Distributed Projects category.

[38] Pub. Utilities Code § 8326.

After the development of the 2014 DCE, SCE determined that the cost to complete several of its Other Distributed Project work scopes would be different than estimated in 2014. For example, in the 2014 DCE SCE estimated that the disposal cost for GTCC waste would be $50.6 million (100% share, 2014 $) based on the highest published disposal rates for Class C low level radioactive waste (LLRW). In the 2017 DCE, however, SCE assumed that the disposal cost for a canister of GTCC waste would be comparable to the disposal cost for a canister of spent fuel. This resulted in an estimated GTCC disposal cost in the 2017 DCE of $40.7 million[39] (100% share, 2014 $), a decrease of $9.9 million.

With respect to Cyber Security-related work, the 2014 DCE included $1.9 million (100% share, 2014 $) and assumed the work would be completed in 2013. At that time, SCE believed that after SCE submitted the certifications of permanently ceased operations for SONGS 2&3, SCE would no longer be subject to the cyber security requirements of 10 C.F.R. § 73.54. However, SCE subsequently determined that the SONGS Cyber Security Plan was still required because it was described in the Physical Security Plan License Condition for SONGS 2&3. Other decommissioning plants had sought an exemption from the cyber security requirements, but the NRC had not yet approved those requests. It was prudent for SCE to wait for the NRC to review these requests and provide further guidance prior to SCE submitting an exemption request so as to avoid any protracted delays in the NRC's review process. In the meantime, SCE was obligated to comply with the requirements related to performing cyber security assessments, but not the more costly implementation aspects of the requirements. When the NRC indicated a willingness to grant such exemption requests, SCE submitted a License Amendment Request (LAR) to the NRC in June 2017, wherein SCE requested removal of the requirement to fully implement the SONGS Cyber Security Plan. At the end of 2017, the NRC granted approval for SONGS to remove the cyber security license condition, thus waiving the implementation requirements. Prior to the NRC's granting of the exemption, SCE had expended $9.4 million[40] (100%

[39] *See* 2017 DCE, Appendix C, Table 2, line 188.

[40] *See* 2017 DCE, Appendix C, Table 2, line 191.

share, 2014 $) to implement cyber security assessments. SCE included this recorded amount in the 2017 DCE, resulting in a $7.5 million increase over the amount estimated in the 2014 DCE.

With respect to the CEQA project, the 2017 DCE forecast $7.9 million[41] (100% share, 2014 $). The 2014 DCE forecasted this major project at $2.7 million (100% share, 2014 $), resulting in an increase of $5.2 million. The increase occurred because the time and effort required to complete this activity were greater than assumed during the development of the 2014 DCE. Specifically, SCE originally anticipated the CEQA review would be completed in approximately one year. Given the complexity of and varied interests (Navy, local communities, environmental advocates) that must be considered, SCE now anticipates that it will be nearly a four-year effort. SCE underestimated the level of effort necessary to complete the CEQA review, resulting in the variance. This activity is required in order to begin D&D.

With respect to Mesa Site Turnover project, the 2017 DCE forecast $20.3 million[42] (100% share, 2014 $). The 2014 DCE forecasted this major project at $17.8 million (100% share, 2014 $), resulting in an increase of $2.6 million. The increase occurred because the time and effort required to complete this activity were greater than assumed during the development of the 2014 DCE. Specifically, SCE originally expected to return the property to the Navy in 2017 with limited environmental characterization. Subsequently, the Navy imposed stringent remediation standards for the property requiring more extensive characterization and remediation, so turnover is now expected to occur in 2021. SCE must comply with the Navy's requirements.

The remaining Other Distributed Projects were not included in the 2014 DCE because their scopes emerged after the 2014 DCE was developed. SCE estimated their costs as follows:

Substructure Removal Contractor Procurement – The 2017 DCE includes costs of $7.0 million[43] (100% share, 2014 $) for a competitive bidding process to select a substructure removal contractor, including the development of a Request for Proposal, proposal evaluation, and contract

41 *See* 2017 DCE, Appendix C, Table 2, line 184.
42 *See* 2017 DCE, Appendix C, Table 2, line 178.
43 *See* 2017 DCE, Appendix C, Table 2, line 190.

award. The estimate is approximately one-half the cost to procure a DGC for the major D&D work because the scope of this effort is nearly half the scope of the DGC D&D work.

Coastal Development Permit (CDP) Extensions – The 2017 DCE includes costs of $5.2 million[44] (100% share, 2014 $) for SCE to obtain extensions for the Areva and Holtec CDPs. SCE holds a CDP to construct and operate the Areva ISFSI to store SONGS 2&3 spent fuel until November 2022, and a separate CDP to construct and operate the Holtec ISFSI to store SONGS 2&3 spent fuel until 2035. The 2017 DCE assumes SCE will need to obtain CDP extensions from the CCC for the Areva and Holtec ISFSI systems prior to the expiration of the permits in 2022 and 2035, respectively. SCE considered the recorded costs from past CDP applications and the complexities of the anticipated issues that will require evaluation in these two CDP extensions to estimate the cost to obtain these two CDP extensions.

ISFSI CDP Settlement – As part of the ISFSI CDP Settlement, SCE agreed to incur up to $4.0 million (100% share, nominal $) on commercially reasonable efforts to identify an offsite location for SONGS spent fuel storage. SCE also included $0.3 million (100% share, nominal $) for SCE outside counsel legal costs to reach the settlement.[45] SCE also included $0.8 million (100% share, nominal $) for attorney's fees to plaintiff's counsel, as agreed to in the settlement.[46] This $5.1 million (100% share, nominal $) increase was unforeseeable at the time the 2014 DCE was developed. This cost category was shared between SONGS 1 and SONGS 2&3. The amount allocated to SONGS 2&3 is $4.3 million (100% share, 2014 $). The settlement allowed SCE to proceed with transferring fuel to the ISFSI. It is also reasonable for SCE to explore offsite locations for the storage of spent fuel.

Future DCE Updates – SCE assumes a cost of $3.7 million[47] (100% share, 2014 $) to develop future DCE Updates because SCE now assumes that it will use a third-party vendor to develop

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[44] *See* 2017 DCE, Appendix C, Table 2, line 167.

[45] Given the ongoing analyses and the current uncertainty regarding the potential location and requirements for an acceptable alternative spent fuel storage site, the estimated cost to re-locate the SONGS 2&3 spent fuel to an alternative site are speculative and have not been included in the 2017 DCE.

[46] Under the California Civil Procedure Code, a prevailing plaintiff in a mandamus proceeding is entitled to seek recovery of attorney's fees. *See* Cal. Civ. Proc. Code § 1021.5.

[47] *See* 2017 DCE, Appendix C, Table 2, line 182.

the DCE Updates instead of preparing them in-house at an average cost of approximately $0.3 million (100% share, 2014 $) per update. Under the Decommissioning Act, SCE is required to periodically revise the DCEs and submit them to the Commission.

NIA Sump Modifications – The North Industrial Area (NIA) sump currently discharges to the SONGS 2&3 dilution water system. Because SDS will remove the dilution water system, the discharge path for the NIA sump must be modified. SCE provided an estimated cost of $1.1 million[48] (100% share, 2014 $) for this work scope.

Relative to the 2014 DCE, the cost increases for Other Distributed Projects described above are partially offset by the lower estimated cost to dispose of GTCC waste, and result in a net increase of $26.7 million (100% share, 2014 $). The Commission should find the increased estimated costs for the Other Distributed Projects reasonable because each of these projects is required to fulfill an unavoidable regulatory requirement or a contractual obligation.

7. Greater Than Class C (GTCC) Waste Storage

In the 2017 DCE, SCE assumes that it will be required to license and purchase ten new canisters for storing and disposing of GTCC waste from SONGS 2&3 D&D activities and will use two existing Areva canisters for storing GTCC waste from the spent fuel pools. In contrast, SCE assumed in the 2014 DCE that it would use the ten Areva canisters that were originally fabricated for storing and disposing spent fuel from SONGS 2&3. SCE made this change because, although the ten Areva canisters are licensed for storing and transporting spent fuel, they are not licensed for transporting GTCC waste.[49] Although the radiological and physical characteristics of spent fuel would seem to bound those of GTCC waste, SCE determined that the canisters may only be used for their intended (and licensed) purpose, and that they would need to be re-licensed before they could be used to store and transport GTCC waste. Because most of the GTCC waste generated at SONGS 2&3 will come from the reactor vessel internals segmentation project, which is scheduled near the beginning of D&D activities, and the time required to re-license the Areva canisters is uncertain, SCE determined that it would be

[48] *See* 2017 DCE, Appendix C, Table 2, line 192.

[49] The canisters can be used to store GTCC waste as long as the canister does not need to be modified. For these ten canisters, the canisters would need to be modified to store the GTCC from D&D activities.

imprudent to risk an unknown delay to the D&D schedule by allowing it to be constrained by an effort to re-license the Areva canisters. SCE determined that it would instead be more prudent to avoid such schedule uncertainties by obtaining ten new canisters that would already be licensed to store and transport GTCC waste.

The estimated cost for GTCC storage in the 2017 DCE is $26.6 million (100% share, 2014 $). The 2014 DCE did not include any costs for GTCC storage. This resulted in a cost increase of $26.6 million[50] (100% share, 2014 $). Nevertheless, the Commission should find this estimated cost increase reasonable because it will reduce the risk of substantially greater costs due to potential project delays resulting from a delay to re-license the Areva canisters for GTCC waste storage and disposal.

8. Plant Easement/Lease Renewals

SCE uses the land upon which the SONGS site is located pursuant to a grant of easement executed with the Navy in 1964. This easement expires in 2024. The Navy has informed SCE that the existing easement will not be renewed because the terms are outdated; therefore, a new real estate authorization will be negotiated. SCE anticipates that the new real estate authorization will: (1) modify land boundaries to exclude roads used by the public, exclude lands within the current easements that SCE does not use, include Parcels 8 and 9, and include lands that SCE occupies that are not within the current easements; and (2) include pricing that is consistent with the current fair market rental value of the property. The Navy will be required to perform a limited-scope NEPA review to issue this new real estate authorization. The public interest in the Navy's decision, mostly due to on-site spent fuel storage, may impact the extent of the Navy's NEPA review effort.

Due to the uncertainty of how long the spent nuclear fuel would be on-site and the potential for relocation of the ISFSI in 2035, the 2017 DCE conservatively assumes that SCE will have to negotiate real estate authorizations with the Navy two additional times. Therefore, the next real estate authorization will expire in 2035, requiring SCE to seek a renewal. It is assumed the terms and site use will remain the same, and that the term will also be 10 years. Thus, the cost for this effort is estimated to be less than for the previous negotiation. This effort will also require a limited-scope NEPA review.

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[50] *See* 2017 DCE, Appendix C, Table 2, line 169.

When the real estate authorization needs to be renewed again in 2045, SCE will request the Navy to specify the final site restoration and substructure removal requirements. SCE currently plans to commence this effort in 2040, such that the real estate authorization renewal and final site restoration and substructure removal requirements would be in place by 2045. This would facilitate performing the Substructure Removal civil works project during 2046-2049; and ISFSI decommissioning, NRC license termination, and final site restoration during 2050-2051. Because this real estate authorization renewal will identify the conditions under which the land will be returned to the Navy, the Navy will be required to perform a more robust NEPA review.

In the 2017 DCE, the estimated cost for Plant Easement/Lease Renewals is $27.1 million[51] (100% share, 2014 $). In the 2014 DCE, the estimated cost was $1.4 million (100% share, 2014 $). This results in an increase of $25.7 million. The 2017 DCE includes costs for SCE labor, contract support, Navy costs (such as consultations/review hours), surveys and mapping for three distinct real estate authorizations and three corresponding NEPA reviews. At the time the 2014 DCE was developed, discussions between SCE and the Navy had not yet progressed to that point that the need for three such updates to the Navy real estate authorization and three NEPA reviews was identified.

Because each of these updates to the Navy real estate authorization and any corresponding NEPA reviews will be required: (1) for SCE to fulfill the Navy's requirements for ongoing use of the SONGS site until SCE is ready to relinquish the land; (2) for the Navy to appropriately analyze and identify the final site restoration requirements; and (3) for SCE to implement the site restoration requirements to the satisfaction of the Navy, these Plant Easement/Lease Renewal costs are necessary decommissioning costs. SCE based the estimate on its recent history negotiating real estate matters with the Navy, as well as the costs incurred to date for SONGS real estate authorizations. Recent history with the Navy regarding the Mesa lease and the switchyard indicates that SCE's negotiations with the Navy will involve a lengthy and more complex undertaking than assumed in the 2014 DCE. The Commission, therefore, should find that these estimated costs are reasonable.

[51] *See* 2017 DCE, Appendix C, Table 2, lines 185-187.

9. Offshore Conduits Removal

The 2017 DCE includes an estimated cost to perform the full removal of the SONGS 2&3 offshore conduits as estimated in the 2014 DCE.

The 2017 DCE includes $91.6 million[52] (100% share, 2014 $) to fully remove the SONGS 2&3 offshore conduits. In the 2014 DCE, the estimated cost was $96.0 million (100% share, 2014 $). This results in a decrease of $4.4 million. This decrease occurred because the estimated value in the 2014 DCE includes a 5% adder for A&G, whereas the A&G adder is excluded from the 2017 DCE estimated value.

10. ISFSI Demolition

Following the removal of all spent fuel and GTCC waste by the DOE, SCE will demolish and remove the ISFSI and perform activities necessary for the final restoration of the SONGS site.

The 2017 DCE includes $19.2 million[53] (100% share, 2014 $) for ISFSI decommissioning costs. In the 2014 DCE, the estimated cost was $21.1 million (100% share, 2014 $). This results in a decrease of $1.9 million. At the time the 2014 DCE was prepared, the specific plans to expand the ISFSI had not been defined. Later in 2014, SCE entered into a contract with Holtec to expand the ISFSI. The ISFSI demolition cost in the 2017 DCE is based on a new estimate completed by High Bridge Associates and reflects both the Areva and Holtec ISFSIs.

11. Completed Projects

During the period between the permanent retirement of SONGS 2&3 on June 7, 2013, and December 31, 2017, SCE completed several Distributed Projects. The following completed projects are some of those already submitted to the Commission for reasonableness review:

- Included in 2014 reasonableness testimony: (1) Development of the Certified Fuel Handler Program; (2) Post-Fukushima Modifications; (3) Independent Spent Fuel Storage Installation (ISFSI) Pad Study; and (4) Spent Fuel Pool Analyses.[54]

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[52] *See* 2017 DCE, Appendix C, Table 2, line 229.

[53] *See* 2017 DCE, Appendix C, Table 2, line 241.

[54] The SONGS 2&3 Distributed Projects completed during 2014 are explained in greater detail in A.16-03-004, Exhibit SCE-09 at pages 18-21.

- Included in 2015 reasonableness testimony: (1) Nuclear Fuel Contracts Cancellations; (2) Legacy Radwaste Disposal; (3) Security Programs – Security Shutdown Strategy; (4) Regulatory Submittals; (5) Historical Site Assessment/Site Characterization; and (6) Transition Project Modifications – Special Purpose Vehicle (SPV) Feasibility Study.[55]

The following completed projects are being submitted for reasonableness review in this proceeding:

- Major Projects completed during 2016-2017: (1) the Spent Fuel Islanding project; (2) Selection of Decommissioning General Contractor; and (3) Transition Project Modifications, including the Large Organism Exclusion Device Modification, Special Purpose Vehicle - Implementation, Records Retention Project, and the Simplification and Streamlining Project.[56]

The following completed activity will be submitted for reasonableness review in the 2021 NDCTP:

- Defueled Safety Analysis Report (DSAR): Updates the current licensing basis for the decommissioning configuration state of SONGS 2&3 and is a reference available for reviewing decommissioning actions and plans affecting the SONGS 2&3 site.

The estimated costs for the Completed Projects are shown in Table IV-5 below:

[55] The SONGS 2&3 Distributed Projects completed during 2015 are explained in greater detail in A.16-03-004, Exhibit SCE-08 at pages 26-39, and in Exhibits SCE-10 and SCE-10C.

[56] The SONGS 2&3 Distributed Projects completed during 2016-2017 are explained in greater detail in A.18-03-XXX, Exhibit SCE-05.

Table IV-5
Reconciliation of 2017 DCE to 2014 DCE
Completed Projects
(100% Share, Millions of 2014 $)

	Description	2017 DCE Total (2014 $)	2014 DCE Total (2014 $)	Variance
1	2014 Reasonableness Review	$ 0.6	$ 0.6	$ (0.0)
2	2015 Reasonableness Review	93.5	76.8	16.7
3	2018 Reasonableness Review	27.2	19.2	8.0
4	Future Reasonableness Reviews	2.0	1.5	0.5
5	**Completed Projects Total**	**$ 123.3**	**$ 98.1**	**$ 25.2**

The total estimated cost for these Distributed Projects, as reflected in the 2017 DCE, was $123.3 million[57] (100% share, 2014 $). In the 2014 DCE, the total estimated cost for the SONGS 2&3 decommissioning-related Completed Distributed Projects completed during 2013-2017 was $98.1 million (100% share, 2014 $), resulting in a variance of $25.2 million more than estimated. The explanations for the variances associated with each of these Distributed Projects are provided in the testimony SCE provided to the Commission in its reasonableness review submittals for each of these completed projects. The 2014 and 2015 completed projects are not being reviewed in this proceeding.

C. Undistributed Activities

1. Contracted Services

Contracted Services are shorter-term supplemental resources, specialty contractors and consultants, third-party services, materials, and supplies that are provided on an as-needed basis to support SONGS. SCE must meet several NRC regulatory requirements,[58] and maintain and operate SONGS to support spent nuclear fuel in the spent fuel pools and ISFSI. SCE also must meet contractual obligations and provide support services (such as engineering, regulatory, financial, and custodial services) for the plant and the general facility,[59] as well as provide basic office services, to complete

[57] *See* 2017 DCE, Appendix C, Table 2, lines 1, 12, 15, 18, and 24.

[58] *See* Exhibit SCE-01, Section 1.F.2.a, Nuclear Regulatory Commission Requirements.

[59] The general facility includes SONGS office buildings, roads, parking lots, fencing, lighting, and all the services necessary to maintain the site in a condition suitable for all the activities that are needed to decommissioning the plant.

decommissioning planning and implement decommissioning. SCE utilizes Contracted Services for these purposes.

Contracted Services in the 2017 DCE consists of two distinct types of costs, recorded and estimated:

- June 2013-2017 recorded costs of $83.7 million (100% share, 2014 $) equaling an approximate annual average of $18.6 million (100% share, 2014 $);[60] and
- 2018-2051 estimated costs of $141.5 million (100% share, 2014 $) reflecting an approximate annual average of $4.2 million (100% share, 2014 $).

The estimated cost for Contracted Services for 2018-2051 includes support activities for the organizations shown in Table IV-6 below.

Table IV-6
Contracted Services
(100% Share, Millions of 2014 $)

	Description	2017 DCE 2018-2051 Total (2014 $)	Annual Average Over 2018-2051 (2014 $)
1	**Contracted Services (2018-2051)**		
2	Decommissioning Oversight	$ 50.9	$ 1.5
3	Maintenance and Work Control	31.3	0.9
4	Nuclear Regulatory Affairs and Nuclear Oversight	22.7	0.7
5	Site Engineering	13.8	0.4
6	Site Management & Administration	10.7	0.3
7	Emergency Preparedness	6.3	0.2
8	Decommissioning Finance	4.8	0.2
9	Operations	1.0	0.0
10	**Contracted Services (2018-2051) Total**	**$ 141.5**	**$ 4.2**

SCE discusses each of these below:[61]

[60] Recorded costs during 2014-2015 were reviewed for reasonableness in the 2015 NDCTP, A.16-03-004. Recorded costs during 2016-2017 have been submitted for reasonableness review in this proceeding. *See* Exhibit SCE-05.

[61] Each of these organizations also incurs common costs for items such as employment related training, office supplies, custodial support, and employment related travel expenses.

- Decommissioning Oversight – Contracted services include EPRI support, document governance, engineering consulting services, estimating services for supply chain, and radiation protection and environmental contract support.
- Maintenance/Work Control – Service vendor support to perform preventive and corrective maintenance on all electrical systems; mechanical systems; instrumentation and controls systems; other plant systems still in operation; and the seawall.
- Nuclear Oversight/Nuclear Regulatory Affairs – Consultants to support Nuclear Regulatory Affairs' (NRA) interface with the NRC regarding SONGS' compliance with regulatory requirements, and to support Nuclear Oversight's execution of SONGS' decommissioning quality assurance program (DQAP).
- Site Engineering – Software licenses, security computer maintenance, and consultants as required to resolve specific issues being faced.
- Site Management and Administration – Staffing consultant to determine appropriate SONGS staffing levels.
- Emergency Preparedness – Contractor support for planning functions that continue to be required by federal regulations as long as nuclear fuel is stored on-site, including periodic drills to verify the effectiveness of the SONGS emergency preparedness program.

The total estimated cost for Contracted Services in the 2017 DCE is $225.2 million[62] (100% share, 2014 $). In the 2014 DCE, the total estimated cost for Contracted Services was $34.6 million (100% share, 2014 $). This resulted in an increase of $190.6 million. The 2014 DCE assumed Contracted Services would involve only office supplies, computers, and related equipment for utility staff use, based upon an assumed cost of $10,500 per year per employee. SCE utilized this category more broadly for the services and activities discussed above. Therefore, there is a variance

[62] *See* 2017 DCE, Appendix C, Table 2, line 287.

between the DCEs because the 2014 DCE did not include forecasts for this broader group of services and activities.

SCE developed the estimated Contracted Services costs in the 2017 DCE by analyzing the costs incurred for these functions in 2013-2016, and then built them up throughout the remaining decommissioning schedule (2018-2051) based on the anticipated future contracted services requirements for the SONGS decommissioning organization. SCE only included the costs necessary to meet its regulatory requirements related to the safe storage of spent fuel on-site; and to provide services required to maintain the plant and general facility. As noted above, the annual requirements going forward are substantially lower than those recorded during the initial decommissioning period and reflect the changed conditions, including SCE's transition of certain work activities to the DGC. The Commission should find that they are reasonable.

2. Service Level Agreements/A&G

Beginning in 2016, SONGS implemented annual intra-company Service Level Agreements (SLAs) with SCE corporate service providers (e.g., HR, IT, Real Estate, Supply Management, Treasurer's, Environmental, and Controller's). Each SLA describes the specific administrative and general (A&G) functions and services SCE provides to SONGS that support and sustain the D&D activities. The SLAs meet the terms and conditions included in the Decommissioning Agreement between SCE and the Participants.[63]

The 2014 DCE included an A&G adder (5.0%) that was applied to the costs of each DCE line item to cover the costs of SCE corporate departments supporting SONGS decommissioning. To maintain the integrity of the values referenced from the 2014 DCE in the variance explanations provided elsewhere in this testimony (i.e., all other cost categories), SCE kept the 5% A&G adder with each DCE line item in Table IV-2 above. This results in the value for the SLA/A&G in line 17 of Table IV-2 being shown as zero dollars in the 2014 DCE column. Rather than comparing the SLA/A&G amount included in the 2017 DCE to zero, it is more appropriate to compare it to the

[63] Section 8.1.7.2 of the SONGS Decommissioning Agreement, dated April 23, 2015.

corresponding 5% A&G adder from the 2014 DCE. The number SCE calculated for the corresponding 5% A&G adder from the 2014 DCE for the period 2016-2051 is $160.8 million (100% share, 2014 $).

The 2017 DCE incorporated the SLA costs to replace the A&G adders during the 2016-2028 period. Beginning in 2029, the 2017 DCE resumes applying the 5% A&G adder to all remaining decommissioning costs until project completion in 2051. Under this approach, the 2017 DCE estimates the cost of these SCE corporate functions at $168.2 million[64] (100% share, 2014 $), an increase of $7.4 million, in comparison to the corresponding 5% adder noted above. Using the combination of SLAs and A&G adder provides greater transparency and certainty of costs for the benefit of Participant oversight and project cost control. The Commission should find the estimated costs for the SLAs/A&G adder reasonable because they more accurately reflect the anticipated costs for these corporate support functions.

3. DGC Staffing

DGC staff consists of SDS personnel who provide the project management of the D&D work being performed by SDS, and manage/perform the programs and functions transferred from SCE to SDS. Their project management function involves the continued planning, scheduling, and monitoring of the D&D work as timely as possible while maintaining a safe work environment. It also includes contracting with third party specialty vendors to complete specific tasks (e.g. RVI segmentation), and administering those contracts. SCE provides oversight of SDS's project management. This division of labor allows SDS and SCE to utilize their core competencies to complete the work in an efficient manner – SDS's expertise in deconstructing facilities and SCE's oversight role. This cost category also includes staffing for a DGC that will be required during substructure removal and ISFSI D&D/final site restoration to be performed during 2046-2051.

In the 2017 DCE, the estimated cost for DGC Staffing is $[redacted][65] (100% share, 2014 $). In the 2014 DCE, the estimated cost for DGC Staffing was $423.6 million (100% share, 2014

[64] *See* 2017 DCE, Appendix C, Table 2, line 381.

[65] *See* 2017 DCE, Appendix C, Table 2, lines 155 and 386.

$). This resulted in a decrease of $[redacted] million. This primarily reflects the result of the competitive procurement process that resulted in the selection of SDS.

4. Labor-Staffing

SCE records costs for the SONGS utility staff and security force as undistributed labor. The SONGS utility staff performs various decommissioning activities relating to state and federal regulatory requirements, external communications with stakeholders, and strategic planning and analysis. The utility staff's activities include complying with existing technical specifications; ensuring the health and safety of the workers and the public; planning and preparing the facility for decommissioning; retiring plant systems to minimize or eliminate costs; and keeping the public and stakeholders informed on decommissioning progress. The security force protects SONGS in accordance with NRC regulations 10 C.F.R. § 73 and 10 C.F.R. § 50.54, and has been sized to meet the current design basis threat assessment, pursuant to 10 C.F.R. § 73.

In the 2017 DCE, SCE estimates that Labor-Staffing costs will be $986.2 million[66] (100% share, 2014 $). In the 2014 DCE, SCE estimated that Labor-Staffing costs would be $1,029.4 million (100% share, 2014 $). This resulted in a decrease of $43.2 million (100% share, 2014 $) relative to the 2014 DCE. Now that SCE has four plus years of experience with the planning of decommissioning, it is better able to identify the required staffing to safely carry out the decommissioning of SONGS 2&3 and oversight of its contractors. The estimated staffing levels in the 2017 DCE were developed through a collaborative process between SONGS executive managers and Kenrich. The staffing levels were subsequently vetted by ABZ. The Commission should find these costs reasonable as they reflect the additional experience SCE has gained, have been reviewed by an industry expert, and represent a well-supported estimate of the staffing levels required going forward.

5. All Other Non-Labor

Non-Labor costs include a wide range of decommissioning activities and obligations, including the following:

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66 *See* 2017 DCE, Appendix C, Table 2, line 265.

- Site Lease and Easement Expenses – SCE will be required to make annual easement and lease payments to the Navy for the onshore plant site and SONGS Mesa facility and to the CSLC for the SONGS 2&3 offshore conduits until the easement and lease agreements are terminated.
- Severance – Under the Decommissioning Act, SCE is required to provide severance benefits to SCE employees at SONGS whose jobs are eliminated as a result of the permanent retirement of SONGS.
- Energy – SCE must purchase electrical energy at retail rates to power the SONGS site.
- Loading Spent Fuel & GTCC Waste to DOE – Under the DOE Standard Contract, SCE is responsible for the cost to transfer spent fuel canisters from the ISFSI and loading them into DOE shipping containers on-site, and then onto the DOE's transportation device.
- Information Technology – SCE will be required to incur software and network licenses, pay network service providers, and provide internal technical support to site personnel at levels commensurate with site staffing until decommissioning is completed.
- Third Party Legal – SCE retains outside counsel as necessary to handle legal matters that require specific expertise or additional resources.
- Emergency Preparedness Fees – SCE provides funding to local jurisdictional authorities for their radiological emergency preparedness, and will continue to do so until all spent fuel has been removed from SONGS, under a memorandum of understanding.
- NRC Fees – As holder of the NRC licenses for SONGS, SCE will be required to pay 10 C.F.R. Part 171 annual license fees and 10 C.F.R. Part 170 inspection fees until the NRC licenses are terminated.

- Utility Staff Health Physics Supplies – After SDS completes the major D&D work, SCE will re-assume responsibility for providing health physics supplies as required to support the ISFSI-only staff.
- Community Engagement Panel – SCE has chartered a panel consisting of a group of representatives from surrounding cities and counties to serve as a conduit of information to the public and other stakeholders regarding decommissioning that seeks to educate and explain SONGS decommissioning matters of interest to the local public. SCE incurs costs to conduct quarterly CEP meetings at venues in the vicinity of SONGS.
- Environmental Permits and Fees – SONGS must comply with a variety of environmental regulations and maintain several environmental permits that will require periodic payments of fees.
- ISFSI Aging Management –The facility maintenance and inspection activities for the ISFSI, in compliance with the Areva and Holtec SARs, as will be determined by the ISFSI Aging Management Program to be developed.
- Security Related Expenses – As long as spent fuel remains on-site, the SONGS security force will continue to require uniforms, weapons, ammunition, other supplies and equipment, as well as background investigations, training, and vendor support.
- DGC Executive Oversight Committee – a five person committee that provides oversight and resolves contractual issues regarding the SDS contract. SCE and SDS share the cost of three independent members on the committee.
- Insurance – NRC regulations require SCE to maintain minimum levels of nuclear liability and property insurance until the spent fuel is removed from the SONGS site. SCE also maintains general liability insurance and excess workers' compensation insurance.

- Association Fees and Expenses – NEI membership fees, and costs related to an external Nuclear Oversight Board (NOB) and an outside advisor to SCE's Internal Nuclear Management Group (INMG).
- Water – SCE is required to purchase potable and service water for the SONGS Site.
- Office Space – During major D&D activities, SDS will demolish all existing office space on the SONGS site and provide temporary office space as necessary. After Major D&D is completed, SCE will need to provide office space for the remaining employees.
- Decommissioning Advisor – One or more outside consultants who provide subject matter expertise regarding decommissioning regulatory issues, spent fuel storage, and project management.
- Ground Water Monitoring – SCE will be required to periodically sample, analyze, and monitor the ground water beneath the SONGS site.

The estimated costs for Non-Labor are shown in Table IV-7 below:

Table IV-7
Reconciliation of 2017 DCE to 2014 DCE
All Other Non-Labor
(100% Share, Millions of 2014 $)

	Description	2017 DCE Total (2014 $)	2014 DCE Total (2014 $)	Variance
1	**Non-Labor**			
2	Site Lease and Easement Expenses	$ 97.5	$ 19.5	$ 78.0
3	Severance	121.0	170.8	(49.8)
4	Energy	84.7	50.2	34.5
5	Loading Spent Fuel & GTCC Waste To DOE	30.6	-	30.6
6	Information Technology	31.9	6.6	25.3
7	Third Party Legal	23.8	-	23.8
8	Emergency Preparedness Fees	48.3	25.8	22.5
9	NRC Fees	31.2	53.6	(22.4)
10	Utility Staff Health Physics Supplies	3.7	25.8	(22.1)
11	Community Engagement Panel	12.5	34.0	(21.5)
12	Environmental Permits and Fees	6.7	27.1	(20.4)
13	ISFSI Aging Management	15.3	-	15.3
14	Security Related Expenses	11.8	18.8	(7.0)
15	DGC Executive Oversight Committee	3.7	-	3.7
16	Insurance	63.7	67.3	(3.6)
17	Association Fees and Expenses	8.6	11.0	(2.4)
18	Water	16.5	14.5	2.0
19	Office Space	1.7	-	1.7
20	Decommissioning Advisor	9.9	11.4	(1.5)
21	Ground Water Monitoring	0.5	-	0.5
22	Property Tax	-	74.7	(74.7)
23	DGC Non-Labor	-	35.9	(35.9)
24	Spent Fuel Maintenance	-	7.4	(7.4)
25	DAW Disposal	-	3.9	(3.9)
26	Tools and Equipment	-	1.3	(1.3)
27	**Non-Labor Total**	**$ 623.6**	**$ 659.6**	**$ (36.0)**

In the 2017 DCE, Other Non-Labor costs are estimated at $623.6 million[67] (100% share, 2014 $). In the 2014 DCE, Other Non-Labor costs were estimated at $659.6 million (100% share,

[67] *See* 2017 DCE, Appendix C, Table 2, line 375 (minus line 287 Contracted Services costs, which are discussed separately in Section IV.C.1).

2014 $). This resulted in a decrease of $36.0 million. This net decrease reflects numerous offsetting increases and decreases as explained below:[68]

- Site Lease and Easement Expenses – In the 2017 DCE, SCE estimates $97.5 million[69] (100% share, 2014 $) for site lease and easement expenses, compared with $19.5 million (100% share, 2014 $) in the 2014 DCE. This resulted in an increase of $78.0 million. SCE expects payments to the Navy to increase after the easement is renegotiated and the Navy resets the fees based on the current fair market rental value of the property.
- Severance – In the 2017 DCE, SCE estimates $121.0 million[70] (100% share, 2014 $) for employee severance costs, compared with $170.8 million (100% share, 2014 $) in the 2014 DCE. This resulted in a decrease of $49.8 million. SCE expects decreased severance costs because it has incurred lower than anticipated payouts to previously terminated SONGS employees. In addition, because many employees were reassigned to other positions within the company, they are no longer eligible for SONGS severance benefits.
- Energy – In the 2017 DCE, SCE estimates $84.7 million[71] (100% share, 2014 $) for energy costs compared with $50.2 million (100% share, 2014 $) in the 2014 DCE, resulting in an increase of $34.5 million. This variance reflects an updated forecast of energy usage levels (at retail energy rates) during 2019-2028 based upon how SDS plans to perform D&D.
- Loading Spent Fuel & GTCC Waste to DOE – In the 2017 DCE, SCE estimates that the cost to transfer spent fuel canisters from the ISFSI into DOE shipping containers

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68 SCE is not providing variance analyses for variances ≤ $7.0 million or when the 2017 DCE did not include costs for items included in the 2014 DCE.

69 *See* 2017 DCE, Appendix C, Table 2, line 358.

70 *See* 2017 DCE, Appendix C, Table 2, line 353.

71 *See* 2017 DCE, Appendix C, Table 2, line 308.

on-site, and then onto the DOE's transportation device, will be $30.6 million[72] (100% share, 2014 $). The 2014 DCE did not include a line item for this cost.

- Information Technology – In the 2017 DCE, SCE estimates $31.9 million[73] (100% share, 2014 $) for IT costs, compared with $6.6 million (100% share, 2014 $) in the 2014 DCE. This resulted in an increase of $25.3 million. The increased cost is due in part to some one-time payments to network service providers in 2018. After payment of these costs, SCE expects that ongoing support costs will be reduced after 2019.
- Third Party Legal – In the 2017 DCE, SCE estimates $23.8 million[74] (100% share, 2014 $) for third party legal expenses. This variance occurred because the 2014 DCE did not forecast these services as direct costs, but instead assumed that the costs were a part of overheads.[75] The services provided by outside legal counsel are required to perform normal business functions as well as tasks required by the NRC, and state and local agencies.
- Emergency Preparedness Fees – In the 2017 DCE, SCE estimates $48.3 million[76] (100% share, 2014 $) for emergency preparedness fees, compared with $25.8million (100% share, 2014 $) in the 2014 DCE. This resulted in an increase of $22.5 million. In the 2017 DCE, SCE anticipates that it will continue to incur emergency preparedness fees pursuant to a Memorandum of Understanding with local jurisdictional authorities until all spent fuel is removed from the SONGS site versus the assumption in the 2014 DCE that such payments would terminate when the spent fuel was removed from the pools.

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72 *See* 2017 DCE, Appendix C, Table 2, line 361.

73 *See* 2017 DCE, Appendix C, Table 2, line 325.

74 *See* 2017 DCE, Appendix C, Table 2, line 336.

75 Corporate support is provided by SCE from organizations other than SONGS (e.g., legal, treasurer's, finance, IT, supply chain).

76 *See* 2017 DCE, Appendix C, Table 2, line 303.

- Utility Staff Health Physics Supplies – In the 2017 DCE, SCE estimates $3.7 million[77] (100% share, 2014 $) for utility staff health physics supplies, compared with $25.8 million (100% share, 2014 $) in the 2014 DCE. This resulted in a decrease of $22.1 million. The decreased cost occurred because SDS will be performing the health physics functions for the major D&D work, and incurring the cost of its health physics supplies. SCE will re-assume responsibility for providing health physics supplies after the major D&D work is completed, as required to support the ISFSI-only staff.
- Community Engagement Panel (CEP) – In the 2017 DCE, SCE estimates $12.5 million[78] (100% share, 2014 $) for Community Engagement Panel expenses, compared with $34.0 million (100% share, 2014 $) in the 2014 DCE. This resulted in a decrease of $21.5 million. The decreased cost occurred because SCE has incurred lower CEP costs than estimated in the 2014 DCE and expects similar CEP expenditures in the future.
- NRC Fees – In the 2017 DCE, SCE estimates $31.2 million[79] (100% share, 2014 $) for NRC fees, compared with $53.6 million (100% share, 2014 $) in the 2014 DCE. This resulted in a decrease of $22.4 million. The decreased estimated cost occurred because the NRC reduced its 10 C.F.R. Part 171 annual license fees, and SCE expects to incur lower NRC inspection costs under 10 C.F.R. Part 170 than previously estimated.
- Environmental Permits and Fees – In the 2017 DCE, SCE estimates $6.7 million[80] (100% share, 2014 $) for environmental permits and fees, compared with $27.1 million (100% share, 2014 $) in the 2014 DCE. This resulted in a decrease of $20.4 million. The decreased estimated cost occurred primarily due to a reduction to

77 *See* 2017 DCE, Appendix C, Table 2, line 373.
78 *See* 2017 DCE, Appendix C, Table 2, line 280.
79 *See* 2017 DCE, Appendix C, Table 2, line 340.
80 *See* 2017 DCE, Appendix C, Table 2, line 313.

the annual NPDES Permit fees. Due to a reduction in the quantity of discharges from the plant associated with the permanent shutdown, SCE was able to negotiate with the SWRCB a reduction to the annual NPDES permit fees from $1.1 million per year to $0.2 million per year. In addition to the reduced NPDES fees, the other environmental fees (e.g., hazardous waste, pollution fees) were less than estimated in the 2014 DCE. The 2014 DCE was prepared before the impact of decommissioning on the fees assessed by various local and state agencies was determined.

- ISFSI Aging Management – In the 2017 DCE, SCE estimates $15.3 million[81] (100% share, 2014 $) for undistributed ISFSI Aging Management expenses. The 2014 DCE did not include a line item for this cost.

The total net variance for Other Non-Labor costs is a decrease of $36.0 million (100% share, 2014 $). Because these estimated costs are necessary to complete decommissioning and reflect SCE's experiences throughout four plus years of decommissioning and incurring these types of costs, the Commission should find these estimated costs reasonable.

[81] *See* 2017 DCE, Appendix C, Table 2, line 270.

V.

CONCLUSION

The 2017 DCE estimates that the total cost to decommission SONGS 2&3 will be $4,479 million (100% share, 2014 $), an increase of approximately 1.5% over the 2014 DCE that the Commission found reasonable in D.16-04-019.

In Chapter II of this testimony, SCE presented a detailed discussion of the methodology by which the 2017 DCE was developed and the bases for its underlying assumptions. SCE also explained that due to the existence of contract pricing for much of the decommissioning work, SCE was able to reduce the overall contingency factor of the 2017 DCE from 25% to 17%. In Chapter III, SCE presented the testimony of Mr. Nicholas Capik, the Managing Director of ABZ Incorporated, a major provider of decommissioning cost estimates for U.S. nuclear facilities. Mr. Capik described the independent review that he performed regarding the completeness and accuracy of the 2017 DCE. In Chapter IV, SCE provided a detailed reconciliation of the 2017 DCE to the 2014 DCE, including detailed discussions of significant cost changes between the two estimates.

Given SCE's thorough and detailed explanation of the 2017 DCE, SCE has met its burden to demonstrate that the 2017 DCE is a reasonable estimate of SONGS 2&3 decommissioning costs, and provides an appropriate basis for the Commission to evaluate the reasonableness of the decommissioning costs. The Commission, therefore, should find the 2017 SONGS 2&3 DCE to be reasonable.

Appendix A

Witness Qualifications

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF JOSE LUIS PEREZ

Q. Please state your name and business address for the record.

A. My name is Jose Luis Perez, and my business address is 2244 Walnut Grove Ave, Rosemead, CA 91770.

Q. Briefly describe your present responsibilities at the Southern California Edison Company.

A. I am a Principal Manager, Nuclear CPUC Regulatory Affairs and Compliance, in the Regulatory Affairs Organization responsible for CPUC regulatory activities and financial planning & analysis for SONGS issues.

Q. Briefly describe your educational and professional background.

A. I earned an MBA from the University of California, Irvine in 1997. I earned a Bachelor of Science Degree in Civil Engineering from California State University, Long Beach in 1977. I am a Registered Professional Engineer in the State of California. Since joining Edison in 1982, I have held various management positions in nuclear generation business, finance, regulatory affairs, planning & strategy, and project controls organizations. In addition, I have managed various projects, including SONGS 1 decommissioning shortly after permanent shutdown and industry restructuring financial analysis. Prior to joining Edison, my professional background included various home office and jobsite positions in the civil engineering, nuclear power plant start-up, and project controls organizations of Bechtel Power Corporation and the collection and analysis of construction cost data for publication in cost estimating manuals for Marshall and Swift Publications.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor Exhibit SCE-03: *Testimony On The 2017 Decommissioning Cost Estimate for SONGS 2&3,* as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

ABZ, INCORPORATED

QUALIFICATIONS AND PREPARED TESTIMONY

OF NICHOLAS J. CAPIK

Q. Please state your name and business address for the record.

A. My name is Nicholas Joseph Capik, and my business address is 4451 Brookfield Corporate Drive, Suite 107, Chantilly, VA 20151.

Q. Who is your current employer?

A. ABZ, Incorporated.

Q. Briefly describe your present responsibilities at ABZ.

A. I am a Managing Director of ABZ. In that role, I am responsible for the management and execution of numerous ABZ projects performed for the nuclear industry.

Q. Briefly describe your educational and professional background.

A. I earned an BS in Mathematics from the Pennsylvania State University in 1983. I completed the Navy Nuclear Training Program in 1985. I served in the U.S. Navy from 1983 through 1991. Since 1991, I have been employed at ABZ. At ABZ, I have performed cost estimates for over 40 clients related to due diligence, decommissioning, accident cleanup, and site restoration. In this role, I was responsible for the development of assumptions, the selection of scenarios, the preparation of studies, and the presentation of results. I have supported litigation related to spent fuel storage, and tax issues related to decommissioning. I have had oversight and involvement of decommissioning activities at several nuclear facilities.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor portions of Exhibit SCE-03: *Testimony On The 2017 Decommissioning Cost Estimate for SONGS 2&3,* as identified in the Table of Contents thereto.

Q. Was this material prepared by you?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Appendix B

Decommissioning Cost Estimate - Confidential

San Onofre Nuclear Generating Station Units 2 & 3
2017 Decommissioning Cost Estimate

Prepared For:
Southern California Edison
2244 Walnut Grove Avenue
Rosemead, CA 91770

Prepared By:
The Kenrich Group LLC
1919 M Street, NW
Suite 620
Washington, DC 20036

January 26, 2018

Revised March 8, 2018

Christopher F. Tierney
Vice President & Chief Financial Officer

San Onofre Nuclear Generating Station Units 2&3
2017 Decommissioning Cost Estimate

DESCRIPTION OF MINOR REVISION

Revision Number: 1

Effective Date: March 8, 2018

The revisions made to the 2017 SONGS 2&3 Decommissioning Cost Estimate are minor in nature and do not revise or otherwise impact the content or results of the cost estimate.

Item 1 – The Spent Fuel Shipping Schedule in Appendix A has been revised to correct the number of Units 2 & 3 canisters transferred to the ISFSI.

Item 2 – Revised an activity description in Appendix B, "Detailed Project Schedule."

Item 3 – Within Appendix C, "Detailed Cost Tables," the notes to Appendix C have been attached.

Item 4 – The line numbers in Table 10, "Utility & Security Force Average Staffing By Period," have been corrected.

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APPENDICES

Acronyms and Abbreviations

APCD	Air Pollution Control District
CCC	California Coastal Commission
CoC	Certificate of Compliance
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
CEP	Community Engagement Panel
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CSLC	California State Lands Commission
D&D	Decontamination & Dismantlement
DCE	Decommissioning Cost Estimate
DGC	Decommissioning General Contractor
DOE	U.S. Department of Energy
DTSC	California Department of Toxic Substances Control
EIR/EIS	Environmental Impact Report/Statement
GTCC	Greater Than Class C
HP	Health Physics
INMG	SCE Internal Nuclear Management Group
ISFSI	Independent Spent Fuel Storage Installation
LLC	Limited Liability Company
LLRW	Low-Level Radioactive Waste
NDCTP	Nuclear Decommissioning Cost Triennial Proceeding
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NIA	North Industrial Area
NOB	Nuclear Oversight Board
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
PG&E	Pacific Gas and Electric Company
PSDAR	Post-Shutdown Decommissioning Activities Report
SAR	Safety Analysis Report
SCE	Southern California Edison Company
SDS	SONGS Decommissioning*Solutions*
SONGS	San Onofre Nuclear Generating Station
WBS	Work Breakdown Structure

I. Executive Summary

The 2017 San Onofre Nuclear Generating Station Units 2&3 (SONGS 2&3) Decommissioning Cost Estimate (2017 DCE) has been prepared by the Kenrich Group LLC[1] (Kenrich) for Southern California Edison Company (SCE).[2] ABZ, Inc. (ABZ) also performed an independent review of the 2017 DCE.

The 2017 DCE utilizes the same Work Breakdown Structure (WBS) and selected distributed cost estimates included in the 2014 SONGS 2&3 DCE (2014 DCE) prepared by Energy*Solutions*, and essentially is an update to that DCE. The 2017 DCE will be submitted for review by the California Public Utilities Commission (CPUC) in the 2018 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP). SCE will also submit certain information contained in the 2017 DCE to the U.S. Nuclear Regulatory Commission (NRC) for its review.[3]

The 2017 DCE incorporates pricing from two significant contracts SCE has entered into for SONGS 2&3 decommissioning. In December 2014, SCE awarded a contract to Holtec International, Inc. (Holtec) to expand the SONGS Independent Spent Fuel Storage Installation (ISFSI) and transfer fuel from the SONGS 2&3 spent fuel pools to the ISFSI (ISFSI Expansion and Fuel Transfer Operations contract). In December 2016, SCE entered into a contract with the companies that have formed a joint venture called SONGS Decommissioning*Solutions* (SDS)[4], who will serve as the Decommissioning General Contractor (DGC) for major decontamination and dismantlement (D&D) activities. The ISFSI expansion project is in process, with transfer of spent fuel from the SONGS 2&3 spent fuel pools to the ISFSI planned to commence in 2018. SDS initially mobilized in January 2017, and is continuing to develop decommissioning plans and schedule. The DGC is currently expected to begin physical work in January 2019, following the approval of a Coastal Development Permit (CDP) by the California Coastal Commission (CCC). The 2017 DCE incorporates the pricing from both of these contracts.

In addition, the 2017 DCE incorporates and reflects recorded costs, new information, and experience gained from decommissioning activities SCE has completed since June 2013. Since announcing its decision in June 2013 to permanently retire SONGS 2&3, SCE has commenced preliminary decommissioning planning and performed other significant preparatory activities for

[1] Kenrich is a national management consulting firm with significant experience in power plant construction and decommissioning and in the energy industry more broadly in the United States and internationally.

[2] Per the SONGS Decommissioning Agreement dated April 23, 2015, Southern California Edison is currently the Decommissioning Agent acting on behalf of itself and the three other SONGS 2&3 Participants, including San Diego Electric & Gas Company, the City of Riverside, and the City of Anaheim.

[3] In accordance with 10 C.F.R. § 50.82(a)(8)(v), the licensee must annually submit to the NRC by March 31 a financial assurance status report.

[4] The contract is between Southern California Edison Company and Energy*Solutions* Services, Inc. and AECOM Energy & Construction, Inc., together the "contractor," and referred to herein as "SDS."

SONGS 2&3 decommissioning. The 2017 DCE incorporates recorded costs through September 2017 associated with these efforts.

The 2017 DCE for SONGS 2&3 is $4.702 billion in Nominal/2017 dollars. The 2014 DCE was $4.411 billion in 2014 dollars. For purposes of comparison to the 2014 DCE, the 2017 DCE expressed in 2014 dollars is $4.479 billion, which results in an approximate $68 million variance (less than 2%) between the two DCEs.

II. Introduction

A. Purpose And Scope Of 2017 DCE

In accordance with the California Nuclear Facilities Decommissioning Act of 1985 (Act), SCE is required by the CPUC to update the SONGS 2&3 DCE every three years in connection with the NDCTP. The DCE is reviewed by the CPUC to determine the sufficiency of SCE's and San Diego Gas & Electric Company's (SDG&E) nuclear decommissioning trust funds, and the amount of customer contributions to those trust funds, if any are required. The DCE is also used in subsequent CPUC reasonableness reviews of actual decommissioning costs.

On June 7, 2013, SCE announced its decision to cease power generation operations and permanently retire SONGS 2&3.[5] In 2014, SCE engaged Energy*Solutions* to "evaluate decommissioning alternatives and assist in the development of a detailed project schedule and DCE to support the preparation and submittal of a Post Shutdown Decommissioning Activities Report (PSDAR) in accordance with 10 C.F.R. § 50.82(a)(4)(i), which requires that a PSDAR be submitted [to the NRC] within two years following the permanent cessation of operations."[6] SCE submitted the PSDAR and 2014 DCE to the NRC on September 23, 2014 and to the CPUC on December 10, 2014.[7] The CPUC approved the 2014 DCE as reasonable in Decision (D.) 16-04-019 issued on April 21, 2016.

In 2017, SCE engaged Kenrich to prepare the 2017 DCE to reflect the actual costs and updated information and experience gained from SCE's decommissioning activities completed since June 2013. The 2017 DCE will be reviewed by the CPUC for the purposes identified above. New and updated information incorporated into the 2017 DCE includes: [8]

[5] SONGS 1 has largely been decommissioned and the site it occupied is now referred to as the North Industrial Area, which includes the SONGS ISFSI.

[6] Energy*Solutions*, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2&3," September 5, 2014.

[7] The NRC accepted the SONGS 2&3 PSDAR and found the 2014 Units 2&3 DCE estimate of $4.411 billion to be reasonable on August 20, 2015.

[8] Information in this DCE is intended to be current as of approximately September 30, 2017.

- The contract pricing for the contract awarded to Holtec International, Inc. (Holtec) for the ISFSI expansion and the transfer of spent fuel from the SONGS 2&3 spent fuel pools to the ISFSI;
- Contract value for the DGC contract awarded to SONGS Decommissioning*Solutions* (SDS) for the decontamination and dismantlement of SONGS 2&3, and the removal and disposal of hazardous and non-hazardous waste off the site;[9]
- Recorded costs for decommissioning activities through September 30, 2017;
- Revised U.S. Department of Energy (DOE) spent fuel acceptance date to reflect the DOE's continued failure to perform its contractual obligation to remove spent fuel from commercial nuclear reactors in the past four years;
- Revised environmental permitting approval dates based on the current permitting status and the requirements of the California Environmental Quality Act (CEQA) and the CCC's CDP processes;
- Revised project execution strategy to delay substructure removal until 2046;
- Updated undistributed cost projections based on historical recorded costs and revised projections;
- Updated ISFSI demolition costs to reflect the Holtec ISFSI pad; and
- Additional costs not included in the 2014 DCE.

In sum, significant components of the 2017 DCE are now based on competitively bid contracts, as well as three additional years of experience managing a decommissioning plant and overseeing decommissioning personnel. Where new information was not available, Kenrich worked with SCE personnel and third-party consultants to validate and refine the 2014 DCE cost and schedule assumptions. Table 1 and Figure 1 below provide a summary of the 2017 DCE in nominal/2017 dollars[10] and in 2014 dollars.

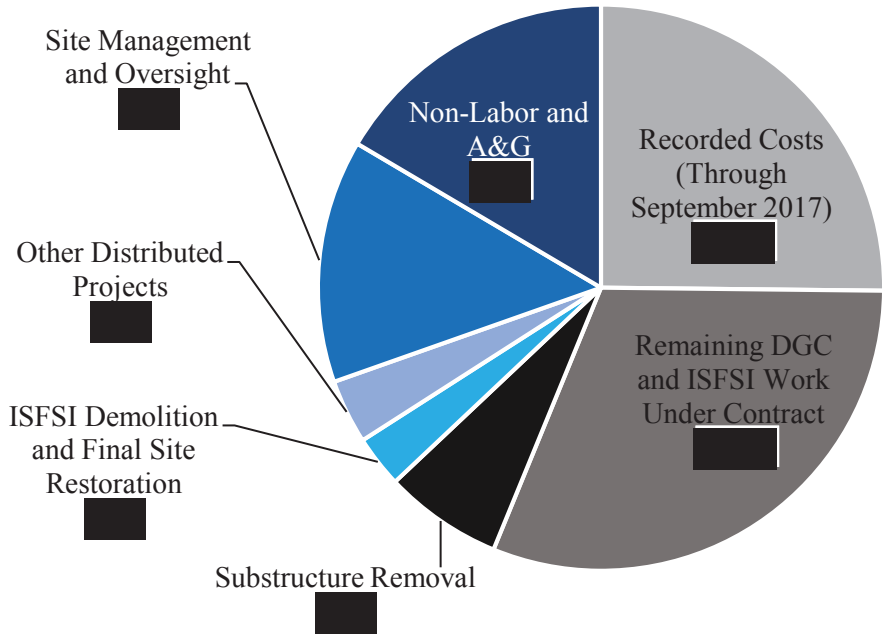
[9] See Appendix B for the schedule and activities for decontamination, and dismantlement.

[10] The 2017 DCE presents recorded costs in nominal dollars and estimated (i.e., October 2017-2051) costs in 2017 dollars.

TABLE 1 – 2017 DCE BY UPDATE CATEGORY [11, 12]
($ IN THOUSANDS)

	Description	2017 DCE (Nominal/ 2017$)	2017 DCE (2014$)
1	Recorded Costs (Through September 2017)		
2	Remaining DGC and ISFSI Work Under Contract		
3	Substructure Removal		
4	ISFSI Demolition and Final Site Restoration		
5	Other Distributed Projects		
6	Site Management and Oversight		
7	Non-Labor and A&G		
8	**Total**	**$ 4,702,264**	**$ 4,478,566**

FIGURE 1 – 2017 DCE BY UPDATE CATEGORY
($ IN MILLIONS OF 2017 DOLLARS)



[11] Totals in tables throughout this report may not tie due to rounding.

[12] Of the $1,183,601 (nominal dollars) in recorded costs included in the 2017 DCE, $964,996 was recorded between June 2013 and December 2016, and $218,605 was recorded between January and September 2017 ($964,996 + $218,605 = $1,183,601).

B. Regulatory Framework

SONGS 2&3 decommissioning is governed by the following NRC regulations:

1. 10 C.F.R. Part 50 License – SCE holds a 10 C.F.R. Part 50 license for SONGS 2&3. SCE, as the license holder, must comply with all the requirements and standards of the Part 50 license. The Part 50 license authorizes SCE to store spent fuel on-site in wet storage (i.e., the spent fuel pool).

2. 10 C.F.R. Part 72 License – SCE is required to hold a 10 C.F.R. Part 72 license in order to store fuel on-site in dry storage at the ISFSI. The current ISFSI Part 72 license is a general license set forth in 10 C.F.R. § 72.210 and requires the possession of a Part 50 license.

3. 10 C.F.R. § 50.75(c) specifies the reporting and recordkeeping requirements for decommissioning planning and requires that the licensee provide adequate funding for termination of the Part 50 license.

4. 10 C.F.R. § 72.30 specifies the financial assurances and recordkeeping for decommissioning and requires that the licensee provide adequate funding for termination of the Part 72 license.

5. 10 C.F.R. § 50.54(bb) requires the licensee to submit written notification to the NRC within two years following permanent cessation of operation of the reactor or five years before expiration of the operating license(s), whichever occurs first, for review and preliminary approval of the program by which the licensee intends to manage and provide funding "for the management of all irradiated fuel at the reactor upon expiration of the reactor operating license until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository." The 2014 DCE was submitted pursuant to this requirement.

C. SONGS Decommissioning Background

SONGS is located in southern California on the shore of the Pacific Ocean, approximately 62 miles southeast of Los Angeles and 51 miles northwest of San Diego. The plant is located entirely within Marine Corps Base Camp Pendleton on land owned by the U.S. Department of the Navy (Navy), except for the offshore intake and outfall conduits. SONGS 2&3 occupy approximately 53 acres of the 84-acre SONGS site. Approximately 16 acres are occupied by the North Industrial Area (NIA), formerly the SONGS 1 site, which is where the ISFSI is located. Additional SONGS support activities occurred on Navy property across Interstate 5 from the SONGS site, referred to as the Mesa site.

SONGS 2&3 was a 2,250-megawatt nuclear generation facility consisting of two pressurized water reactors, which commenced operation in 1983 and 1984, respectively. On June 7, 2013, SCE announced plans to permanently retire SONGS 2&3. On June 12, 2013, SCE

submitted a Certification of Permanent Cessation of Power Operations to the NRC, certifying that SCE had permanently ceased power operations of SONGS 2&3, and surrendering SCE's authority to operate the units. SCE submitted to the NRC a Certification of Permanent Removal of Fuel for Unit 3 on June 28, 2013, and for Unit 2 on July 22, 2013. As a result of these submittals, SCE now holds an NRC license that does not permit power operations, but authorizes the possession of the SONGS facilities and licensed nuclear material.

As noted above, SCE has completed preliminary planning and performed other significant preparatory activities associated with SONGS 2&3 decommissioning. These activities include: (1) expanding the on-site spent fuel dry storage facility (also referred to as the ISFSI) and beginning preparations to transfer fuel from the spent fuel pools to the ISFSI; (2) planning the major decontamination, dismantlement, demolition and disposal efforts; (3) selecting a DGC to complete major portions of the decommissioning project, including the decontamination and dismantlement of SONGS 2&3, and removal and disposal of hazardous and non-hazardous waste from the site; (4) obtaining necessary approvals of various NRC license amendments now that SONGS 2&3 is permanently retired and being decommissioned; and (5) implementing various site projects to comply with regulatory requirements and other obligations, and prepare the site for major decommissioning activities.

Along with these efforts, SCE's legal and environmental teams have been working to complete the CEQA process and obtain a CDP so that major decontamination and dismantlement work by SDS can begin.

The current Grant of Easement for SONGS from the Navy is scheduled to expire May 11, 2024. Efforts to obtain a new real estate authorization from the Navy for the plant site are ongoing, and approval for the issuance of a new real estate authorization is expected by 2024.

D. The Kenrich Group

Kenrich is a national management consulting firm with substantial experience in the public utility industry, nuclear power plant construction and decommissioning, and other commercial and public construction projects. Kenrich professionals have prepared and sponsored expert testimony with respect to cost and schedule analyses, project management, and economic damages before state and federal courts, domestic and international arbitration tribunals, and state utility commissions.

Kenrich personnel have consulted with utilities for more than 30 years on a wide range of matters, including strategic planning and financial analyses to support management decision-making, reviews and investigations by state and federal regulatory commissions, and economic damages analyses in the context of business disputes. Kenrich's consultants include accountants, financial analysts, and engineers, and the firm typically focuses on complex and detailed accounting and financial issues, as well as cost and schedule performance on major projects, including nuclear power plant construction and decommissioning.

III. Summary of the 2017 DCE

A. General Approach

This 2017 DCE builds on the 2014 DCE, incorporating recorded costs through September 30, 2017; contract pricing for the ISFSI expansion contract awarded to Holtec in December 2014 and the DGC contract awarded to SDS in December 2016; site restoration costs estimated by third-party engineering firms; and revised SCE estimates for ongoing plant security and maintenance, and project oversight. Kenrich worked closely with SCE management and project oversight to develop the 2017 DCE. This DCE is generally consistent with the guidance provided in NRC Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors."

SCE retained ABZ, Incorporated (ABZ) to perform an independent review of the 2017 DCE. ABZ is a management consulting and engineering firm specializing in providing services related to decommissioning costs, scheduling, and spent fuel storage. ABZ has prepared decommissioning cost estimates for numerous nuclear plant owners, including an estimate of SONGS 2&3 decommissioning costs for SCE in 2013, shortly following the announcement of the permanent retirement of SONGS 2&3.

B. Energy*Solutions* 2014 DCE

In January 2014, SCE retained Energy*Solutions* to evaluate decommissioning alternatives and assist in the development of a detailed project schedule and DCE to support the preparation and submittal of a PSDAR in accordance with 10 C.F.R. § 50.82(a)(4)(i), which requires that a PSDAR be submitted to the NRC within two years following the permanent cessation of facility operations.

The 2014 DCE included the following three cost categories:

- **License Termination** -- Decommissioning SONGS 2&3 to the extent required to terminate the plant's operating license pursuant to 10 C.F.R. § 50.75(c);
- **Spent Fuel Management** -- Post-shutdown management of spent fuel until acceptance by the DOE pursuant to 10 C.F.R. § 50.54(bb) and ISFSI decommissioning pursuant to 10 C.F.R. § 72.30; and
- **Site Restoration** -- Demolition of uncontaminated structures and restoration of the site in accordance with the Navy Grant of Easement and the California State Lands Commission (CSLC) requirements.

The 2014 DCE was prepared using a WBS to differentiate between these three major cost categories. The 2014 DCE included SCE's actual costs incurred from June 7, 2013 through December 31, 2013 and estimated costs thereafter.

The 2014 DCE was based on the following technical approach to decommissioning:

- Prompt DECON decommissioning methodology;[13]
- Decommissioning would be performed by a DGC with oversight by the SONGS participants;
- Spent fuel would be transferred from the spent fuel pools and stored in Multi-Purpose Canisters at an on-site ISFSI; and[14]
- The DOE would begin accepting spent fuel from the nuclear industry in 2024 and complete the removal and acceptance of all spent fuel stored at SONGS by 2049. A dry transfer facility would not be necessary to transfer the spent nuclear fuel canisters to DOE transport canisters.

The 2014 DCE followed the approach originally presented in the Atomic Industrial Forum/National Environmental Studies Project Report AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates." The report was prepared in accordance with NRC Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors." The estimate was based on compliance with current regulatory requirements and proven decommissioning technologies.

On December 10, 2014, SCE filed Application (A.)14-12-007 and submitted the 2014 SONGS DCE to the CPUC. On April 21, 2016, the CPUC issued D.16-04-019, determining that the 2014 SONGS DCE was reasonable. On August 20, 2015, the NRC accepted the PSDAR, and found the DCE to be reasonable, stating:

> The NRC staff reviewed the cost estimates against the guidance in RG 1.185, Section C.3 and finds that SCE's site-specific DCE and the costs of long-term storage of spent fuel for SONGS, Units 2 and 3, are considered reasonable, are described consistent with the guidance in RG 1.185, provide sufficient details

[13] DECON is one of three basic methods for decommissioning defined by the NRC. Under the DECON method, the equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the Part 50 license after cessation of operations.

[14] The three options for long-term post-shutdown spent fuel management currently available to power plant operators are as follows: (1) wet storage consisting of continued maintenance and operation of the spent fuel pools; (2) dry storage consisting of transfer of spent fuel from the fuel pool to on-site dry storage modules after a cooling period; or (3) a combination of the two as is the present case at SONGS. Maintaining the spent fuel pool for an extended duration following cessation of operations would prevent the reduction of the Part 50 license and result in higher annual maintenance and operating costs than the dry storage alternative. Transfer of spent fuel to an ISFSI requires additional expenditures for purchase and construction of the ISFSI and dismantlement and disposal of the ISFSI following the completion of spent fuel transfer to the DOE.

associated with the funding mechanisms, and meet the requirements of 10 CFR 50.82(a)(4)(i).[15]

C. 2017 DCE Structure

The 2017 DCE utilizes the WBS that was established in the 2014 DCE, [16] and is estimated in 2017 dollars. Certain comparisons of the 2014 and 2017 DCEs are provided in 2014 dollars for ease of comparison. Costs were de-escalated from 2017 dollars to 2014 dollars using escalation factors provided by SCE.

Consistent with the 2014 DCE, the 2017 DCE provides the total costs to decommission SONGS 2&3. The liability for the total decommissioning costs is shared between the SONGS participants.[17]

As noted above, the 2014 DCE summarized the decommissioning costs by the License Termination, Spent Fuel Management, and Site Restoration cost categories (as generally defined by the NRC). The costs were further summarized into sequential periods within each cost category. For the 2017 DCE, Kenrich revised the periods from the 2014 DCE and established common periods that include all cost categories to better align the estimated costs with SCE's current project schedule and to simplify cost and schedule reporting.[18]

The 2017 DCE periods were designed to reflect the timing and completion of certain decommissioning milestones, including the completion of: (1) ISFSI fuel transfer operations; (2) mobilization and transition of various program activities (e.g. radiation protection program, maintenance, etc.) to SDS; and (3) major D&D phases of work defined in the DGC contract.[19] The completion of these milestones are expected to trigger certain reductions in staffing and undistributed costs. Figure 2 illustrates how the 2017 DCE periods align to the DGC contract and the completion of fuel transfer operations.

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[15] August 20, 2015 letter from NRC to SCE Vice President and Chief Nuclear Officer, Mr. Thomas J. Palmisano (ADAM Accession No.: ML15204A383)

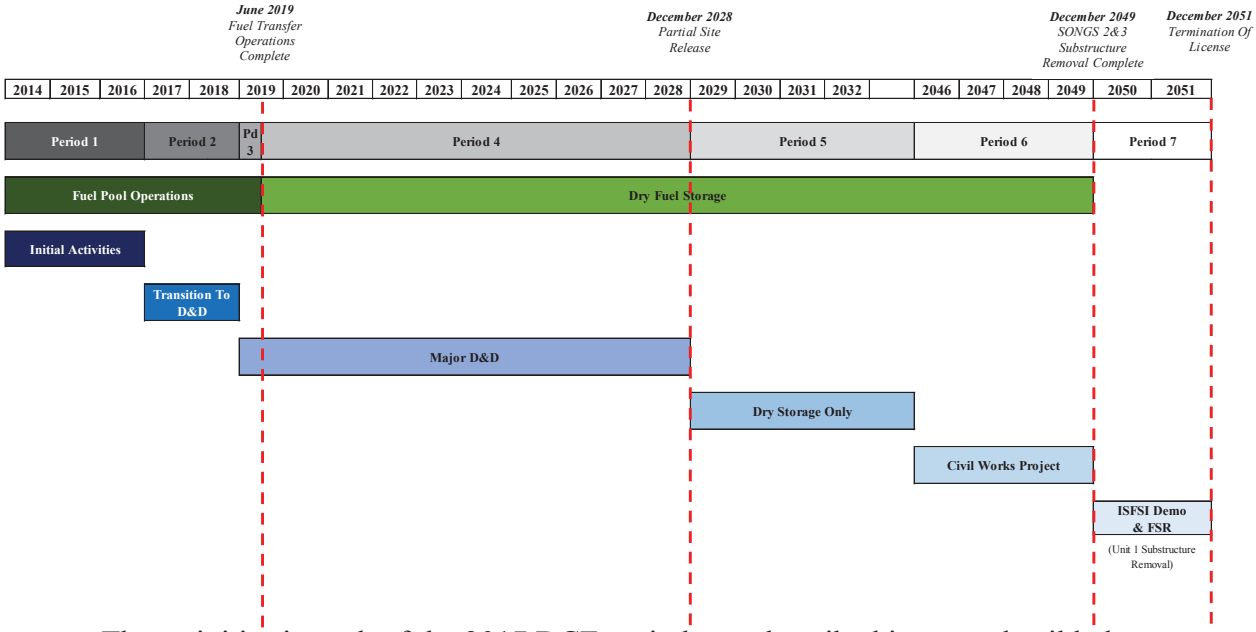
[16] The DCE line numbers in Appendix C of this report align to the line numbers in Appendix D of the 2014 DCE. The DCE line numbers in Appendix C of this report indicate the corresponding 2014 DCE: (1) NRC cost category, (2) 2014 DCE period, (3) cost type (i.e., distributed or undistributed), and (4) line number. For example, "LT-2-D-2.17" in Appendix C of this DCE corresponds to License Termination Period 2, distributed cost line number 2.17 in Appendix D of the 2014 DCE.

[17] The share of the liability for each of the SONGS Participants is provided in Appendix E.

[18] While new periods are used to summarize the costs in this DCE, the underlying cost structure remains the same as the 2014 DCE and will facilitate cost reconciliations between the two estimates.

[19] The phases of work in the DGC contract are described in more detail in Section V.D.3 below.

FIGURE 2 ALIGNMENT OF 2017 DCE PERIODS TO DECOMMISSIONING MILESTONES



The activities in each of the 2017 DCE periods are described in more detail below.

Period 1 – Initial Activities (June 2013 – December 2016)

Period 1 began on June 7, 2013 immediately following SCE's decision to permanently retire SONGS 2&3. As the decision was made approximately nine years before the units' Part 50 operating licenses would have expired, SONGS's premature retirement was unexpected. SCE spent the following six months reducing its workforce and beginning to formulate plans for decommissioning. This period includes preliminary decommissioning planning, obtaining necessary approvals of NRC license amendments, commencing the expansion of its on-site ISFSI facility, and procuring a DGC. The end of this period aligns with the selection and award of the DGC contract to SDS in December 2016.

Period 2 – Transition and Pool Storage (January 2017 – December 2018)

Period 2 began with the mobilization of SDS in January 2017 and extends through December 2018, during which time SCE will transition responsibility of D&D-related site management and support functions at SONGS to SDS. In addition, SCE will complete the CEQA process with CSLC and obtain a CDP from the CCC. The CEQA process and CDP are required for SDS to begin major decontamination and dismantlement work. Other activities during Period 2 include the ongoing expansion of the on-site ISFSI facilities, and various other smaller projects. In addition, SCE currently anticipates that Holtec will begin transferring spent fuel from the wet storage pools adjacent to the reactors into dry storage at the expanded on-site ISFSI in 2018. The fuel transfer operations will continue into Period 3.

Period 3 – D&D and Pool Storage (January 2019 – May 2019)

Period 3 begins with SDS's mobilization to commence the major physical work to decontaminate and dismantle SONGS 2&3. SDS's initial work during this period will primarily focus on the segmentation and packaging of reactor internals. The completion of the transfer of all fuel from the operating spent fuel pools into dry storage at the on-site ISFSI marks the end of Period 3. After the SONGS spent fuel pools are empty, related systems needed for the spent fuel pools will be retired, and otherwise applicable plant programs associated with spent fuel management will be modified, allowing SCE to further reduce SONGS staffing.

Period 4 – D&D and Dry Storage (June 2019 – December 2028)

Period 4 begins with the completion of fuel transfer operations and extends through the completion of the D&D work. Period 4 is expected to span approximately 9.6 years. This period includes the decontamination, dismantlement, demolition, removal, and waste disposal of the entire SONGS plant to approximately 3 feet below grade, with the exception of the on-site ISFSI and its associated security facilities, as well as the switchyard area. At the end of this period, SDS is expected to have completed all D&D work necessary to obtain NRC approval to reduce the Part 50 license site footprint to the ISFSI area only and to allow partial release of the SONGS site for unrestricted future use.

Period 5 – Dry Storage (January 2029 – December 2045)

During Period 5, the primary activity at SONGS will be the ongoing maintenance and security of the on-site ISFSI and the transfer of all SONGS spent fuel to the DOE. For purposes of the 2017 DCE, SCE has assumed that the DOE will begin performing its obligations nationally in 2028, which means that the DOE would begin removing the SONGS 2&3 spent nuclear fuel from the on-site ISFSI in 2034 under the pick-up rates published in the DOE's July 2004 "Acceptance Priority Ranking & Annual Capacity Report." In addition, Period 5 includes the Navy's National Environmental Policy Act (NEPA) environmental review process, associated with amending the SONGS real estate authorization to establish the site restoration or "end state" requirements for SONGS to return the property to the Navy. SCE will also initiate a Request For Proposal (RFP) process for substructure removal work.

Period 6 – Civil Works Project (January 2046 – December 2049)

Period 6 begins with a contractor mobilizing in order to perform the remaining work to restore the SONGS site for its return to the Navy. This work includes removing all onshore below-grade man-made structures, with the exception of the North Industrial Area where the on-site ISFSI is located. This work is currently expected to span approximately four years and is scheduled to be completed in December 2049. During Period 6, the DOE will continue to remove the remaining SONGS spent fuel from the ISFSI. SCE assumes all fuel is removed by the DOE by December 2049, marking the end of this period and the commencement of Period 7,

the demolition and removal of the ISFSI facilities and the final site restoration of the SONGS site.

Period 7 – ISFSI Demolition and Final Site Restoration (January 2050 – December 2051)

After all of the spent fuel is removed from SONGS, SCE can begin the final decommissioning and site restoration activities. These activities include dismantling and disposing of the ISFSI, completing the final site restoration work, obtaining NRC approval to terminate the remaining license covering the ISFSI, and returning the property to the Navy.[20] SCE projects that all decommissioning activities will be completed by 2051, approximately two years after the removal of the last spent fuel from the SONGS ISFSI.

In addition, for purposes of the 2017 DCE, SCE has assumed that the offshore intake and outfall conduits will be excavated and removed during this period.

At the end of decommissioning in 2051, all above and below ground man-made improvements, including the seawall and the offshore intake and outfall conduits, will be removed, and the site will be re-graded, re-vegetated, and returned to the Navy.

IV. Summary Of 2017 DCE Costs And Schedule

A. Summary Of 2017 DCE Recorded And Estimated Costs

SONGS has incurred $965.0 million (nominal dollars) through December 31, 2016 and estimates $3,737 million (2017 dollars) to complete decommissioning through 2051, for a total estimate of $4,702 million (Nominal/2017 dollars). The equivalent total in 2014 dollars is $4,479 million. Table 2 below summarizes the 2017 DCE by cost category.

[20] The Units 2&3 ISFSI Demolition and Final Site Restoration scope excludes the removal of the remaining Unit 1 foundations. The scope of the removal of the Unit 1 foundations is included in the Unit 1 DCE.

TABLE 2 SUMMARY OF 2017 DCE [21] [22]
($ IN THOUSANDS)

	Description	[A] Recorded Through 2016 (Nominal $)	[B] Estimate To Complete (2017$)	[C = A + B] Total Estimate At Completion (Nominal /2017$)	[D] Total Estimate At Completion (2014$)
1	**Distributed Projects**				
2	Completed Projects	$ 216,611	$ 1,234	$ 217,845	$ 214,024
3	ISFSI & Fuel Transfer Operations	140,047	142,385	282,432	270,210
4	Decontamination, Demolition, & Disposal	-	[redacted]	[redacted]	[redacted]
5	Other Projects	19,959	180,789	200,748	189,758
6	Substructure Removal	-	287,340	287,340	273,042
7	Offshore Conduit Removal	-	96,039	96,039	91,631
8	ISFSI Demolition	-	20,229	20,229	19,171
9	Final Site Restoration	-	7,267	7,267	6,905
10	**Distributed Subtotal**	[redacted]			
11					
12	**Undistributed Activities**				
13	Labor-Staffing	$ 336,628	$ 696,304	$ 1,032,932	$ 986,172
14	Non-Labor	241,104	639,572	880,676	848,786
15	Service Level Agreements	10,647	166,996	177,643	168,212
16	DGC Staffing	[redacted]			
17	**Undistributed Subtotal**				
18					
19	**Total**				

B. Summary Of 2017 DCE By Period

As discussed above, the 2017 DCE periods were designed to reflect the timing and completion of key decommissioning milestones that impact the cost estimate. The table below summarizes the 2017 DCE by period.

[redacted]

[22] The "estimate to complete" amounts in the tables through the report summarize period 2 through 7 costs (i.e., 2017 – 2051), which include January through September 2017 recorded costs.

San Onofre Nuclear Generating Station Units 2&3
2017 Decommissioning Cost Estimate

TABLE 3 – SUMMARY OF 2017 DCE BY PERIOD (NOMINAL/2017$ IN THOUSANDS)

	Description	Period 1 Initial Activities (Nominal $)	Period 2 Transition and Pool Storage (2017$)	Period 3 D&D and Pool Storage (2017$)	Period 4 D&D and Dry Storage (2017$)	Period 5 Dry Storage (2017$)	Period 6 Civil Works Project (2017$)	Period 7 ISFSI Demolition & Final Site Restoration (2017$)	Total (Nominal/ 2017$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4									
5	**Distributed Projects**								
6	Completed Projects	$ 216,611	$ 1,234	$ -	$ -	$ -	$ -	$ -	$ 217,845
7	ISFSI & Fuel Transfer Operations	140,047	138,943	3,442	-	-	-	-	282,432
8	Decontamination, Demolition, & Disposal	[redacted]							
9	Other Projects	19,959	42,196	7,922	55,867	31,318	43,488	-	200,748
10	Substructure Removal	-	-	-	-	-	263,698	23,642	287,340
11	Offshore Conduit Removal	-	-	-	-	-	670	95,369	96,039
12	ISFSI Demolition	-	-	-	-	-	-	20,229	20,229
13	Final Site Restoration	-	-	-	-	-	-	7,267	7,267
14	**Distributed Subtotal**	[redacted]							
15									
16	**Undistributed Activities**								
17	Labor-Staffing	$ 336,628	$ 125,814	$ 22,954	$ 284,800	$ 172,804	$ 75,196	$ 14,735	$ 1,032,932
18	Non-Labor	241,104	84,020	17,913	220,608	218,376	72,388	26,266	880,676
19	Service Level Agreements	10,647	27,510	4,518	83,094	20,521	22,210	9,143	177,643
20	DGC Staffing	[redacted]							
21	**Undistributed Subtotal**								
22									
23	**Total**	[redacted]							**$ 4,702,264**

TABLE 4 – SUMMARY OF 2017 DCE BY PERIOD (2014$ IN THOUSANDS)

	Description	Period 1 Initial Activities (2014 $)	Period 2 Transition and Pool Storage (2014$)	Period 3 D&D and Pool Storage (2014$)	Period 4 D&D and Dry Storage (2014$)	Period 5 Dry Storage (2014$)	Period 6 Civil Works Project (2014$)	Period 7 ISFSI Demolition & Final Site Restoration (2014$)	Total (2014$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4									
5	**Distributed Projects**								
6	Completed Projects	$ 213,032	$ 992	$ -	$ -	$ -	$ -	$ -	$ 214,024
7	ISFSI & Fuel Transfer Operations	136,403	130,570	3,237	-	-	-	-	270,210
8	Decontamination, Demolition, & Disposal	[redacted]							
9	Other Projects	19,580	39,699	7,455	52,611	29,481	40,932	-	189,758
10	Substructure Removal	-	-	-	-	-	250,603	22,438	273,042
11	Offshore Conduit Removal	-	-	-	-	-	637	90,994	91,631
12	ISFSI Demolition	-	-	-	-	-	-	19,171	19,171
13	Final Site Restoration	-	-	-	-	-	-	6,905	6,905
14	**Distributed Subtotal**	[redacted]							
15									
16	**Undistributed Activities**								
17	Labor-Staffing	$ 332,184	$ 118,054	$ 21,564	$ 267,549	$ 162,337	$ 70,641	$ 13,843	$ 986,172
18	Non-Labor	239,691	79,724	17,005	210,259	208,221	68,862	25,023	848,786
19	Service Level Agreements	10,278	26,121	4,288	78,793	19,278	20,865	8,589	168,212
20	DGC Staffing	[redacted]							
21	**Undistributed Subtotal**								
22									
23	**Total**	[redacted]							**$ 4,478,566**

V. Bases Of Estimate And Key Assumptions

A. General Principles

Where available, Kenrich relied on executed contracts, actual cost data, and lessons learned from on-site performance to date. The cost estimate of decommissioning activities through the completion of the major decontamination, dismantlement, and waste disposal activities at SONGS in 2028 is based on competitively bid contracts and detailed project cost estimates prepared by SCE project managers. Kenrich worked with SCE personnel to ensure project cost estimates were reasonable and consistent with underlying key assumptions. Kenrich also worked with SCE to determine appropriate contingency factors to ensure that the total estimate remained reasonable and conservative. In addition, Kenrich incorporated project costs that were not included in the 2014 DCE, including those associated with the substantial environmental permitting efforts that are currently in process.

The majority of the cost estimates for activities after 2028, such as the substructures removal and the final site restoration are based on either the 2014 DCE values or updated estimates prepared by High Bridge Associates, experts in cost estimating.[23] Consistent with industry practice, the 2014 DCE used quantity take-offs from plant drawings and Unit Cost Factors.

Kenrich worked with knowledgeable SCE personnel to prepare cost estimates for the ongoing operations and maintenance of the SONGS facilities, as well as the oversight and support of the decommissioning project. Consistent with the 2014 DCE, these indirect project costs are referred to as undistributed costs in the 2017 DCE. Such undistributed costs include Utility Staffing, Contracted Services, Energy, Site Lease expenses, among other items. Kenrich worked closely with knowledgeable SCE personnel to develop detailed cost estimates that reflect the current known regulatory and project support requirements throughout the entire decommissioning project. Kenrich ensured these cost estimates were supported, reviewed by subject matter experts, and consistent with the project schedule and other key underlying assumptions.

B. Key Facts And Assumptions

Kenrich worked closely with SCE personnel to identify, define, and support the key assumptions underlying the 2017 DCE. As part of this process, subject matter experts were interviewed and meetings were held with cross-functional teams to review and refine the

[23] High Bridge Associates is a project management consulting and services company with experience supporting capital projects, decommissioning and closure projects, new build construction projects, and operating/maintenance programs in various markets. High Bridge has provided consulting and technical subject matter expert services to customers spanning Cost Estimating, Cost/Schedule Reviews, Risk Assessments, Due Diligence Evaluations, Feasibility Studies, Readiness Assessments, Contract Change Management/Claims, and Technical/Management Assessments.

assumptions. Additionally, relevant supporting documents were identified and reviewed to confirm accuracy and reasonableness.

The key assumptions and general bases of estimate for the 2017 DCE are summarized below. The detailed bases for the estimated costs for specific distributed and undistributed activities are described in subsequent sections of this report.

General

1. Costs are presented in the same WBS utilized in the 2014 DCE (see Appendix C). Distributed costs are summarized and discussed by major project, and undistributed costs are discussed by cost category.

2. Recorded costs for decommissioning activities through September 30, 2017 are included in this estimate.

3. Approximately $[redacted] billion of the SONGS decommissioning project are covered by two contracts (i.e., ISFSI expansion and fuel transfer operations with Holtec and the DGC contract with SDS). Those contract amounts are incorporated into this DCE.[24]

Decontamination, Dismantlement, Demolition, and Disposal to Achieve Partial Site Release

4. The DGC contract with SDS was executed in December 2016. SDS mobilized to the SONGS site and commenced Phase I work (transition and planning) on January 9, 2017.

5. The pricing of the SDS contract generally covers two phases of work: transition and planning (Phase I) and the decontamination, dismantlement, and removal of all man-made improvements to 3 feet below grade (and or deeper as required) to reduce the Part 50 license to the ISFSI area only (Phase II). In addition, SDS is expected to install backfill and perform other work as requested.

6. The CEQA review process completed by the CSLC will conclude with the issuance of an Environmental Impact Report that will be utilized by the CCC in connection with its issuance of a CDP in the last quarter of 2018. The CDP will allow physical decommissioning work to commence at SONGS. Accordingly, SDS is expected to begin Phase II work in January 2019.

7. SDS's Phase II work is estimated to be completed by December 2028, following the submission of Final Site Survey to the NRC and the approval of a partial site release, reducing the SONGS 2&3 NRC Part 50 license footprint to the ISFSI area only.[25]

[24] Contract milestone payments are aligned with SCE's current expected project schedule.

[25] SDS's Phase II work also covers non-radiological hazardous waste disposal, e.g., asbestos, chromates, lead paint, and polychlorinated biphenyls (PCBs).

8. Following the D&D work, the SONGS plant site will be backfilled to current grade levels. Clean material available on the SONGS plant site may be acceptable for purposes of backfill and additional required backfill material will be imported from offsite.[26]

9. The 2017 DCE includes costs to purchase and import backfill material from offsite.

Spent Nuclear Fuel and GTCC Waste

10. All spent fuel will be transferred from the SONGS 2&3 pools to the on-site ISFSI by June 1, 2019.

11. Greater Than Class C (GTCC) waste will be stored in twelve canisters (five for reactor internals and one for spent fuel pool hardware/contents at each unit). GTCC waste from the containment buildings (e.g., portions of the reactor vessel internals) and spent fuel pools will be loaded into canisters and the loaded canisters will be transferred to the ISFSI.

12. The DOE will remove all GTCC waste from SONGS by 2049.

13. The DOE will commence accepting spent fuel from the commercial nuclear industry in 2028. The DOE will accept the first SONGS 2&3 spent fuel in 2034. All SONGS spent fuel will be removed from the ISFSI by 2049.

14. SCE is responsible for the loading of spent fuel and GTCC waste canisters into DOE transportation containers. (No dry transfer facility is required.)

15. GTCC disposal costs are conservatively estimated to account for potential DOE charges for acceptance of GTCC waste (i.e., in addition to the one-mill fee charged per kilowatt of generation per the Standard Contract with the DOE).

Substructure Removal Below 3 Feet Below Grade (i.e., Below 27 Feet Elevation)

16. SCE anticipates submitting an application to the Navy to amend the then current real estate authorization to seek a Navy determination of the substructure removal requirements. The Navy is expected to establish those requirements after completing a NEPA process and to include the requirements within a new or amended real estate authorization. This will define the final site release criteria for turnover of the SONGS property back to the Navy. The

[26] Paragraph 12 of the Grant of Easement, U.S. Department of Navy to Southern California Edison Company and San Diego Gas & Electric Company, dated May 12, 1964 states, "That upon termination of the easement granted herein, the Grantees at their expense may remove, and if desired by the government, shall remove any and all improvements installed or constructed hereunder and shall restore the Premises to a condition satisfactory to the Director, Southwest Division, Bureau of Yards and Docks, except that the Grantees shall not be obligated to restore any natural material cut or filled in the necessary excavation and grading of the Premises and such surrounding area within the Reservation as may have been contaminated by the operation of the Nuclear Station." Thus, the contract states that the Navy will specify the final site restoration requirements. The Navy has not yet specified its decontamination, backfill, compaction, grading, or re-vegetation requirements. The Navy is expected to establish these requirements as a part of the NEPA process and specify them within a new real estate authorization.

application is currently expected to be filed in 2040, with a Navy decision by 2045. That timing may change depending upon the time frame for the DOE removal of the spent fuel.

17. The removal of substructures (i.e., man-made improvements remaining after the D&D work and reduction of the Part 50 license to the ISFSI area only) is expected to begin in 2046 and be completed by December 2049. The final site restoration criteria will not be known until the Navy amends the SONGS site real estate authorization to include such criteria. Therefore, for purposes of the 2017 DCE, it is assumed that all SONGS 2&3 substructures will be removed during 2046-2049 (Period 6) (excluding the ISFSI which will be removed in a subsequent period).[27]

18. The estimated costs for the substructure removal work scope included in the 2014 DCE were reviewed and updated by High Bridge Associates. High Bridge Associates validated the quantities contained in the 2014 DCE and reduced the costs for non-radioactive waste disposal (based on La Paz, Arizona disposal rates, as compared to Oregon state rates which were assumed for purposes of the 2014 DCE).[28]

19. All concrete and other demolition debris (including "clean;" i.e., non-radioactive, non-hazardous material) that is deemed by the Navy or SCE to be not suitable for purposes of backfill will be transported to and disposed at an out-of-state Class III landfill at La Paz, Arizona or other facilities as may be required.[29] Cost for transporting clean scrap metal to a recycler is included in the DCE. No credit is taken for any salvage value of the scrap metal.

Conduits, ISFSI Demolition, and Final Site Restoration

20. For purposes of the 2017 DCE, it is assumed the offshore intake and outfall conduit will be removed during Period 7, ISFSI Demolition and Final Site Restoration, and will be complete by 2050.

[27] Any determination in the 2017 DCE that accounts for only partial removal of substructures would be non-conservative, arbitrary and inconsistent with the U.S. Navy easement, and without basis. If the final site restoration requirements specified in the future by the Navy allow less than complete removal of non-contaminated structures below 3 feet below grade (i.e., 27 feet elevation), then that new assumption will be incorporated into the subsequent DCE update.

[29] This out-of-state disposal requirement is consistent with the Governor of the State of California Executive Order D-62-02.

21. Following the complete removal of SONGS spent fuel and GTCC waste in 2049, the ISFSI and related facilities, and all remaining man-made structures (e.g., gunite walls, roads and parking lots, rail facilities) will be demolished and removed.

22. The SONGS site will be re-established to meet Navy site restoration requirements, including grading and re-vegetated.

Other

23. SCE expects to return the Mesa site to the Navy by July 31, 2021. The April 2011 lease from the Navy is known as the "Mesa lease" and contains five parcels. Parcels 5, 6, and 7 are associated with the Mesa site and are being returned. Parcels 8 & 9 are adjacent to the SONGS site and will be retained and incorporated into a new site lease during the real estate authorization process.

C. Project Schedule

The 2017 DCE assumes the timing for completing major activities is generally the same as the 2014 DCE, with the exception of the timing for removing the substructures below 3 feet below grade, which moved from 2031 to 2049. The schedule assumed in the 2017 DCE is as follows:

- **June 1, 2019** – Fuel Transfer Operations Complete.
- **December 2028** – Completion of the D&D work and receipt of NRC approval of the amendment to achieve partial site release and reduce the Part 50 License to the ISFSI area only.
- **December 2049** – Completion of Substructures removal below 3 feet below grade (i.e., 27 feet elevation).
- **December 2049** – All spent fuel removed from the site.
- **December 2051** – Completion of ISFSI Demolition, Conduits Removal, Final Site Restoration, and Lease Termination.

D. Distributed Costs

1. Completed Projects

Following the transition to decommissioning in June 2013, SCE began efforts to prepare the site for decommissioning and obtain necessary approvals of NRC license amendments. During the period from June 7, 2013 to September 30, 2017, SCE began and completed projects

to implement "Cold & Dark,"[30] perform the initial site assessment, dispose of legacy radwaste, prepare and receive approval for regulatory submittals, and select a DGC.

During this period, SCE also implemented projects that were needed to comply with regulatory requirements and other obligations. SCE began and completed projects related to Security Shutdown Strategy, Large Organism Exclusion Device Modifications, Fuel Cancellation payments, and other efforts.

Kenrich incorporated the recorded costs for the completed projects into the 2017 DCE. SCE will support the reasonableness of costs incurred in separate filings in the 2015 and 2018 NDCTP.

2. ISFSI And Fuel Transfer Operations

Following a competitive bidding process, SCE awarded a contract to Holtec to license, design, and construct an expanded on-site ISFSI; and to supply, load, and transfer the multi-purpose canisters containing fuel assemblies, from the SONGS 2&3 spent fuel pools to the expanded ISFSI. Holtec's work scope generally includes:

- Perform engineering, procurement, and construction services for a new on-site ISFSI pad and supporting facilities (e.g., security building, haul path).
- Perform fuel inspections and spent fuel pool waste characterizations.
- Provide spent fuel canisters and vertical ventilated underground dry storage modules to store SONGS spent fuel assemblies.
- Load and transport the canisters to the ISFSI and place the canisters into the dry storage modules.
- Transport the loaded GTCC waste (reactor internals and certain other non-fuel waste material) canisters to the ISFSI.[31]
- Engineering analyses, documentation, licensing and permitting activities.

SCE also maintains an ISFSI oversight team to ensure safe and efficient execution of the work by Holtec. The estimate for ISFSI and Fuel Transfer Operations also includes these SCE project oversight costs.

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[30] Includes plant modifications to systems that are not required to support spent fuel pool cooling or to meet other license conditions and places SONGS in a Cold and Dark condition in preparation of dismantlement and decontamination.

[31] The Holtec contract milestone payment for transferring the GTCC waste to the ISFSI, as well as costs associated with the procurement of GTCC canisters is included in a separate line item in the DCE for "GTCC Waste Storage" within "Other Projects."

TABLE 5 ISFSI & FUEL TRANSFER OPERATIONS ESTIMATE
($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**ISFSI & Fuel Transfer Operations**				
2	ISFSI Expansion	$ 60,485	$ 74,100	$ 134,585	$ 128,026
3	Canister Fabrication	79,562	27,705	107,266	104,026
4	Spent Fuel Loading & Transfer to ISFSI	-	40,580	40,580	38,159
5	**ISFSI & Fuel Transfer Operations Total**	**$ 140,047**	**$ 142,385**	**$ 282,432**	**$ 270,210**

3. Decontamination, Dismantlement, Demolition, And Disposal

In December 2016, following a competitive bidding process, SCE executed a contract with SDS to perform the major decontamination, dismantlement, demolition, and disposal work at SONGS. The SDS work will include removing all SONGS 2&3 structures, systems, and components to 3 feet below grade (i.e., to 27 feet elevation) to permit the release of the property for unrestricted future use.[32] The SDS work will include characterizing, packaging, transporting, and disposing of waste from the SONGS site to appropriately licensed or permitted facilities.[33] Additionally, SDS will support SCE to modify or amend its NRC Part 50 license for SONGS 2&3, as well as its existing agreements with the U.S. Navy and other permitting agencies as required for completion of this work scope.

The work is divided into two phases:

Phase I: Transition and mobilization

Phase II: Decontamination, dismantlement, demolition, and waste disposal activities necessary to achieve partial site release and reduce the SONGS Part 50 license footprint to the ISFSI area only.

SDS will provide project management and field oversight, as well as planning and execution of D&D-related site management and support functions during the decommissioning of SONGS. SCE will perform oversight of SDS's activities, as required by the applicable licenses and permits, and will retain responsibility for license-related operations and security (i.e., spent fuel pool, fuel transfer, and ISFSI operations).

[32] SDS's work scope excludes the ISFSI and switchyard facilities.

[33] GTCC waste and spent fuel will be stored on the ISFSI and are not expected to be transported to a disposal facility during SDS's performance of the work.

Phase II D&D activities will include:

- Segmenting the SONGS 2&3 reactor vessels and internals, and loading them into storage containers.
- Removing and disposing of large components including SONGS 2&3 reactor pressure vessels, steam generators, pressurizers, and turbine-generators.
- Decontaminating and removing all structures, systems, and components as necessary to achieve partial site release and reduce the Part 50 license to the ISFSI area only.
- Removing certain above-seabed components of the ocean conduits.
- Necessary backfill work to achieve level grade for the power block area at an elevation of +30.0 feet.[34]
- Development of the partial site release plan in accordance with 10 C.F.R. § 20.1402 site release criteria. SDS will perform necessary D&D work to meet a radiological release criteria that does not exceed 15 millirem per year.[35]

The work scope under DGC contract does not include removing the intake/discharge structure beneath the seawall; ocean conduits; seawall and pedestrian walkway; gunite slope protection; and certain railroad track and site access roads.

Support for SCE-Retained Responsibilities

SCE will remain the licensed operator for NRC licenses associated with SONGS and will retain responsibility for interfacing and corresponding with the regulatory agencies in the management of licenses.[36] SCE will also continue to be the primary interface with the Navy (property owner), and the regulatory agencies and other government authorities responsible for existing permits and the issuance of new permits necessary to perform decommissioning. SDS will support SCE interface with the regulatory agencies and the Navy.[37]

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[34] Backfill material is excluded from the fixed price portion of SDS's contract scope.

[35] Per 10 C.F.R § 20.1402, the NRC site release criteria is 25 mrem per year calculated as the peak annual Total Effective Dose Equivalent ("TEDE") dose expected within the first 1,000 years after decommissioning. Release criteria is defined as residual radioactivity that is distinguishable from background radiation which results in a TEDE to an average member of the critical group, including that from groundwater sources of drinking water, and has been reduced to levels that are as low as reasonably achievable (ALARA).

[36] Nuclear operations are defined as operations and administration of installed, in-service structures, systems, and components within the Protected Area (PA).

[37] SCE will retain responsibility for personnel screening for access and badging to the SONGS protected areas (PAs) and vital areas (VAs) until all spent fuel is removed from the spent fuel pools and placed into storage on the ISFSI and the associated security plans are revised and approved. When the PAs/VAs are reduced to the ISFSI only, SCE will transition this responsibility to SDS for all areas except the ISFSI. SCE will retain responsibility for the

4. Substructure Removal

The substructure removal work will include the activities necessary to achieve the final "end state" requirements determined by the Navy (which are incremental to the NRC partial site release requirements that will be met during SDS's major D&D work). SCE currently plans to select a contractor to perform the substructure removal work in the mid-2040s.

For purposes of preparing the 2017 DCE, Kenrich retained High Bridge Associates to review and update the 2014 DCE estimate for the removal of substructures below 3 feet below grade.

More specifically, substructure removal activities will include the following:

- Removing substructure systems and components required to achieve "end state" requirements set forth in the applicable Navy real estate authorization for the SONGS Site. This work will include cleanup, remediation, and/or removal of structures, systems, and components, soils/debris, and/or contaminated groundwater, as required.[38]
- Backfilling excavations and voids with approved material and leveling the SONGS site, as required by regulatory and landowner closure requirements.
- Characterizing, packaging, transporting, processing, and disposing of SONGS waste as required to support the regulatory and landowner closure requirements.
- Removing the existing seawall and intake and outfall box culvert.

Excluded from the substructure removal work are the demolition and removal of the ISFSI after the spent nuclear fuel and GTCC waste is removed by the DOE. Also excluded is the other final site restoration work to meet requirements related to the final termination of the SONGS site easements (e.g., ocean conduits, gunite slopes, drainage requirements, access roads, etc.).

The estimated substructure removal costs are summarized in the table below.

industrial and commercial security requirements at SONGS until the security plans are revised and the NRC approves the reduction of the PA/VAs to the area associated with the on-site ISFSI. SDS will take over this responsibility following the transfer of all spent fuel and GTCC to the ISFSI and the implementation of the associated revised security plans.

[38] The activities may also include removal of certain above grade facilities remaining after the major D&D work performed by SDS, potentially including non-essential utilities, parking areas, roads, and other improvements.

TABLE 6 SUBSTRUCTURE REMOVAL ESTIMATE
($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**Substructure Removal**				
2	Excavation and Dewatering	$ -	$ 152,819	$ 152,819	$ 145,563
3	Demolition and Backfill	-	108,277	108,277	102,573
4	Other	-	8,833	8,833	8,386
5	Removal of Seawall and Box Culvert	-	17,410	17,410	16,520
6	**Substructure Removal**	**$ -**	**$ 287,340**	**$ 287,340**	**$ 273,042**

5. Offshore Conduit Removal

As was the case for the 2014 DCE, uncertainty remains regarding the requirements for removal of the offshore intake and outfall conduits located below the sea floor. For SONGS 1, the CSLC has allowed the SONGS 1 conduits to remain in place provided that the SONGS 1 Participants retain the liability to remove the SONGS 1 conduits should that be deemed by the CSLC to be necessary at a future date. For these reasons, the 2017 DCE continues to include an estimated cost to perform the full removal of the SONGS 2&3 offshore conduits as was estimated in the 2014 DCE. The 2017 DCE includes $96.0 million to fully remove the SONGS 2&3 offshore conduits.

6. ISFSI Demolition

Following the removal of all spent fuel and GTCC waste by the DOE, SCE will demolish and remove the ISFSI and perform activities necessary for the final restoration of the SONGS site. At the time the 2014 DCE was prepared, the specific plans to expand the ISFSI had not been defined. Later in 2014, SCE entered into a contract with Holtec to expand the ISFSI. Kenrich retained High Bridge Associates to update the ISFSI demolition estimate in the 2014 DCE to reflect the Holtec ISFSI pad. The updated estimate for ISFSI demolition is $20.2 million.

7. Final Site Restoration

The final restoration work includes the removal of the gunite slope protection; remaining railroad tracks, rails, and ballast; access roads and parking lots. In addition, this work includes any other work required by the Navy real estate authorization, which is expected to include the final grading and re-vegetation of the SONGS site. The total estimated final site restoration work in the 2017 DCE is $7.3 million. The 2014 DCE included, as part of final site restoration, the costs to remove the intake and outfall structure underneath the seawall, which required installing and removing dewatering equipment and a temporary seawall. The intake and outfall structure beneath the seawall, as well as the seawall itself, are now expected to be removed

during the civil works project (i.e., Period 6, 2046-2049). Therefore, the second dewatering process and temporary seawall are no longer necessary during final site restoration.

8. Other Distributed Projects

In addition to the major decommissioning projects discussed above, SCE must also perform other projects to comply with federal and state regulations and the terms of SCE's real estate authorizations with the Navy. These other projects and their associated estimated costs are shown in Table 7 and discussed in more detail below.

TABLE 7 OTHER DISTRIBUTED PROJECTS ESTIMATE
($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**Other Projects**				
2	ISFSI Aging Management	$ 385	$ 38,376	$ 38,761	$ 36,489
3	Coastal Development Permit Extensions	-	5,580	5,580	5,252
4	GTCC Waste Storage	-	28,270	28,270	26,632
5	Mesa Site Turnover	7,245	13,967	21,212	20,341
6	CEQA Permitting	3,169	5,162	8,331	7,914
7	Initial Real Estate Authorization Renewal And Plant Easements	646	14,658	15,305	14,427
8	Plant Lease Extension	-	4,118	4,118	3,878
9	Plant Lease Amendment For Final Site Restoration	-	9,290	9,290	8,745
10	Cyber Security Modifications	8,513	1,131	9,644	9,380
11	DCE Update	-	3,897	3,897	3,669
12	GTCC Disposal	-	43,200	43,200	40,662
13	ISFSI CDP Settlement	-	4,543	4,543	4,277
14	Substructure Removal Contractor Procurement	-	7,447	7,447	7,011
15	NIA Sump Modifications	-	1,150	1,150	1,081
16	**Other Projects Total**	**$ 19,959**	**$ 180,789**	**$ 200,748**	**$ 189,758**

a. ISFSI Aging Management

The "Aging Management" project was established to develop inspection and maintenance programs for the Areva and Holtec spent fuel dry storage systems. Also included are initial cask testing, inspection equipment and licensing costs for dry cask NRC Certificate of Compliance (CoC) renewals, and Safety Analysis Report (SAR) updates. Ongoing required annual maintenance and inspections of the spent fuel dry storage systems are included in the undistributed non-labor Aging Management category.

b. Coastal Development Permit Extensions

SCE holds a Coastal Development Permit for the storage of SONGS 2&3 spent fuel in the Areva ISFSI system until November 2022, and a separate CDP to store SONGS 2&3 spent fuel in the Holtec ISFSI system until 2035. Therefore, SCE will need to obtain CDP extensions

from the CCC for the Areva and Holtec ISFSI systems prior to the expiration of the permits in 2022 and 2035, respectively.

c. GTCC Waste Storage

As part of the DGC contract, SDS is responsible for preparing, characterizing, and packaging the GTCC waste into canisters, with the exception of the relatively small amount of GTCC waste which currently resides in the spent fuel pools and will be loaded by Holtec. Holtec will supply the GTCC canisters and is also responsible for transferring the loaded GTCC waste canisters to the ISFSI pad. The estimated costs cover the purchase and licensing of GTCC canisters, as well as their transfer from the containment buildings to the ISFSI pad.

d. Mesa Site Turnover

SCE's Mesa site consists of five parcels leased from the Navy. Parcel 5 is on the west side of U.S. Interstate Highway 5 (I-5) and includes a security station to control access to Parcels 6 and 7. Parcels 6 and 7 are located on the east side of I-5 and comprise the largest portion of the Mesa site. Parcels 8 and 9 include a parking lot and lay-down area on the west side of I-5.

SCE currently estimates that Parcels 5, 6, and 7 will be returned to the Navy in 2021, and Parcels 8 & 9 will be retained until the end of decommissioning. As part of the process to return the parcels to the Navy, SCE must first remediate any contamination and obtain "No Further Action Letters" from the California Department of Toxic Substances Control (DTSC) indicating the property is available for unrestricted use.[39] The estimated cost associated with the project is based on currently anticipated remediation requirements.

e. CEQA Permitting (California State Lands Commission)

Under CEQA, the CSLC, as lead agency, is required to evaluate the SONGS decommissioning project and prepare an Environmental Impact Report (EIR) in response to SCE's application to modify and extend the existing CSLC lease regarding the offshore conduits. The CEQA permitting process began in 2015. The CSLC is expected to issue a draft EIR in the second quarter of 2018 and issue its Final EIR in the third quarter of 2018. The California Coastal Commission is then expected to review an application for a CDP based on the EIR, as well as its own additional analysis. The CCC is expected to approve the CDP in the fourth quarter of 2018. Following the receipt of the CDP, the physical decommissioning of the plant can proceed.

[39] On April 24, 2017, the DTSC issued a No Further Action Letter for Parcel 5. The efforts to assess and remediate contamination for Parcels 6 and 7 are ongoing. SCE continues to hold Parcel 5 as it provides access to Parcels 6 and 7.

f. Real Estate Authorization Renewals and Plant Lease Amendments

The current SONGS Plant Easement with the Navy expires in 2024. SCE will therefore seek an extension (new real estate authorization) covering the time to complete major decommissioning activities. As a federal agency, the Navy must undertake a NEPA environmental review prior to issuing a new real estate authorization. The initial NEPA process is expected to be completed in 2024 and will allow SCE to continue using the property until 2035.

In 2030, SCE will begin the process to further extend the lease from 2035 until such time the property is projected to be to be turned over to the Navy. In 2040, the Navy is expected to undertake another NEPA review to determine the final site restoration conditions, including the substructure removal requirements. These end-state requirements should be determined by 2045, prior to beginning the civil works project in 2046.

g. Cyber Security Modifications

NRC regulations require a Cyber Security Plan at SONGS to ensure certain digital assets, such as computer and communication systems and networks, are secure and protected. SCE has implemented 7 of 8 Cyber Security Plan milestones. At the end of 2017 the NRC granted approval for a license amendment to remove the cyber security license condition, thus waiving the requirement to implement Milestone 8.

h. DCE Update

As part of the NDCTP, SCE is required to submit an updated DCE for approval by the CPUC.

i. GTCC Disposal

Presently, a disposal facility licensed to accept GTCC waste does not exist in the United States. Courts have determined that the DOE is obligated to accept and dispose of GTCC waste; however, issues regarding costs remain unsettled. For purposes of the 2017 DCE, the cost of shipping and disposing of a GTCC canister was assumed to equal the cost associated with a canister of SONGS spent fuel. The one-mill fee per kilowatt-hour of generation under the Standard Contract was used to estimate this cost.

j. ISFSI CDP Settlement

In August 2017, SCE reached a settlement agreement with parties opposed to the storage of spent fuel at SONGS. As part of that settlement, SCE agreed to incur up to $4 million on commercially reasonable efforts to identify an alternative location for SONGS spent fuel storage.

SCE also incurred third-party legal costs to reach the settlement. Given the ongoing analysis and current uncertainty relating to the potential location and requirements of an acceptable alternative spent fuel storage site, the associated costs with moving to an alternative site have not been included in this DCE.

k. Substructure Removal Contractor Procurement

In 2044, SCE will begin efforts to procure a contractor for the removal of SONGS substructures and placement of permanent backfill. The 2017 DCE therefore includes costs to cover a competitive bidding process, including the development of a Request for Proposal, proposal evaluation, and contract award. For purposes of this DCE, the effort was assumed to be approximately one-half the expended cost to procure a DGC for the major D&D work.

l. NIA Sump Modifications

The NIA sump currently discharges to the SONGS 2&3 dilution water system. The dilution water system will be retired by SDS, and therefore the discharge pathway for the NIA sump will need to be modified. Kenrich utilized the current budget estimate provided by the cognizant SCE Project Manager.

E. Undistributed Costs

Undistributed costs represent activities or fees, necessary to oversee, manage and support the overall decommissioning project. Undistributed costs are sometimes referred to as collateral, indirect, or "level of effort" costs. By their nature, such costs are not assignable to specific activities representing the physical work performed to decommission a nuclear plant.

Undistributed activities and cost items are characterized by a uniform rate of activity over a specific period of time. Accordingly, undistributed costs were estimated for each decommissioning period. Within each period, the undistributed costs are incurred at a fixed rate and are thus largely time-dependent.

The table below summarizes the undistributed costs incurred through 2016 and future costs estimated for each decommissioning period. The costs are also segregated between labor and non-labor. The labor items include staff to provide oversight, management and other support. Non-labor items include costs associated with services performed by third-parties, as well as rents, fees, and other costs necessary to ensure compliance with regulatory and other requirements.

San Onofre Nuclear Generating Station Units 2&3
2017 Decommissioning Cost Estimate

TABLE 8 UNDISTRIBUTED COST ESTIMATE
(NOMINAL/2017$ IN THOUSANDS)

	Description	Period 1 Initial Activities (Nominal $)	Period 2 Transition and Pool Storage (2017$)	Period 3 D&D and Pool Storage (2017$)	Period 4 D&D and Dry Storage (2017$)	Period 5 Dry Storage (2017$)	Period 6 Civil Works Project (2017$)	Period 7 ISFSI Demolition & Final Site Restoration (2017$)	Total (Nominal/ 2017$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4	**Undistributed Activities**								
5	**Labor-Staffing**								
6	Site Management & Administration		$ 19,393	$ 3,379	$ 71,195	$ 16,666	$ 13,265	$ 1,901	
7	Plant Management		46,774	8,140	46,085	85,274	20,799	2,340	
8	Decommissioning Oversight		14,417	4,916	136,266	13,417	27,121	8,919	
9	**Utility Staff Subtotal**	**$ 245,555**	**$ 80,583**	**$ 16,436**	**$ 253,546**	**$ 115,356**	**$ 61,185**	**$ 13,159**	**$ 785,820**
10	Security Force	91,073	45,231	6,518	31,254	57,448	14,012	1,576	247,112
11	**Labor-Staffing Subtotal**	**$ 336,628**	**$ 125,814**	**$ 22,954**	**$ 284,800**	**$ 172,804**	**$ 75,196**	**$ 14,735**	**$ 1,032,932**
12									
13	**Non-Labor**								
14	Aging Management	$ -	$ -	$ 48	$ 4,209	$ 10,018	$ 1,955	$ -	$ 16,230
15	Association Fees and Expenses	817	1,332	251	3,910	1,958	478	215	8,961
16	Community Engagement Panel	2,304	1,640	279	5,482	2,405	566	283	12,958
17	Contracted Services	67,641	33,556	3,957	59,073	50,430	16,086	4,349	235,092
18	DAW Disposal	-	32	-	-	-	-	-	32
19	Decommissioning Advisor	2,515	1,231	278	6,392	-	-	-	10,416
20	DGC Executive Oversight Committee	-	508	144	3,306	-	-	-	3,958
21	Emergency Preparedness Fees	9,099	3,792	864	15,081	16,998	4,146	-	49,980
22	Energy	16,964	7,571	2,241	45,194	10,983	4,117	526	87,596
23	Environmental Permits and Fees	3,081	662	14	328	1,064	1,154	576	6,879
24	Ground Water Monitoring	-	-	-	-	391	92	46	529
25	Information Technology	12,886	5,248	479	7,494	2,486	3,033	1,365	32,991
26	Insurance	13,824	4,778	977	15,947	22,029	5,688	2,479	65,722
27	Third Party Legal	4,336	2,579	479	7,571	7,648	2,300	230	25,142
28	NRC Fees	4,566	2,836	248	9,169	10,369	2,455	2,646	32,291
29	Office Space	-	-	-	1,173	391	92	92	1,748
30	Security Related Expenses	1,552	1,209	422	1,017	5,461	2,192	526	12,378
31	Severance	89,594	9,135	6,001	9,782	2,367	-	6,165	123,044
32	Site Lease and Easement Expenses	8,049	5,710	1,039	21,040	47,825	11,552	5,930	101,145
33	Loading Spent Fuel & GTCC Waste To DOE	-	-	-	-	17,940	14,628	-	32,568
34	Tools and Equipment	49	-	-	-	-	-	-	49
35	Water	1,663	1,224	184	4,243	7,261	1,771	797	17,143
36	Utility Staff Health Physics Supplies	2,163	979	9	198	352	83	41	3,825
37	**Non-Labor Subtotal**	**$ 241,104**	**$ 84,020**	**$ 17,913**	**$ 220,608**	**$ 218,376**	**$ 72,388**	**$ 26,266**	**$ 880,676**
38									
39	Service Level Agreements	10,647	27,510	4,518	83,094	20,521	22,210	9,143	177,643
40	DGC Staffing	[redacted]							
41	**Undistributed Activities Subtotal**								
42									
43	**Distributed Projects**								
44									
45	**Total**								**$ 4,702,264**

San Onofre Nuclear Generating Station Units 2&3
2017 Decommissioning Cost Estimate

TABLE 9 UNDISTRIBUTED COST ESTIMATE
(2014$ IN THOUSANDS)

	Description	Period 1 Initial Activities (2014$)	Period 2 Transition and Pool Storage (2014$)	Period 3 D&D and Pool Storage (2014$)	Period 4 D&D and Dry Storage (2014$)	Period 5 Dry Storage (2014$)	Period 6 Civil Works Project (2014$)	Period 7 ISFSI Demolition & Final Site Restoration (2014$)	Total (2014$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4	**Undistributed Activities**								
5	**Labor-Staffing**								
6	Site Management & Administration		$ 18,179	$ 3,175	$ 66,883	$ 15,656	$ 12,462	$ 1,785	
7	Plant Management		43,882	7,647	43,293	80,109	19,539	2,198	
8	Decommissioning Oversight		13,537	4,618	128,012	12,604	25,478	8,378	
9	**Utility Staff Subtotal**	**$ 242,544**	**$ 75,598**	**$ 15,440**	**$ 238,189**	**$ 108,369**	**$ 57,478**	**$ 12,362**	**$ 749,981**
10	Security Force	89,640	42,456	6,123	29,360	53,968	13,163	1,481	236,192
11	**Labor-Staffing Subtotal**	**$ 332,184**	**$ 118,054**	**$ 21,564**	**$ 267,549**	**$ 162,337**	**$ 70,641**	**$ 13,843**	**$ 986,172**
12									
13	**Non-Labor**								
14	Aging Management	$ -	$ -	$ 45	$ 3,958	$ 9,421	$ 1,838	$ -	$ 15,262
15	Association Fees and Expenses	800	1,277	237	3,701	1,882	459	207	8,564
16	Community Engagement Panel	2,267	1,556	267	5,268	2,311	544	272	12,486
17	Contracted Services	66,942	31,650	3,736	55,800	47,718	15,215	4,102	225,164
18	DAW Disposal	-	30	-	-	-	-	-	30
19	Decommissioning Advisor	2,470	1,156	261	6,011	-	-	-	9,899
20	DGC Executive Oversight Committee	-	477	135	3,109	-	-	-	3,722
21	Emergency Preparedness Fees	9,047	3,645	830	14,496	16,339	3,985	-	48,341
22	Energy	16,840	7,277	2,154	43,440	10,557	3,957	506	84,732
23	Environmental Permits and Fees	3,065	636	14	312	1,007	1,108	553	6,695
24	Ground Water Monitoring	-	-	-	-	368	87	43	497
25	Information Technology	12,845	4,945	454	7,117	2,361	2,881	1,296	31,900
26	Insurance	13,779	4,592	939	15,328	21,175	5,467	2,383	63,663
27	Third Party Legal	4,234	2,425	451	7,119	7,192	2,163	216	23,799
28	NRC Fees	4,539	2,725	239	8,813	9,967	2,360	2,544	31,187
29	Office Space	-	-	-	1,104	376	88	87	1,655
30	Security Related Expenses	1,536	1,150	403	973	5,166	2,069	496	11,792
31	Severance	89,524	8,599	5,657	9,222	2,232	-	5,812	121,047
32	Site Lease and Easement Expenses	7,996	5,488	999	20,223	45,970	11,104	5,700	97,481
33	Loading Spent Fuel & GTCC Waste To DOE	-	-	-	-	16,870	13,756	-	30,626
34	Tools and Equipment	49	-	-	-	-	-	-	49
35	Water	1,654	1,176	177	4,078	6,979	1,702	766	16,534
36	Utility Staff Health Physics Supplies	2,103	918	8	187	331	78	39	3,663
37	**Non-Labor Subtotal**	**$ 239,691**	**$ 79,724**	**$ 17,005**	**$ 210,259**	**$ 208,221**	**$ 68,862**	**$ 25,023**	**$ 848,786**
38									
39	Service Level Agreements	10,278	26,121	4,288	78,793	19,278	20,865	8,589	168,212
40	DGC Staffing	[redacted]							
41	**Undistributed Activities Subtotal**								
42									
43	**Distributed Projects**								
44									
45	**Total**								**$ 4,478,566**

1. Decommissioning Staffing

Since January 2017, SCE and SDS have been working closely to manage and implement the transition of numerous management programs and functions from SCE to SDS. Following this transition, SCE will maintain an oversight role with respect to SDS's contract. SCE will continue to be responsible for the ISFSI project, for ongoing nuclear operations, security, and other distributed projects (e.g., ISFSI Aging Management, Mesa Turnover). Following the completion of the SDS D&D contract, SCE will take back over the performance of the on-site programs and functions that had been transitioned to SDS.

With contracts now in place for the majority of the SONGS decommissioning work, SCE was able to carefully evaluate its own staffing needs. As part of the process to develop the staffing projections, each SONGS division was grouped into the following categories.

Site Management & Administration – Responsible for oversight and strategic planning, ensuring compliance with regulatory and permitting requirements, safety, security, and overall project cost and schedule.

Plant Management – Responsible for the operations, maintenance, and security of the plant facilities. Staffing levels are expected to decrease significantly after the nuclear fuel is transferred from the spent fuel pool to the ISFSI pad.

Project Oversight – Responsible for oversight of the SDS D&D contract, management of the ISFSI, and other distributed projects. The oversight role ensures all work is completed safely and in compliance with the contract, government regulations, and permits. The staffing levels will vary over the duration of the project based on the amount of physical work being performed (e.g., the number of radiological oversight personnel will decrease after D&D is complete).

As part of the process to estimate staffing needs, senior management met with SONGS division managers to identify major activities during each phase of the decommissioning project. The estimated staffing for each period was based on a "bottom up" assessment of each needed discipline and position. Kenrich also worked with SCE management to vet the underlying assumptions and confirm the rationale underlying the projections. This effort involved numerous interviews of SONGS division managers, an analysis of the plan to transition management and supervision responsibilities from SCE to SDS, and a reconciliation to the staffing levels in the 2014 DCE.[40]

Staffing levels at other utilities having nuclear decommissioning experience were reviewed and considered, while also taking into account site-specific requirements and characteristics of SONGS. To further ensure the reasonableness of the SONGS staffing projections, SCE retained ABZ, an industry expert in decommissioning cost estimating. SCE specifically requested ABZ to provide input based on their experiences working with other nuclear utilities and to confirm that the SONGS projections were in line with industry norms.

The table below summarizes the staffing projection by period. The average staffing levels estimated for each period are intended to account for anticipated adjustments within each decommissioning period.

[40] The 2014 DCE did not assume the transition of programs to the DGC, therefore the headcount for certain divisions, such as maintenance and radiological control and chemistry, decreased in the 2017 DCE, but the decommissioning oversight positions increased in the 2017 DCE.

TABLE 10 UTILITY & SECURITY FORCE AVERAGE STAFFING BY PERIOD[41]

	Description	Period 2 Transition and Pool Storage	Period 3 D&D and Pool Storage	Period 4 D&D and Dry Storage	Period 5 Dry Storage	Period 6 Civil Works Project	Period 7 ISFSI Demolition & Final Site Restoration
1	Start	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050
2	End	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051
3	Duration (Years)	2 0	0 4	9 6	17 0	4 0	2 0
4							
5	**Site Management & Administration**						
6	Site Management & Administration	16	11	10	1	3	-
7	Decommissioning Finance	5	8	8	1	4	1
8	Regulatory Affairs & Nuclear Oversight	10	8	8	2	4	4
9	**Total Site Management & Administration**	**30**	**27**	**26**	**4**	**11**	**5**
10							
11	**Plant Management**						
12	Plant Management	1	1	1	1	1	-
13	Operations	40	36	-	-	-	-
14	Radiological Control & Chemistry	13	-	-	-	-	-
15	Maintenance, Work Control, & PI/CAP	18	7	7	7	7	3
16	Engineering	15	7	7	7	7	3
17	EP Planning	3	3	2	2	2	1
18	Security	155	158	34	34	34	14
19	**Total Plant Management**	**244**	**212**	**51**	**51**	**51**	**20**
20							
21	**Decommissioning Oversight**	**23**	**38**	**45**	**-**	**22**	**16**
22							
23	**Total**	**296**	**277**	**122**	**55**	**84**	**41**

The costs associated with the projected staffing is based on average labor rates for each position. The staffing cost estimate includes labor burdens and short-term incentive compensation, and accounts for positions being filled by contractors.

The table below summarizes the labor-staffing costs by each project period.

[41] Excludes DGC staffing and third-party contractors at SONGS.

TABLE 11 UNDISTRIBUTED LABOR COST ESTIMATE (NOMINAL/2017$ IN THOUSANDS)

	Description	Period 1 Initial Activities (Nominal)	Period 2 Transition and Pool Storage (2017$)	Period 3 D&D and Pool Storage (2017$)	Period 4 D&D and Dry Storage (2017$)	Period 5 Dry Storage (2017$)	Period 6 Civil Works Project (2017$)	Period 7 ISFSI Demolition & Final Site Restoration (2017$)	Total (Nominal/ 2017$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4	**Utility Staff**								
5	Site Management & Administration		$ 19,393	$ 3,379	$ 71,195	$ 16,666	$ 13,265	$ 1,901	
6	Plant Management		46,774	8,140	46,085	85,274	20,799	2,340	
7	Decommissioning Oversight		14,417	4,916	136,266	13,417	27,121	8,919	
8	**Utility Staff Subtotal**	**$ 245,555**	**$ 80,583**	**$ 16,436**	**$ 253,546**	**$ 115,356**	**$ 61,185**	**$ 13,159**	**$ 785,820**
9	Security Force	91,073	45,231	6,518	31,254	57,448	14,012	1,576	247,112
10	**Labor-Staffing Total**	**$ 336,628**	**$ 125,814**	**$ 22,954**	**$ 284,800**	**$ 172,804**	**$ 75,196**	**$ 14,735**	**$ 1,032,932**

TABLE 12 UNDISTRIBUTED LABOR COST ESTIMATE (2014$ IN THOUSANDS)

	Description	Period 1 Initial Activities (2014$)	Period 2 Transition and Pool Storage (2014$)	Period 3 D&D and Pool Storage (2014$)	Period 4 D&D and Dry Storage (2014$)	Period 5 Dry Storage (2014$)	Period 6 Civil Works Project (2014$)	Period 7 ISFSI Demolition & Final Site Restoration (2014$)	Total (2014$)
1	Start	6/7/2013	1/1/2017	1/1/2019	6/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2016	12/31/2018	5/31/2019	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	3 6	2 0	0 4	9 6	17 0	4 0	2 0	
4	**Utility Staff**								
5	Site Management & Administration		$ 18,179	$ 3,175	$ 66,883	$ 15,656	$ 12,462	$ 1,785	
6	Plant Management		43,882	7,647	43,293	80,109	19,539	2,198	
7	Decommissioning Oversight		13,537	4,618	128,012	12,604	25,478	8,378	
8	**Utility Staff Subtotal**	**$ 242,544**	**$ 75,598**	**$ 15,440**	**$ 238,189**	**$ 108,369**	**$ 57,478**	**$ 12,362**	**$ 749,981**
9	Security Force	89,640	42,456	6,123	29,360	53,968	13,163	1,481	236,192
10	**Labor-Staffing Total**	**$ 332,184**	**$ 118,054**	**$ 21,564**	**$ 267,549**	**$ 162,337**	**$ 70,641**	**$ 13,843**	**$ 986,172**

2. Undistributed Non-Labor Costs

In addition to staffing, SCE incurs non-labor costs to support the decommissioning efforts. As part of the process to identify and estimate future non-labor costs, historical recorded costs were reviewed in detail. Kenrich worked with knowledgeable SONGS personnel to develop and estimate future decommissioning costs which are summarized in Table 13 and broken down below.

TABLE 13 UNDISTRIBUTED NON-LABOR COST ESTIMATE ($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**Non-Labor**				
2	Aging Management	$ -	$ 16,230	$ 16,230	$ 15,262
3	Association Fees and Expenses	817	8,144	8,961	8,564
4	Community Engagement Panel	2,304	10,653	12,958	12,486
5	Contracted Services	67,641	167,451	235,092	225,164
6	DAW Disposal	-	32	32	30
7	Decommissioning Advisor	2,515	7,901	10,416	9,899
8	DGC Executive Oversight Committee	-	3,958	3,958	3,722
9	Emergency Preparedness Fees	9,099	40,881	49,980	48,341
10	Energy	16,964	70,631	87,596	84,732
11	Environmental Permits and Fees	3,081	3,798	6,879	6,695
12	Ground Water Monitoring	-	529	529	497
13	Information Technology	12,886	20,105	32,991	31,900
14	Insurance	13,824	51,898	65,722	63,663
15	Third Party Legal	4,336	20,807	25,142	23,799
16	NRC Fees	4,566	27,724	32,291	31,187
17	Office Space	-	1,748	1,748	1,655
18	Security Related Expenses	1,552	10,826	12,378	11,792
19	Severance	89,594	33,450	123,044	121,047
20	Site Lease and Easement Expenses	8,049	93,096	101,145	97,481
21	Tools and Equipment	49	-	49	49
22	Water	1,663	15,480	17,143	16,534
23	Utility Staff Health Physics Supplies	2,163	1,662	3,825	3,663
24	Loading Spent Fuel & GTCC Waste To DOE	-	32,568	32,568	30,626
25	**Non-Labor Total**	**$ 241,104**	**$ 639,572**	**$ 880,676**	**$ 848,786**

a. Aging Management

Aging Management programs cover both the Areva and Holtec dry storage systems. In addition to the scope covered by the distributed Aging Management project, the programs include annual facility maintenance and inspection as well as in-service canister inspections every five years, in compliance with the respective Areva and Holtec SARs.

The Areva Aging Management undistributed costs begin in 2022, after the NRC Certificate of Compliance is renewed. These costs continue until the DOE is assumed to accept the final Areva canister from SONGS in 2037. The Holtec Aging Management costs begin in 2019 after all of the fuel has been transferred from the SONGS 2&3 spent pools to the ISFSI, and then continue until the DOE is assumed to accept the final Holtec canister in 2049.

b. Association Fees and Other Expenses

Association Fees and Other Expenses include Nuclear Energy Institute (NEI) membership fees, costs related to an external Nuclear Oversight Board (NOB), and an outside

advisor to SCE's Internal Nuclear Management Group (INMG). SCE remains an NEI member to obtain access to industry policies, standards, and guidance regarding decommissioning. The NOB is composed of independent review specialists who provide independent review of decommissioning activities.

NEI Fees are estimated to be incurred through Period 7 (ISFSI Demolition & Final Site Restoration); NOB costs are expected through Period 4 (major D&D); and SCE anticipates retaining an outside advisor to the INMG until 2022.

c. Community Engagement Panel

The SONGS Community Engagement Panel (CEP) holds periodic meetings with the public to provide information on various issues, including decommissioning plans, spent fuel management, emergency planning, security, and the environmental review process. CEP costs are estimated to be incurred through the end of Period 7 (ISFSI Demolition & Final Site Restoration). The annual estimate is based on the 2018 budgeted amounts per CEP meeting, and is adjusted proportionately based on the number of meetings estimated each year. Six CEP meetings are assumed in 2018, four CEP meetings per year are estimated during major D&D, through 2028, and one meeting per year is assumed after major D&D is complete.

d. Contracted Services

Contracted Services generally consist of shorter-term supplemental resources, specialty contractors and consultants, third-party services, materials, equipment, and supplies. SONGS senior management, division managers, and Kenrich worked together to identify and estimate the projected costs. Contracted Services costs were estimated for each decommissioning period in each of the following divisions: (1) Decommissioning Projects / Decommissioning Oversight; (2) Engineering; (3) Emergency Preparedness; (4) Maintenance; (5) Nuclear Oversight, Safety, Regulatory Affairs; (6) Operations; (7) Decommissioning Finance; and (8) Site Management & Administration.

Similar to the undistributed staffing, the projected needs for Contracted Services are reduced after major decommissioning milestones are achieved. For example:

- **Transition of SONGS Programs to SDS –** SDS will assume responsibility for the management of numerous SONGS programs by the end of 2017. Accordingly, the estimated costs for contracted services in the Maintenance and Decommissioning Projects divisions are significantly lower in 2018.

- **Completion of Fuel Transfer Operations –** After all spent fuel has been transferred to the ISFSI, the Operations division and its associated contracted services will no longer be needed.

- **D&D Complete** – Many of the contracted services costs in the Decommissioning Oversight and Site Management & Administration divisions will not be needed after SDS completes its work and the SONGS programs are reduced.

e. Decommissioning Advisor

The Decommissioning Advisor provides subject matter expertise and assistance on various matters, including regulatory issues, spent fuel storage, and project management. Decommissioning Advisor costs are estimated through Period 4 (D&D).

f. DGC Executive Oversight Committee

The SDS D&D contract requires an Executive Oversight Committee composed of five individuals charged with resolving contractual issues. The committee includes one person each from SCE and SDS, and three independent third-party members. SCE and SDS share the costs of the third-party positions.

g. Emergency Preparedness Fees

SCE provides funding to local jurisdictions for the management of radiological emergency preparedness, including planning, response, and recovery activities. Currently, SCE pays fees in accordance with a December 2015 Memorandum of Understanding (MOU) covering a period through 2020. The Emergency Preparedness fees are assumed to be paid annually until all spent fuel has been removed from SONGS.

h. Energy

SCE must purchase energy from the grid to power the site, including loads required for decommissioning work. The energy costs are based on historical retail electricity rates and on projected usage. The projected usage was prepared by SCE Engineering and reflects the major activities in each decommissioning period.

i. Environmental Permits And Fees

SONGS must comply with a variety of environmental regulations and maintain numerous permits, which involve the payment of fees. These permits and associated fees include: (1) the State Water Resource Control Board National Pollutant Discharge Elimination System (NPDES) permit fees and Stormwater Pollution Prevention Plan (SWPPP) fees; (2) State of California Board of Equalization mixed waste fees; (3) fees for the California Department of Environmental Health Permit, which includes the permit for Underground Storage Tanks; (4) Air Pollution Control District Permit (APCD) fees; (5) Diesel Generator permit fees; (6) California Coastal

Commission fees; (7) Refrigerant Management Program; and (8) Kelp consortium costs for monitoring and surveying ocean kelp.

During the D&D period, SDS will be responsible for certain permits and fees, including the NPDES permit, mixed waste fee, SWPPP fee, and APCD permit. However, SCE will continue to maintain other permits and incur other fees (e.g. Department of Environmental Health fees, Diesel Generator air permits, CCC fees, and Refrigerant Management Program fees) through this period.

j. Ground Water Monitoring

SCE is required to monitor the ground water beneath the site for the presence of tritium. The costs include sampling, analysis, and monitoring performed by third-party contractors and will be required through the end of SONGS decommissioning. During the D&D period, SDS will assume responsibility for ground water monitoring.

k. Information Technology

Information Technology (IT) costs include SONGS software and network licenses, internal technical support, and payments to network service providers. IT costs are expected to decrease after 2018 after one-time IT projects are completed, and ongoing support costs will be reduced after 2019.[42]

l. Insurance

NRC regulations require that SCE maintains a minimum level of nuclear liability and property insurance, including Nuclear Property Insurance (provided by Nuclear Electric Insurance Limited) and Nuclear Liability Insurance (provided by American Nuclear Insurers).[43] SCE must maintain nuclear-related insurance coverage until the spent nuclear fuel is removed from the SONGS site.[44]

In addition, SCE also maintains General Liability Insurance and Excess Workers' Compensation Insurance, the cost of which is generally a function of SONGS headcount. Historical costs were used as the primary basis to estimate future insurance costs.

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[42] Separately, SONGS also incurs costs associated with support provided by SCE corporate IT personnel and resources. The costs for such additional IT support are provided via a Service Level Agreement with SCE.

[43] Should the Participants choose to reduce current insurance coverage amounts, the future premiums would be reduced accordingly. In December 2017, the Participants received an exemption from the NRC allowing them to reduce insurance coverage.

[44] Insurance requirements per NRC regulations 10 C.F.R § 50.54(w) and 10 C.F.R § 140.11.

m. Third Party Legal

SCE retains outside counsel as necessary to handle legal matters that require specific expertise, or when legal matters require additional resources. For example, SCE engaged outside counsel to support decommissioning licensing proceedings before the NRC, and environmental/land use permitting proceedings before the CCC, CSLC, and other government agencies.

n. NRC Fees

The NRC charges two different types of fees to nuclear reactor licensees: (1) annual fees (Part 171 Fees), and (2) inspection fees (Part 170 Fees). The Part 171 Fees are fixed annual payments per licensee (i.e., an annual fee for each SONGS unit), including nuclear plants that have been permanently retired. The Part 171 fees are to cover generic (i.e., non-licensee specific) activities performed by the NRC. In contrast, the NRC charges licensees Part 170 Fees based on the time it spends on performance reviews, evaluations, incident investigations, and other activities that are specific to an individual licensee.

o. Office Space

Following the completion of major D&D, SCE will need to lease office space for the remaining employees as all the existing office space on the SONGS site will have been removed. The costs to install trailers and annual lease payments are included in the estimate. During major D&D, SDS is responsible for providing SCE's office space.

p. Security Related Expenses

Security Related Expenses include uniforms, weapons, ammunition, and other supplies and equipment to support the SONGS Security Force, as well as background investigations, training costs, and vendor support.

q. Severance

Under the California Nuclear Facilities Decommissioning Act of 1985,[45] SCE employees at SONGS who are severed as a result of the shutdown and permanent retirement of SONGS are eligible for severance benefits. These benefits include lump sum cash payments based on years of service, outplacement services, and reimbursement for educational expenses.

[45] California Public Utilities Code § 8322(g).

r. Site Lease And Easements

SCE makes annual lease and easement payments to the Navy for the SONGS plant site and Mesa, and to the CSLC for the SONGS offshore conduits. The current site lease with the Navy ends in 2024. As previously discussed, SCE expects to negotiate a new lease to cover the period after 2024 through the end of Period 7 (ISFSI Demolition and Final Site Restoration). The rate per acre in the new plant site lease agreement is expected to increase to account for the fair market value of the property.

The Mesa lease payments to the Navy are expected to remain consistent with the current agreement until Mesa Parcels 5, 6, and 7 are returned to the Navy in 2021. The conduits lease payments to the CSLC are expected to remain consistent with the current agreement, which includes periodic increases in lease payments, through the end of Period 7 (ISFSI Demolition and Final Site Restoration).

s. Water

Utilities includes expenses for water provided by the South Coast Water District (SCWD) Joint Regional Water Supply System (JRWSS). Costs were estimated based on historical recorded costs.

t. Utility Staff Health Physics Supplies

Health Physics (also referred to as HP or Radiation Protection) supplies, including personal radiological monitoring and protection equipment, are used by personnel performing work in radiological areas of the plant. Beginning in 2018, SDS will assume responsibility for the radiation protection program. SCE will resume responsibility after the D&D work is performed. Minimal Health Physics supplies will be needed to support the ISFSI only staff as virtually all contaminated materials will have been removed from the site.

u. Loading Spent Fuel And GTCC Waste To DOE

Under the Standard Contract with the DOE, SCE is responsible for transferring canisters from the ISFSI and loading them into DOE shipping containers on-site. The estimate assumes the DOE will accept the loaded canisters and that a "dry fuel transfer" facility is not necessary. The DOE will take title to the waste after it is loaded onto the DOE's transport device and the carrier signs for the shipment at the plant site. For purposes of the 2017 DCE, DOE loading costs are assumed to equal approximately 50% of the costs to load and transfer the spent fuel to the ISFSI. The timing of the DOE loading costs is based on the assumed Spent Fuel Shipping Schedule (Appendix A).

3. Service Level Agreements For Administrative & General Expenses

The 2014 DCE included 5% on all estimated costs to account for SCE's administrative and general (A&G) expenses supporting the SONGS decommissioning project. Beginning in 2016, SCE started to develop Service Level Agreements (SLAs) between the SONGS Participants and the SCE departments that support SONGS decommissioning. The SLAs are intended to provide additional transparency with respect to types of costs and level of support needed. There are separate SLAs for each SCE department supporting SONGS (e.g., Human Resources, IT, Legal, CPUC Regulatory Affairs). Beginning in 2029, after Period 4 is completed, corporate support functions are estimated in the A&G line item in lieu of separate SLAs, and is calculated as 5% of all other 2029-2051 estimated costs. The table below summarizes the SLAs and their associated estimated costs.

TABLE 14 SERVICE LEVEL AGREEMENT (A&G) COST ESTIMATE
($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete 2017 - 2028 (2017$)	Estimate To Complete 2029 - 2051 (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**Service Level Agreements (A&G)**					
2	Audit Services	$ -	$ 9,893	$ -	$ 9,893	$ 9,404
3	Controllers	-	12,193	-	12,193	11,587
4	Corporate Communications	228	1,933	-	2,161	2,043
5	Corporate Security	-	2,878	-	2,878	2,754
6	CPUC Regulatory Affairs	-	10,982	-	10,982	10,444
7	Decommissioning Finance	1,128	718	-	1,846	1,760
8	Environmental Policy	-	1,833	-	1,833	1,726
9	Environmental Services	107	2,243	-	2,349	2,211
10	Human Resources	-	8,005	-	8,005	7,588
11	Information Governance	-	1,092	-	1,092	1,033
12	Information Technology	7,037	24,820	-	31,857	30,461
13	Legal	-	10,883	-	10,883	10,226
14	Local Public Affairs	-	764	-	764	719
15	Real Properties	247	659	-	906	856
16	Risk Management	-	300	-	300	283
17	Short Term Incentive Plan (STIP)	-	6,050	-	6,050	5,684
18	Supply Management	1,375	9,341	-	10,716	10,147
19	Tax	-	1,874	-	1,874	1,787
20	Transportation Services	525	4,989	-	5,514	5,308
21	Treasurers	-	3,672	-	3,672	3,461
22	A&G (2029 - 2051)	-	-	51,874	51,874	48,732
23	**Service Level Agreements (A&G) Total**	**$ 10,647**	**$ 115,122**	**$ 51,874**	**$ 177,643**	**$ 168,212**

4. DGC Staffing

[redacted]

[redacted]

F. 2017 DCE Costs By NRC Cost Category

SONGS distributed projects are classified into one of the following three NRC cost categories: (1) License Termination (LT); (2) Spent Fuel Management (SNF); and (3) Site Restoration (SR). License Termination activities are those required to decontaminate the site and reduce residual radioactivity in order to terminate the NRC licenses pursuant to 10 C.F.R § 50.75(c). License termination activities are expected to be completed in 2028, following the SDS D&D work, and NRC approval of the partial site release.

Spent Fuel Management activities are those required to operate and maintain the on-site spent fuel storage facilities until such time the spent fuel is removed by the DOE, in accordance with 10 C.F.R § 50.54(bb). The decommissioning of the ISFSI after the spent fuel is transferred offsite (10 C.F.R § 72.30) is also classified as a Spent Fuel Management activity.

The remaining distributed costs are classified as Site Restoration costs, which are primarily driven by the terms of the easement and lease agreements with the Navy and CSLC. Site Restoration distributed projects include non-radiological decommissioning activities, such as the removal of non-contaminated substructures below 3 feet below grade.

The classification of distributed projects in this DCE to NRC cost categories is generally consistent with how projects were classified in the 2014 DCE.

Undistributed costs are also assigned to NRC cost categories. Certain undistributed cost items are assignable to a single NRC cost category (e.g., 100% of the annual cost to load spent fuel to the DOE is classified as Spent Fuel Management). However, given their nature, there are many other undistributed cost items which support multiple decommissioning activities (e.g., energy costs). These undistributed costs are allocated to License Termination, Spent Fuel Management, and Site Restoration based on the distributed cost amounts in each NRC cost category.[46]

The table below summarizes the 2017 DCE costs by NRC cost category.

[46] The undistributed costs incurred to date were recorded to each NRC cost category based on the allocation percentages assumed in the 2014 DCE.

TABLE 15 2017 DCE BY NRC COST CATEGORY
($ IN THOUSANDS)

	Description	Recorded Through 2016 (Nominal $)	Estimate To Complete (2017$)	Total Estimate At Completion (Nominal /2017$)	Total Estimate At Completion (2014$)
1	**License Termination**				
2	Distributed	[redacted]			$ [redacted]
3	Undistributed				
4	**License Termination Subtotal**				**$ 1,906,728**
5					
6	**Spent Fuel Management**				
7	Distributed	[redacted]			$ [redacted]
8	Undistributed				
9	**Spent Fuel Management Subtotal**				**$ 1,367,361**
10					
11	**Site Restoration**				
12	Distributed	[redacted]			[redacted]
13	Undistributed				
14	**Site Restoration Subtotal**	**$ 166,324**	**$ 1,098,532**	**$ 1,264,856**	**$ 1,204,476**
15					
16	**Total**	[redacted]			**$ 4,478,566**

G. Contingency

Contingency is used in cost estimates to account for the costs of unplanned events and circumstances that often occur during the performance of a project. As defined in the American Association of Cost Engineers Project and Cost Engineers' Handbook, contingency is "an amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs."

Examples of costs intended to be covered by contingency include planning and estimating errors and omissions, design development and changes within scope, minor price fluctuations, and variations in the market and environmental conditions. Contingency is not intended to cover all unknowns or unplanned occurrences. For example, contingency usually excludes major scope changes, extraordinary events such as strikes and natural disasters, specified "management reserves" for defined issues, and general price escalation or currency effects.

The consensus in industry literature is that a primary consideration in determining appropriate amounts for contingency on a particular project is the stage of development and level of confidence in the estimated known base project costs. The 2014 DCE used a 25%

contingency factor,[47] which was deemed reasonable by the CPUC in D.16-04-019 given the then-existing level of uncertainty in the then-current DCE.[48]

Given the current stage of decommissioning, a lower contingency factor is warranted in some areas. Kenrich and knowledgeable SCE personnel reviewed each major category of costs and determined an individual contingency factor for each group. In determining the contingency factors for each cost grouping, consideration was given to contracting status (e.g., ISFSI and D&D work are under contract), technical complexity, estimating approach, and other variables.

The remaining work associated with ISFSI is primarily the loading and transfer of spent fuel canisters to the ISFSI. The associated contingency factor reflects that this work is under contract and benefits from significant learning and industry experience over many decades. The D&D work is also under contract, following a rigorous competitive procurement process. However, the contingency factor for this work also accounts for the significant influence of site-specific factors on D&D work. For other distributed work, not currently under contract and planned to occur in the relative distant future, the same 25% contingency factor used in the 2014 DCE was used in this DCE. With regard to undistributed labor and non-labor costs, the associated contingency factors account for a significantly more rigorous process used to develop the estimates contained in this DCE. In contrast to the 2014 DCE, the estimated headcount and non-labor costs for each division were subject to more substantial and iterative internal review and updating processes.

The table below summarizes the contingency factor applied to the to-go costs for each estimate.

[47] Contingency of 25% was applied to all costs in the 2014 DCE with the following exceptions: 2013 and 2014 Actual Expenditures 0%; Department of Navy Easement Payments 15%; Hazardous and Asbestos Wastes 50%; Site Characterization Surveys 15%; Temporary Facilities 15%; Backfill and Compaction 15%.

[48] Specifically referring to SONGS in its 2012 NDCTP decision, the CPUC stated, "[t]he Commission finds the reasonableness of a contingency amount is significantly related to the stage of decommissioning and the activities projected, including particular site-specific challenges. Consequently, the reasonable contingency factor may vary between nuclear plants and at different stages of decommissioning." (D.14-12-082 at 38). Further, in its April 20, 2017 proposed decision pertaining to PG&E's updated cost estimates for the decommissioning of its two nuclear power plants, the CPUC specifically noted that PG&E use of a 25% contingency factor for Diablo Canyon raised questions in light of other information which had been supplied by PG&E's third-party decommissioning cost consultant, TLG Services, Incorporated (TLG). Specially, TLG estimated contingency on a line item basis and the resulting composite contingency factor was 17.4%.

TABLE 16 CONTINGENCY FACTORS APPLIED IN 2017 DCE

2017 DCE Category	Contingency Factor
Recorded Costs Through September 2017	0%
ISFSI & Fuel Transfer Operations	[redacted]
[redacted]	
Substructure Removal	25%
Other Projects	15-25%
Offshore Conduit Removal	25%
ISFSI Demolition	25%
Final Site Restoration	25%
Undistributed Labor	10%
Undistributed Non-Labor	15%
Service Level Agreements	10%

The composite contingency factor included in the 2017 DCE is approximately [redacted] percent of base estimated costs.

TABLE 17 CONTINGENCY INCLUDED IN THE SONGS 2&3 2017 DCE ($ IN THOUSANDS)

	Description	2017 DCE (Nominal /2017$)	2017 DCE (2014$)
1	Base Estimated Costs	[redacted]	
2	Estimated Contingency		
3	**Subtotal Estimated Costs**	**$ 3,518,663**	**$ 3,322,641**
4	Recorded Costs	1,183,601	1,155,925
5	**Total DCE Value**	**$ 4,702,264**	**$ 4,478,566**

VI. Additional Discussion Regarding The Project Schedule

The SONGS decommissioning project schedule defines the sequence and timing of activities, the completion dates for major project milestones, and the duration of each decommissioning period. The 2017 DCE is presented in 2017 dollars. These constant dollars are spread over the duration of the SONGS entire decommissioning project based on the 2017 DCE project schedule.[49]

In accordance with the contract, SDS has developed a baseline schedule for completing its major D&D and achieving partial site release. SCE incorporated SDS's Baseline Schedule

[49] To assess the adequacy of the amount of funds residing in the Nuclear Decommissioning Trust, the annual constant dollar cash flows are escalated and discounted to present value.

into the overall decommissioning project schedule on which the 2017 DCE is based. The completion dates were mapped to corresponding 2017 DCE milestones.

As described earlier, the decommissioning schedule is comprised of seven (7) periods. Each period is generally defined by the major focus of activity on-site, as well as the licensing status of the plant (i.e., from an NRC perspective). SONGS is currently planning and preparing for the physical decommissioning of the plant facilities (Periods 1 and 2). The major D&D work is expected to begin in 2019 and estimated to be completed by late 2028 (Periods 3 and 4). At the conclusion of the major D&D work, all structures, systems, and components on-site will have been removed to at least 3 feet below grade and the NRC Part 50 license will have been reduced to the ISFSI area only.

From 2029 until 2046, when the work to remove the below-grade structures begins, the only significant activity at the site will be the transfer of spent fuel canisters to the DOE (Period 5). During this period, SCE will become informed regarding the regulatory and landowner "end-state" requirements for the SONGS site. The demolition and removal of the ISFSI and remaining below-grade structures will be performed after 2046 (Periods 6 and 7). This timing of this work is determined in part by the anticipated date by which the DOE is expected to have removed all SONGS spent fuel. The DOE is currently assumed to begin removing SONGS 2&3 spent fuel in 2034 and complete the removal of all fuel by 2049. Final site restoration and license termination is projected to be completed by 2051.

Two critical milestones include the completion of spent fuel transfer operations (i.e., transfer of all spent fuel from the wet pools to the ISFSI) in mid-2019 and the completion of major D&D work in late 2028. After each of these milestones, SONGS's licensing status and regulatory requirements change such that the associated costs to manage and support (e.g., operations, maintenance, security, management, and contract oversight) the decommissioning of the site will be substantially reduced.

SCE currently anticipates commencing spent fuel transfer operations in 2018 and is targeting completion in early to mid-2019. Fuel transfer operations are relatively complex, subject to extensive regulatory oversight, and intended to be performed 24 hours per day, seven days per week. Accordingly, for purposes of this DCE, SCE included schedule margin in its determination of the June 1, 2019 milestone completion date.

The critical activities driving the overall duration of major D&D work are the removal of the nuclear steam supply system (NSSS) equipment (e.g., reactor vessels, steam generators, reactor coolant pumps) from inside the containment buildings, and then the decontamination, demolition, and removal of the containment buildings. The decontamination, demolition, and removal of other SONGS buildings and facilities will be performed concurrently.

SCE and SDS are continuing to plan and schedule major D&D work. Currently, SDS intends to complete the physical decommissioning work in 2025 and obtain final NRC approval of the final site survey and partial site release in 2026. SDS's schedule is currently based on performing the preparation and segmentation of the reactor vessel internals and NSSS large component removal at both Units 2 and 3 in parallel. These activities include relatively high-risk

cutting and material handling operations. As another example of uncertainty that is currently inherent in the major D&D schedule, SCE is currently planning for increased radiological decontamination efforts associated with the below-grade structures that will remain at SONGS after SDS completes its work. Accordingly, for purposes of this DCE, SCE has included schedule margin in its determination of the planned completion date of major D&D in late 2028.[50]

VII. Waste Disposal

The disposition of waste is a significant activity in the decommissioning of SONGS. A brief description of the waste to be generated from the SONGS decommissioning process is described below. In addition, the estimated quantity of each type of waste is summarized in Table 18 below.

Spent Nuclear Fuel – Under the Nuclear Waste Policy Act of 1982, the DOE is responsible for the removal and permanent disposal of all SONGS spent nuclear fuel. In the 2014 DCE, SCE assumed the DOE would begin accepting spent fuel from domestic commercial nuclear power plants in 2024 at the rate published in DOE's July 2004 Acceptance Priority Ranking & Annual Capacity Report. Due to DOE inactivity in the past four years, SCE revised its spent fuel shipping schedule for the 2017 DCE to assume that the DOE will begin accepting spent fuel from the nuclear industry in 2028.

GTCC Waste – GTCC waste will be generated when SDS segments the reactor vessel internals. Additional GTCC waste may reside in the spent fuel pools. GTCC waste cannot be disposed of in a federally licensed low-level radioactive waste (LLRW) disposal facility. As explained above, courts have held that the DOE must accept GTCC waste, but currently there is no disposal facility in the U.S. that is licensed to accept it. Therefore, GTCC waste will be packaged and stored in licensed canisters on the SONGS ISFSI until final disposal.

Low-Level Radioactive Waste (LLRW) – 10 C.F.R. § 61 outlines the requirements for LLRW and identifies the criteria for the classifications of waste materials that can be accepted at federally licensed LLRW disposal facilities. SDS will characterize, package, and transport offsite the Class A, Class B, and Class C waste.

Exempt Waste – It is assumed that some waste generated during the decommissioning of SONGS will receive NRC approval to be disposed of at a facility that accepts very low-level waste. According to the NRC, "10 CFR 20.2002 is available for use by licensees for wastes that typically are a small fraction of the Class A limits contained in Part 61, and for which the extensive controls in Part 61 are not needed to ensure protection of public health and safety and the environment. Thus, 10 CFR 20.2002 provides an alternative, safe, risk-informed disposal

[50] The 2028 date is generally consistent with the schedule that was assumed in the 2014 DCE.

method for these materials, which are frequently called 'very low-level waste' (VLLW), or 'low-activity waste' (LAW)."[51]

Non-Radiologically Contaminated Waste – Radiologically clean concrete or debris will be disposed of at an out of state Class III landfill. This material will be scanned for radiological contamination prior to leaving SONGS to meet all applicable regulatory requirements. Non-contaminated reinforcing and structural steel may be recycled.

Non-Radiologically Contaminated Hazardous and Industrial Waste Disposal – Lead shielding and other hazardous materials and chemicals will be removed and properly disposed of during decommissioning. Non-Radioactive contaminated surfaces coated with tightly adhering and undamaged lead-based paint will be removed as non-hazardous building demolition debris.

Table 18 summarizes the estimated waste disposal quantities by class for the remainder of SONGS decommissioning.

TABLE 18 REMAINING WASTE DISPOSAL QUANTITIES

	Description	Period 2 Transition and Pool Storage (lbs)	Periods 3 & 4 D&D (lbs)	Period 5 Dry Storage (lbs)	Period 6 Civil Works Project (lbs)	Period 7 ISFSI Demolition & Final Site Restoration (lbs)	Total (lbs)
1	Start	1/1/2017	1/1/2019	1/1/2029	1/1/2046	1/1/2050	
2	End	12/31/2018	12/31/2028	12/31/2045	12/31/2049	12/31/2051	
3	Duration (Years)	2.0	10.0	17.0	4.0	2.0	
4	**Class B, C, GTCC**						
5	Class B	-	69,320	-	-	-	69,320
6	Class C	5,700	inc	-	-	-	5,700
7	GTCC	-	222,800	-	-	-	222,800
8	**Class B, C, GTCC Subtotal**	**5,700**	**292,120**	**-**	**-**	**-**	**297,820**
9	**Class A**						
10	Class A	-	395,096,463	-	-	502,383	395,598,846
11	Class A - Containerized Waste	7,950	inc	-	-	-	7,950
12	**Class A Subtotal**	**7,950**	**395,096,463**	**-**	**-**	**502,383**	**395,606,796**
13	**Other**						
14	Out of State Landfill / Exempt	-	489,594,000	-	1,074,296,250	394,648,923	1,958,539,173
15	Scrap Metal Recycler	-	105,391,000	-	71,736,000	10,325,800	187,452,800
16	**Other Subtotal**	**-**	**594,985,000**	**-**	**1,146,032,250**	**404,974,723**	**2,145,991,973**
17							
18	**Waste Total**	**13,650**	**990,373,583**	**-**	**1,146,032,250**	**405,477,106**	**2,541,896,589**

[51] "Low-Level Waste Disposal Under 10 C.F.R. § 20.2002." U.S. NRC, 21 September 2017, https://www.nrc.gov/waste/llw-disposal/10cfr20-2002-info.html, accessed December 1, 2017.

VIII. References

1. Energy*Solutions*, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2&3," September 5, 2014

2. August 20, 2015 letter from NRC to SCE Vice President and Chief Nuclear Officer, Mr. Thomas J. Palmisano (ADAM Accession No.: ML15204A383)

3. Application 14-12-007 "Joint Application Of Southern California Edison Company (U 338-E) And San Diego Gas & Electric Company (U 902-E) For 2014 SONGS Units 2&3 Decommissioning Cost Estimate And Related Decommissioning Issues," December 10, 2014

4. California Public Utilities Commission Decision 16-04-109, "Decision Approving Decommissioning Cost Estimate," April 21, 2016

5. State of California State Lands Commission, "Lease P.R.C. No. 4862.1," November 19, 1984

6. Department of the Navy, "Grant of Easement," May 1964

7. State of California, Executive Order D-62-02, September 2002

8. U.S. Nuclear Regulatory Commission, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, February 2005

9. California Public Utilities Commission Proposed Decision A.16-03-006, "Decision Approving Decommissioning Cost Estimate," April 20, 2017

Appendix A

Spent Fuel Shipping Schedule

SONGS Units 1, 2, and 3
Spent Fuel Shipping Schedule
2028 DOE Acceptance
(as of 1/2/2018)

	On-Site Inventory (Beginning of Year)					On-Site Transfers (During Year)		Off-Site Transfers (During Year)			
	Unit 1 Fuel Assemblies at Morris	Unit 1 Fuel Assemblies in ISFSI	Units 2 & 3 Fuel Assemblies in Pools	Units 2 & 3 Fuel Assemblies in ISFSI	Units 1, 2, & 3 Canisters in ISFSI*	Units 2 & 3 Fuel Assemblies Transferred to ISFSI	Units 2 & 3 Canisters Transferred to ISFSI	Unit 1 Assemblies Transferred to DOE	Unit 2 Assemblies Transferred to DOE**	Unit 3 Assemblies Transferred to DOE**	Units 1, 2, & 3 Canisters Transferred from ISFSI to DOE*
2016	270	395	2,668	792	50	-	-	-	-	-	-
2017	270	395	2,668	792	50	-		-	-	-	-
2018	270	395	2,668	792	110	2,220	60	-	-	-	-
2019	270	395	448	3,012	170	448	13	-	-	-	-
2020	270	395	-	3,460	182	-	-	-	-	-	-
2021	270	395	-	3,460	182	-	-	-	-	-	-
2022	270	395	-	3,460	182	-	-	-	-	-	-
2023	270	395	-	3,460	182	-	-	-	-	-	-
2024	270	395	-	3,460	182	-	-	-	-	-	-
2025	270	395	-	3,460	182	-	-	-	-	-	-
2026	270	395	-	3,460	182	-	-	-	-	-	-
2027	270	395	-	3,460	182	-	-	-	-	-	-
2028	270	395	-	3,460	182	-	-	96	-	-	4
2029	270	299	-	3,460	178	-	-	48	-	-	2
2030	270	251	-	3,460	176	-	-	120	-	-	5
2031	270	131	-	3,460	171	-	-	48	-	-	2
2032	270	83	-	3,460	169	-	-	48	-	-	2
2033	270	35	-	3,460	167	-	-	-	-	-	-
2034	270	35	-	3,460	167	-	-	35	48	48	6
2035	270	-	-	3,364	161	-	-	-	192	96	12
2036	270	-	-	3,076	149	-	-	-	120	168	12
2037	270	-	-	2,788	137	-	-	-	48	72	5
2038**	270	-	-	2,668	132	-	-	-	74	111	5
2039	270	-	-	2,483	127	-	-	-	111	111	6
2040	270	-	-	2,261	121	-	-	-	111	74	5
2041	270	-	-	2,076	116	-	-	-	-	-	-
2042	270	-	-	2,076	116	-	-	-	111	111	6
2043	270	-	-	1,854	110	-	-	-	74	111	5
2044	270	-	-	1,669	105	-	-	-	111	74	5
2045	270	-	-	1,484	100	-	-	-	-	-	-
2046	270	-	-	1,484	100	-	-	-	222	222	12
2047	270	-	-	1,040	88	-	-	-	74	74	4
2048	270	-	-	892	84	-	-	-	222	222	12
2049	270	-	-	448	72	-	-	-	208	240	13
2050***	270	-	-	-	59	-	-	270	-	-	13
2051	-	-	-	-	-	-	-	-	-	-	-

* Excluding GTCC Waste
** Before 2038, SONGS 2 & 3 fuel assemblies shipped in Areva 24-PTH canisters Beginning in 2038, SONGS 2 & 3 fuel assemblies shipped in Holtec MPC canisters
*** Unit 1 fuel assemblies transferred to DOE from GE facility in Morris, Illinois in TADS (21 assemblies per TAD)

Appendix B

Detailed Project Schedule

San Onofre Nuclear Generating Station Units 2 and 3 Decommissioning Schedule (Period 2 – 4)

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

Based on SONGS DS Schedule Submitted 09/14/2017

2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028

2014 DCE Containment NSSS Removal Duration

2017 Containment Nuclear Steam Supply Systems Removal

U2 and U3 Containment NSSS Baseline

Unit 2 Containment

U2 – Containment Prep (1/19 – 10/19) | U2 – RV Internals Segmentation (10/19 – 1/21) | U2 – RV Shell (10/20 – 4/22) | U2 – Large Component Removal (1/21 – 4/22)

Complex Cutting and Handling Operations
Performed in Parallel in lieu of Series as in 2014 DCE

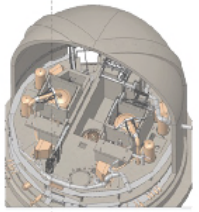
Unit 3 Containment

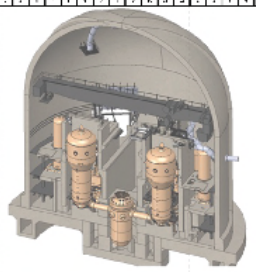
U3 – Containment Prep (1/19 – 10/19) | U3 – RV Internals Segmentation (10/19 – 1/20) | U3 – RV Shell (1/21 – 4/22) | U3 – Large Component Removal (1/21 – 5/22)

◇7/20 U1 Reactor Pressure Vessel

◇1/21 Final GTCC Offload

Additional Six Months to Manage Project Risk





2018 | 2019

2014 DCE Dry Storage Fuel Transfer Campaign

2017 Dry Storage Fuel Transfer Campaign

Spent Fuel Loading Services (1/18 – 12/18) | Closeout and Demobilization (1/19 – 12/19)

Additional Five Months Due to 24/7 Dual Plant Spent Fuel Offload

2014 DCE Containment Decontamination and Demolition

2017 Containment Decontamination and Demolition

U2 and U3 Containment Decontamination & Demolition Baseline

U2 Containment Decon (1/22 – 6/22) | U2 Interior Demo (6/22 – 9/23) | U2 Open Air Demo (7/25 – 8/25) | U2 Additional Decon (8/25 – 12/25)

U3 Containment Decon (6/23 – 12/23 3/24) | U3 Interior Demo (6/24 – 7/24) | Power Block Area Backfill (7/24 – 10/24) | U3 Open Air Demo (7/25 – 8/25) | U3 Additional Decon (7/25 – 9/25)

Additional Decontamination of Remaining Sub-Structure Surfaces to Leave as Clean as Practical for Subsequent Removal in 2046 – 2049

Risk Duration for Segregating, Handling and Packaging Concrete Rubble if not Considered for Backfill. Contract and Strategic Change Under Consideration.
Areas depicted: △ and △ or △

Auxiliary Radwaste Building

Auxiliary Control Building

Auxiliary Building Decontamination & Demolition

Aux Radwaste Planning & Characterization (10/19 – 4/20) | Aux Radwaste Systems Removal (4/20 – 4/22) | Aux Radwaste Decon (4/21 – 4/22)

Aux Radwaste Building Demo (11/22 – 6/23) | Aux Radwaste Additional Decon (7/23 – 7/25) | Remove Tents (6/23 – 7/23)

Install Tents (4/21 – 11/21)

Aux Control Planning & Characterization (6/21 – 11/21) | Aux Control Systems Removal (11/21 – 4/22) | Aux Control Decon (4/22 – 5/22) | Aux Control Building Demo (5/22 – 11/22) | Aux Control Additional Decon (7/23 – 9/23)

Unit 2 – Turbine Building

Unit 3 - Turbine Building

Turbine Building Decontamination & Demolition

U2 Planning & Characterization (1/20 – 10/20) | U2 Decon (10/20 – 12/20 1/21) | U2 Building Demo (1/21 – 2/22) | U2 Additional Decon (4/22 – 4/24)

U2 Systems Removal (6/20 – 8/20)

U3 Planning & Characterization (7/20 – 1/21) | U3 Systems Removal (1/21 – 6/21) | U3 Decon (6/21 – 7/21) | U3 Building Demo (8/21 – 6/23) | U3 Additional Decon (12/23 – 1/24)

Unit 2 – Safety Equipment Building

Unit 3 – Safety Equipment Building

Systems Removal & Decon

Planning & Characterization (4/20 – 7/20) | Systems Removal (7/20 – 1/21) | Decon (1/21 – 4/21) | Remove Safety Injections Systems (1/21 – 3/21)

Planning & Characterization (1/21 – 4/21) | Systems Removal (4/21 – 4/22) | Decon (4/22 – 5/22) | Remove Safety Injections Systems (3/21)

Interior – Open Air Demo

Interior Demo (7/24 – 5/24) | Open Air Demo (1/24 3/25) | Additional Decon (3/25 – 7/25)

Interior Demo (6/23 – 1/24) | Open Air Demo (12/24 1/25) | Additional Decon (3/25 – 7/25)

Unit 2 – Penetration Building

Unit 3 – Penetration Building

Systems Removal & Decon: Planning & Characterization (7/22 – 10/22) | Systems Removal (10/22 – 1/23) | Decon (1/23 – 4/23) | Interior Demo (4/23 – 6/23)

Interior – Open Air Demo: U2 FSS (CVS) Penetration (7/24) | Open Air Demo (1/24 12/24) | Additional Decon (2/25 – 4/25)

Systems Removal & Decon: Planning & Characterization (4/23 – 6/23) | Systems Removal (6/23 – 7/23) | Decon (7/23 – 8/23) | Interior Demo (8/23 11/23 01/24)

Interior – Open Air Demo: U3 FSS (CVS) Penetration (8/24) | Open Air Demo (11/24 12/24) | Additional Decon (2/25 – 4/25)

Unit 2 – Fuel Handling Building

Unit 3 – Fuel Handling Building

Systems Removal & Decon: Planning & Characterization (1/20 – 4/21) | Systems Removal (4/21 – 1/22) | Decon (1/21 – 4/22)

Systems Removal & Decon: Planning & Characterization (10/20 – 4/21) | Systems Removal (4/21 – 1/22) | Decon (1/22 – 5/22)

Interior – Open Air Demo: Interior Demo (1/23 – 6/24) | U2 FSS (CVS) Fuel Handling (7/24) | Open Air Demo (1/24 – 1/25) | Additional Decon (1/25 – 7/25)

Interior – Open Air Demo: Interior Demo (6/23 – 6/23) | U3 FSS (CVS) Fuel Handling (7/24) | Open Air Demo (10/24 12/24) | Additional Decon (1/25 – 7/25)

Additional Decon of These Ancillary Buildings May Change Means and Methods to Rip-and-Ship

Intake Area Backfill (12/22 – 3/23)

OCA Area Backfill (7/25 – 9/25)

P epare LTP (1/2/19 – 12/22)

◇7/20 Remove Unit 1 Reactor Vessel from Site (Unit 1 DCE)

◇4/21 Nuclear Security SAS Building

◇5/21 864/865 Buildings

◇5/21 862/863 Buildings

◇5/21 Maintenance Building

◇6/21 U2 Diesel Generator Building

◇6/21 Fire Protection Tanks

◇6/21 Outage Control Building

◇6/21 AWS Building

◇6/21 841 / 842 Modulars

◇10/21 U2 Main Transformer

◇11/21 K60 Warehouse

◇11/21 K70 South Security Building

◇12/21 K40 / K50 Office Building

◇1/22 K10 / K20 / K30 Buildings

◇2/22 U3 Diesel Generator Building

◇3/22 U3 Main Transformer

◇5/22 Intake Area / Structure

◇11/22 Full Flow Demineralizers

◇9/23 Removal of Off-Shore Components

◇12/22 Submit License Termination Plan to NRC

NRC Review of License Termination Plan (1/23 – 7/24)

LTP ASLB Hearing Support (6/23 – 1/25)

◇7/24 License Termination Plan NRC Approval

◇2/25 U3 Diesel Generator Tanks

◇3/25 U2 Diesel Generator Tanks

◇4/25 T10 / T20 Shop

FSS Preparation (8/25 – 1/26)

NRC FSS Approval Period (1/26 – 7/26)

◇5/26 Final Status Survey Approval and License Termination

◇6/26 Final Acceptance Certification

◇6/25 HazMat Building

◇6/25 Rems Staging Area

◇6/25 OCA Parking Yard Utilities

◇6/25 Multi-Purpose Building 60

◇6/25 Yard / Drains / Utilities

◇6/25 Security Building L50

◇7/25 Sewage Plant

Tertiary Major Finish Milestones

Project Closeout

- Final Status Surveys
- Contract Final Acceptance
- Administrative Closeout

Phase Legend:

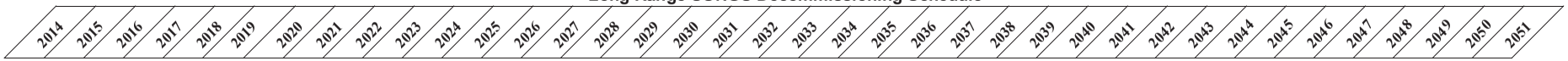
- 2017 Major Work Activity
- 2017 Period of Work Performed
- 2014 DCE Equivalent Period of Work Performed

Activity Legend:

Projected Baseline Plus 12 Months

- Summary
- Planning & Characterization
- Systems Removal
- Decon
- Support Activities
- Open Air Demo
- Combined Demo
- Interior Demo
- Backfill
- Additional Decon (Duration Undefined)

Long Range SONGS Decommissioning Schedule



Period 1 - Initial Activities
(June 2013 - Dec 2016)

- DGC Selection
- Fuel Cancellation
- Preps for Decommissioning

Period 2 - Transition and Pool Storage
(Jan 2017 - Dec 2018)

- Program Transition
- CEQA Permitting Approval
- ISFSI Pad / Security Building Completion
- Pool to Pad Campaign

Period 3 - D&D and Pool Storage
(Jan 2019 - May 2019)

- Pool to Pad Completion
- ISFSI Only Transition

Period 4 - D&D and Dry Storage
(June 2019 - Dec 2028)

- Nuclear Steam Supply System (NSSS)
- Large Component Removal (LCR)
- Building Decontamination
- Building Demolition
- Licensed Material Removal
- Part 50 License Partial Site Release
- Temporary Backfill

Period 5 - Dry Storage
(Jan 2029 - Dec 2045)

Dewatering

Period 6 - Civil Works Project
(Jan 2046 - Dec 2049)

- Civil Works Request for Proposal (RFP) (3)
- Oversight Team Mobilization (3)
- Seawall / Walkway Removal
- Civil Works Contractor Selection (3)
- Site Dewatering
- Substructure Removal
- Permanent Backfill

Period 7 - ISFSI Demolition & Final Site Restoration
(Jan 2050 - Dec 2051)

- ISFSI Demolition (AREVA and Holtec)
- Ocean Conduit Removal
- Site Vegetation
- Final License Termination

(1) All Unit 1 fuel at SONGS is expected to be removed from the site by the end of 2034
(2) Period 7 also includes the removal of Unit 1 substructures
(3) These activities occur prior to Period 6

Appendix C

Detailed Cost Table

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

	DCE No.[1]		Description	Total (Nominal / 2017$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
1	**Completed Projects - 2015 NDCTP**			**$ 1,223**	**$ 2,671**	**$ 89,834**	**$ (137)**	**$ -**	**$ 1,563**	**$ -**	**$ 95,154**
2											
3	LT-2-D-2 18		Planning & Design For Cold and Dark	1,888	1,008	14,977	1,054	-	1,373	-	20,299
4	LT-2-D-2 19		Implement Cold and Dark (Repower Site)	2,151	415	52,191	(663)	-	1,522	-	55,615
5	LT-2-D-2 20		Install 12 kV Service Line to Power Temp Power Ring	1,579	2,779	4,746	419	-	758	-	10,281
6	LT-2-D-2 21		Drain & De-Energize Non-Essential Systems (DEC Process)	2,363	946	1,299	14	-	1,487	-	6,111
7	LT-2-D-2 29		Implement Control Room Modifications (Command Center Relocation)	-	4	340	3	-	3	-	350
8	**Completed Activities - Initial D&D Activities Subtotal**			**$ 7,981**	**$ 5,152**	**$ 73,553**	**$ 826**	**$ -**	**$ 5,143**	**$ -**	**$ 92,655**
9											
10	LT-2-D-2 26		Install Spent Fuel Pool System Modifications - Unit 2	139	2,814	1,159	31	-	129	-	4,271
11	LT-2-D-2 27		Install Spent Fuel Pool System Modifications - Unit 3	139	2,814	1,159	31	-	129	-	4,271
12	**Completed Activities - Spent Fuel Islanding Subtotal**			**$ 277**	**$ 5,627**	**$ 2,317**	**$ 63**	**$ -**	**$ 258**	**$ -**	**$ 8,543**
13											
14	LT-2-D-2 07		Prepare Defueled Safety Analysis Report (DSAR)	1	-	1,991	8	-	21	-	2,021
15	**Completed Activities - Phase 2 Regulatory Compliance Subtotal**			**$ 1**	**$ -**	**$ 1,991**	**$ 8**	**$ -**	**$ 21**	**$ -**	**$ 2,021**
16											
17	LT-2-D-2 22		Select Decommissioning General Contractor (DGC)	1,219	7	11,842	392	-	809	-	14,270
18	**Completed Activities - DCG RFP & Prep Subtotal**			**$ 1,219**	**$ 7**	**$ 11,842**	**$ 392**	**$ -**	**$ 809**	**$ -**	**$ 14,270**
19											
20	LT-2-D-LOED	[2]	Large Organism Exclusion Device Modification	69	1,070	178	(4)	-	51	-	1,364
21	LT-D-SPV	[2]	Special Purpose Vehicle Support	-	-	442	-	-	6	-	448
22	LT-3-D-RecB	[2]	Records Backlog	-	-	1,807	186	-	20	-	2,014
23	LT-3-D-S&S	[2]	Simplification & Streamlining Project	1	6	1,329	33	-	8	-	1,377
24	**Completed Activities - Transition Modifications Subtotal**			**$ 69**	**$ 1,076**	**$ 3,757**	**$ 215**	**$ -**	**$ 84**	**$ -**	**$ 5,202**
25											
26	**Completed Projects And Activities Subtotal**			**$ 10,771**	**$ 14,534**	**$ 183,294**	**$ 1,368**	**$ -**	**$ 7,877**	**$ -**	**$ 217,845**
27											
28	**ISFSI & Fuel Transfer Operations**										
29	SNF-1-D-7 02		Holtec Long Lead Items and Areva Contract Closure [3]	95	16,342	32,106	(12,796)	-	445	1,026	37,219
30	SNF-2-D-8 07		ISFSI Pad Study	-	-	199	2	-	2	-	203
31	SNF-2-D-8 08		Design ISFSI Expansion, Fuel Inspection, and Oversight [4]	1,284	103	76,028	2,808	-	916	3,589	84,729
32	SNF-2-D-8 09		Construct ISFSI Expansion	96	5	44,885	267	-	177	4,225	49,655
33	SNF-2-D-8 10		Fabrication of Spent Fuel Canisters - Unit 2 [5]	24	1,696	27,107	8,978	-	568	317	38,690
34	SNF-2-D-8 11		Fabrication of Spent Fuel Canisters - Unit 3 [5]	23	1,696	19,640	8,979	-	490	528	31,357
35	SNF-2-D-8 12		Load Fuel Canisters and Fuel Transfer Operations - Unit 2 [6]	-	-	17,684	-	-	-	2,606	20,290
36	SNF-2-D-8 13		Load Fuel Canisters and Fuel Transfer Operations - Unit 3 [6]	-	-	17,684	-	-	-	2,606	20,290
37	**ISFSI & Fuel Transfer Operations Subtotal**			**$ 1,523**	**$ 19,842**	**$ 235,332**	**$ 8,239**	**$ -**	**$ 2,598**	**$ 14,899**	**$ 282,432**
38											
39	**Decontamination, Demolition, & Disposal**										
40	[redacted]		Prepare Integrated Work Sequence and Schedule for Decommissioning	-	-	[redacted]	-	-	-	[redacted]	[redacted]
41			Modify Containment Access- Unit 2	-	-		-	-	-		
42			Modify Containment Access- Unit 3	-	-		-	-	-		
43			Remove and Dispose of Missile Shields - Unit 2	-	-		-	[redacted]	-		
44			Remove and Dispose of Reactor Head - Unit 2	-	-		-		-		
45			Remove and Dispose of Missile Shields - Unit 3	-	-		-		-		
46			Remove and Dispose of Reactor Head - Unit 3	-	-		-		-		
47			Prepare Activity Specifications - U2	-	-		-	-	-		
48		[2]	Waste Contracts	-	-		-	-	-		
49			Install GARDIAN System	-	-		-	-	-		
50	**Decontamination, Demolition, & Disposal - Initial D&D Activities Subtotal**			**$ -**	**$ -**		**$ -**		**$ -**		**$**

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

	DCE No.[1]	Description	Total (Nominal / 2017$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
51										
52	[redacted]	Design, Specify, and Procure Special Items and Materials		-	-		-	-	-	
53		Test Special Cutting and Handling Equipment and Train Operators		-	-		-	-	-	
54		Finalize Internals and Vessel Segmenting Details - Unit 2		-	-		-	-	-	
55		Segment, Package and Dispose of Reactor Internals - Unit 2		-	-		-	[redacted]	-	
56		Segment, Package and Dispose of Reactor Internals - Unit 3		-	-		-		-	
57	**Decontamination, Demolition, & Disposal - Internals and Vessel Segmentation Subtotal**		$	- $	- $	$	- $	$	- $	$
58										
59	[redacted]	Remove Underground Diesel Tank - Unit 2		-	-		-	-	-	
60		Remove Underground Diesel Tank - Unit 3		-	-		-	-	-	
61		Remove and Dispose of Spent Fuel Storage Racks - Unit 2		-	-		-	[redacted]	-	
62		Remove and Dispose of Spent Fuel Storage Racks - Unit 3		-	-		-		-	
63		Drain Spent Fuel Pool and Process Liquid Waste - Unit 2		-	-		-	-	-	
64		Drain Spent Fuel Pool and Process Liquid Waste - Unit 3		-	-		-	-	-	
65		Remove Protected Area Security Fencing		-	-		-	-	-	
66	**Decontamination, Demolition, & Disposal - Removal Of Spent Fuel Systems/Equipment Subtotal**		$	- $	- $	$	- $	$	- $	$
67										
68	[redacted]	Remove and Dispose of Steam Generators - Unit 2		-	-		-	[redacted]	-	
69		Remove and Dispose of Steam Generators - Unit 3		-	-		-		-	
70	**Decontamination, Demolition, & Disposal - Steam Generator Removal Subtotal**		$	- $	- $	$	- $	$	- $	$
71										
72	[redacted]	Upgrade Rail Spur		-	-		-	-	-	
73		Remove, Package and Dispose of Non-Essential Systems - Unit 2		-	-		-	[redacted]	-	
74		Remove, Package and Dispose of Non-Essential Systems - Unit 3		-	-		-		-	
75	**Decontamination, Demolition, & Disposal - Non-Essential System Removal Subtotal**		$	- $	- $	$	- $	$	- $	$
76										
77	[redacted]	Remove, Package and Dispose of Essential Systems		-	-		-	[redacted]	-	
78		Reactor Vessel Insulation Removal and Disposal - Unit 2		-	-		-		-	
79		Segment, Package and Dispose of Reactor Pressure Vessel - Unit 2		-	-		-		-	
80		Reactor Vessel Insulation Removal and Disposal - Unit 3		-	-		-		-	
81		Segment, Package and Dispose of Reactor Pressure Vessel - Unit 3		-	-		-		-	
82		Remove and Dispose of Pressurizer - Unit 2		-	-		-		-	
83		Remove and Dispose of Pressurizer - Unit 3		-	-		-		-	
84		Remove and Dispose of Turbine Gantry Crane - Unit 2		-	-		-		-	
85		Remove and Dispose of Turbine Gantry Crane - Unit 3		-	-		-		-	
86	**Decontamination, Demolition, & Disposal - Large Component Removal Subtotal**		$	- $	- $	$	- $	$	- $	$
87										
88	[redacted]	Demolish Service Building (K-10, 20, 30)		-	-		-	[redacted]	-	
89		Demolish South Security Processing Facility (K-70)		-	-		-		-	
90		Demolish South Yard Area Buildings T-10, 20, 60 and Haz Mat		-	-		-		-	
91		Procure Clean Building Demolition Equipment		-	-		-		-	
92		Demolish Diesel Generator Building - Unit 3		-	-		-		-	
93		Demolish Diesel Generator Building - Unit 2		-	-		-		-	
94		Demolish Condensate Building and Transformer Pads - Unit 2		-	-		-		-	
95		Demolish Full Flow Area and Turbine Building - Unit 2		-	-		-		-	
96		Demolish AWS Building		-	-		-		-	
97		Demolish Building L-50		-	-		-		-	

Appendix C
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(Dollars In Thousands, 100% Share)

	DCE No.[1]	Description	Total (Nominal / 2017$)							
			Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
98	[redacted]	Demolish Maintenance Building 4 (B-64/B-65)		-	-	[redacted]	-	[redacted]	-	[redacted]
99		Demolish Maintenance Building 5 (B-62/B-63)		-	-		-		-	
100		Demolish Outage Control Center		-	-		-		-	
101		Demolish Maintenance Building 2 (B-49/B-50)		-	-		-		-	
102		Demolish Maintenance Building 1 (B-43/B-44)		-	-		-		-	
103		Demolish Auxiliary Radwaste Building - Common		-	-		-		-	
104		Demolish Auxiliary Control Building - Common		-	-		-		-	
105		Remove Systems and Demolish Make-Up Demineralizer Structures		-	-		-		-	
106		Install Concrete Plugs in Intake and Discharge Structures		-	-		-		-	
107		Demolish Intake and Discharge Structures to 3-Feet Below Grade		-	-		-		-	
108	**Decontamination, Demolition, & Disposal - Initial Plant Building Demo Subtotal**		$ -	$ -	$	$ -	$	$ -	$	$ 1
109										
110	[redacted]	Decon Containment Building - Unit 3		-	-			-		
111		Decon Penetration Building - Unit 3		-	-			-		
112		Decon Safety Equipment and MSIV Building - Unit 3		-	-			-		
113		Decon Fuel Handling Building - Unit 3		-	-			-		
114		Decon Containment Building - Unit 2		-	-			-		
115		Decon Penetration Building - Unit 2		-	-			-		
116		Decon Safety Equipment and MSIV Building - Unit 2		-	-			-		
117		Decon Fuel Handling Building - Unit 2		-	-			-		
118		Decon Turbine Building - Unit 2		-	-			-		
119		Decon Auxiliary Radwaste Building - Common		-	-			-		
120		Decon Auxiliary Control Building - Common		-	-			-		
121	**Decontamination, Demolition, & Disposal - Building Decontamination Subtotal**		$ -	$ -	$	$ -	$	$ -	$	$ 2
122										
123	[redacted]	Remove Protected Area Pavement		-	-			-		
124		Demolish Condensate Building and Transformer Pads - Unit 3		-	-			-		
125		Demolish Full Flow Area and Turbine Building - Unit 3		-	-			-		
126		Demolish Unit 3 Fuel Handling Building to 3-Feet Below Grade		-	-			-		
127		Demolish Penetration Building - Unit 3		-	-			-		
128		Demolish Unit 2 Fuel Handling Building to 3-Feet Below Grade		-	-			-		
129		Demolish Penetration Building - Unit 2		-	-			-		
130	**Decontamination, Demolition, & Disposal - Final Plant Building Demo Subtotal**		$ -	$ -	$	$ -	$	$ -	$	$
131										
132	[redacted]	[2] Offshore Conduit Diffuser and Risers		-	-		-			
133										
134		[2] Backfill		-	-		-			
135										
136		Demolish Staging Warehouse		-	-			-		
137		Demolish Administration Building (K-40/50)		-	-			-		
138		Detension and Remove Unit 3 Containment Building Tendons		-	-		-	-		
139		Demolish Safety Equipment and MSIV Building - Unit 3		-	-			-		
140		Demolish Unit 3 Containment Building to 3-Feet Below Grade		-	-			-		
141		Detension and Remove Unit 2 Containment Building Tendons		-	-			-		
142		Demolish Safety and MSIV Equipment Building - Unit 2		-	-			-		
143		Demolish Unit 2 Containment Building to 3-Feet Below Grade		-	-			-		
144	**Decontamination, Demolition, & Disposal - Containment Building Demo Subtotal**		$ -	$ -	$	$ -	$	$ -	$	$
145										

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

	DCE No.[1]		Description		Total (Nominal / 2017$) Labor	Material	Cont	Other	Disposal	Overheads	Contingency	Total
146	[redacted]		Prepare License Termination Plan		-	-	[redacted]	-	-	-	[redacted]	[redacted]
147			Final Status Survey		-	-		-	[redacted]	-		
148			Subsurface Structure Removal Engineering Planning and Design		-	-		-	-	-		
149	**Decontamination, Demolition, & Disposal - Final Survey/License Termination Subtotal**				**$ -**	**$ -**		**$ -**		**$ -**		**$**
150												
151	[redacted]	[2]	Waste Taxes (Pass Through)		-	-	-	-	[redacted]	-		
152		[2]	Waste Taxes (Pass Through)		-	-	-	-		-		
153	**Decontamination, Demolition, & Disposal - Waste Subtotal**				**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**		**$**
154												
155	[redacted]				-	-	[redacted]	-	-	-		
156												
157	[redacted]				**$ -**	**$ -**		**$ -**	[redacted]	**$ -**		**$**
158												
159	**Other Projects**											
160	SNF-2-D-AM Areva	[2]	Areva ISFSI Relicensing	[7]	-	-	12,550	8	-	-	2,441	14,998
161	SNF-2-D-AM Holtec 1	[2]	Holtec ISFSI I&M Program Development	[7]	-	-	14,892	25	-	3	2,843	17,763
162	SNF-2-D-AM Holtec 2	[2]	Holtec ISFSI Relicensing		-	-	5,000	-	-	-	1,000	6,000
163	**ISFSI Aging Management Subtotal**				**$ -**	**$ -**	**32,441**	**$ 32**	**$ -**	**$ 3**	**$ 6,284**	**$ 38,761**
164												
165	SNF-2-D-EP Holtec	[2]	Environmental Permitting - Holtec		-	-	3,000	-	-	-	600	3,600
166	SNF-2-D-EP Areva	[2]	Environmental Permitting - Areva		-	-	1,650	-	-	-	330	1,980
167	**Coastal Development Permit Extension Subtotal**				**$ -**	**$ -**	**4,650**	**$ -**	**$ -**	**$ -**	**$ 930**	**$ 5,580**
168												
169	SNF-2-D-GTCC	[2]	GTCC Waste Storage		-	-	22,616	-	-	-	5,654	28,270
170												
171	SR-1-D-14 01		Mesa Site Phase I and II Site Assessment and Lease Surrender	[8]	526	-	7,213	25	-	173	1,118	9,054
172	SR-1-D-14 02		Disposition Hazardous Waste from Mesa Site		113	-	10	-	-	73	-	195
173	SR-1-D-14 03		Mesa Site Characterization Survey		15	-	138	(102)	-	10	-	61
174	SR-2-D-15 02		Obtain Required Permits - Mesa	[9]	-	-	55	26	-	1	-	82
175	SR-2-D-15 09		Mesa Buildings - Demo, Maintenance	[10]	258	42	8,783	64	-	99	545	9,791
176	SR-2-D-15 11		Demolish Mesa Roads and Parking Lots		-	396	591	-	-	-	197	1,185
177	SR-2-D-15 12		Finish Grading and Re-vegetate Mesa Site		-	400	304	-	-	-	141	845
178	**Mesa Site Turnover Subtotal**				**$ 911**	**$ 838**	**$ 17,093**	**$ 13**	**$ -**	**$ 356**	**$ 2,001**	**$ 21,212**
179												
180	LT-3-D-DCE	[2]	DCE Update		-	-	2,183	375	-	-	189	2,747
181	SNF-D-DCE	[2]	DCE Update		-	-	1,000	-	-	-	150	1,150
182	**DCE Update Subtotal**				**$ -**	**$ -**	**3,183**	**$ 375**	**$ -**	**$ -**	**$ 339**	**$ 3,897**
183												
184	SR-3-D-16 05		Obtain CEQA Permit & Approvals	[11]	947	16	5,896	327	-	433	712	8,331
185	SR-3-D-16 03		Initial Real Estate Authorization Renewal and Plant Easement	[12]	2,377	-	9,418	640	-	647	2,223	15,305
186	SR-D-NEPA 2	[2]	Plant Lease Extension		1,397	-	1,576	45	-	414	686	4,118
187	SR-D-NEPA 3	[2]	Plant Lease Amendment For Final Site Restoration		1,663	-	5,532	54	-	493	1,548	9,290
188	SNF-D-GTCC Disp	[2]	GTCC Disposal		-	-	36,000	-	-	-	7,200	43,200
189	SNF-2-D-CDP	[2]	ISFSI CDP Settlement		-	-	3,743	800	-	-	-	4,543
190	SR-D-RFP	[2]	Substructure Removal Contractor Procurement		4,741	59	-	-	-	1,406	1,241	7,447
191	SNF-1-D-7 05		Cyber Security Modifications		341	671	8,241	55	-	336	-	9,644
192	SNF-D-NIA Sump	[2]	NIA Sump Modifications		-	-	1,000	-	-	-	150	1,150
193	**Other Projects Subtotal**				**$ 12,377**	**$ 1,583**	**$ 151,389**	**$ 2,341**	**$ -**	**$ 4,088**	**$ 28,969**	**$ 200,748**
194												

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			Total (Nominal / 2017$)							
	DCE No.[1]	Description	Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
195	**Substructure Removal**									
196	SR-D-BKFL REM [2]	Backfill Removal	3,358	2,713	-	-	-	996	1,767	8,833
197	SR-5-D-18 02	Install Sheet Piling and Excavation Shoring	-	20,385	10,280	-	-	-	7,666	38,332
198	SR-5-D-18 03	Install Dewatering System and Effluent Treatment and Discharge Controls	-	-	-	29,053	-	-	7,263	36,316
199	SR-5-D-18 04	Demolish and Backfill Unit 3 Condensate Storage Area Below -3 Feet	-	292	207	-	569	-	267	1,334
200	SR-5-D-18 05	Demolish and Backfill Unit 3 Diesel Generator Building Below -3 Feet	-	166	118	-	276	-	140	701
201	SR-5-D-18 06	Demolish and Backfill Unit 3 Fuel Handling Building Below -3 Feet	-	449	344	-	938	-	433	2,163
202	SR-5-D-18 07	Demolish and Backfill Unit 3 Radwaste and Control Building Below -3 Feet	-	1,183	1,062	-	1,819	-	1,016	5,079
203	SR-5-D-18 08	Demolish and Backfill Unit 3 Turbine Building Structure Below 9 Ft Elevation	-	5,374	4,502	-	7,880	-	4,439	22,195
204	SR-5-D-18 09	Demolish and Backfill Unit 3 Safety Equipment Building Below -3 Feet	-	841	828	-	4,120	-	1,447	7,237
205	SR-5-D-18 10	Demolish and Backfill Unit 3 Penetration Area Below -3 Feet	-	394	323	-	801	-	380	1,899
206	SR-5-D-18 11	Demolish and Backfill Unit 3 Full Flow Building Below -3 Feet	-	148	104	-	256	-	127	637
207	SR-5-D-18 12	Demolish and Backfill Unit 3 Containment Building Below -3 Feet	-	1,789	1,358	-	5,048	-	2,049	10,243
208	SR-5-D-18 13	Demolish and Backfill Unit 2 Condensate Storage Area Below -3 Feet	-	292	207	-	569	-	267	1,334
209	SR-5-D-18 14	Demolish and Backfill Unit 2 Diesel Generator Building Below -3 Feet	-	166	118	-	276	-	140	701
210	SR-5-D-18 15	Demolish and Backfill Unit 2 Fuel Handling Building Below -3 Feet	-	449	344	-	938	-	433	2,163
211	SR-5-D-18 16	Demolish and Backfill Unit 2 Radwaste and Control Building Below -3 Feet	-	1,282	1,098	-	1,819	-	1,050	5,249
212	SR-5-D-18 17	Demolish and Backfill Unit 2 Turbine Building Structure Below 9 Ft Elevation	-	5,374	4,502	-	7,881	-	4,439	22,195
213	SR-5-D-18 18	Demolish and Backfill Unit 2 Safety Equipment Building Below -3 Feet	-	841	828	-	4,120	-	1,447	7,237
214	SR-5-D-18 19	Demolish and Backfill Unit 2 Penetration Area Below -3 Feet	-	394	323	-	801	-	380	1,899
215	SR-5-D-18 20	Demolish and Backfill Unit 2 Full Flow Building Below -3 Feet	-	405	248	-	256	-	227	1,137
216	SR-5-D-18 21	Demolish and Backfill Unit 2 Containment Building Below -3 Feet	-	1,786	1,356	-	5,048	-	2,047	10,237
217	SR-5-D-18 22	Demolish and Backfill Intake Structure Below -3 Feet	-	10,418	7,867	-	25,339	-	10,906	54,529
218	SR-5-D-18 24	Remove Sheet Piling and Excavation Shoring	-	-	11,967	-	-	-	2,992	14,958
219	SR-5-D-18 25	Remove Dewatering System and Effluent Treatment	-	-	-	6,947	-	-	1,737	8,684
220	SR-6-D-19 06	Remove and Stockpile Existing Seawall Erosion Protection	-	11	6	-	-	-	4	21
221	SR-6-D-19 07	Remove Unit 2 and 3 Seawall and Pedestrian Walkway	-	3,032	3,258	-	4,606	-	2,724	13,620
222	SR-6-D-19 08	Remove Remaining Intake and Outfall Box Culvert	-	464	341	-	2,211	-	754	3,770
223	SR-6-D-19 10	Backfill and Compaction of Excavation	-	2,217	1,495	-	-	-	928	4,640
224	**Substructure Removal Subtotal**		**$ 3,358**	**$ 60,862**	**$ 53,084**	**$ 36,000**	**$ 75,573**	**$ 996**	**$ 57,468**	**$ 287,340**
225										
226	**Offshore Conduit Removal**									
227	SR-3-D-16 01	Hydrogeologic Investigation and Outfall Conduit Survey	-	130	302	104	-	-	134	670
228	SR-5-D-18 23	Remove Off Shore Intake and Outfall Conduits	-	43,901	12,606	-	19,788	-	19,074	95,369
229	**Offshore Conduit Removal Subtotal**		**$ -**	**$ 44,031**	**$ 12,908**	**$ 104**	**$ 19,788**	**$ -**	**$ 19,208**	**$ 96,039**
230										
231	**ISFSI Demolition**									
232	SNF D&D-1-D-12 01	Preparation and NRC Review of License Termination Plan	-	-	118	161	-	-	70	349
233	SNF D&D-2-D-13 01	Install GARDIAN Bulk Assay System	-	-	-	546	-	-	137	683
234	SNF D&D-2-D-13 02	Decon Areva Modules [13]	-	47	111	-	141	-	75	374
235	SNF D&D-2-D-13 03	Final Status Survey of ISFSI	-	82	520	-	-	-	151	753
236	SNF D&D-2-D-13 04	Clean Demo of Areva ISFSI Pad and Modules [14]	-	1,049	1,923	-	1,270	-	1,060	5,302
237	SNF D&D-2-D-13 05	Demolish ISFSI Security Building [15]	-	266	199	-	528	-	248	1,240
238	SNF D&D-2-D-13 06	Restore ISFSI Site	-	512	346	-	-	-	215	1,073
239	SNF D&D-2-D-13 07	Preparation of Final Report on Decommissioning and NRC Review	-	-	55	-	-	-	14	69
240	SNF D&D-2-D-13 08 [2]	Clean Demo of Holtec ISFSI Pad and Modules	-	1,946	1,452	-	4,910	-	2,077	10,386
241	**ISFSI Demolition Subtotal**		**$ -**	**$ 3,902**	**$ 4,725**	**$ 707**	**$ 6,849**	**$ -**	**$ 4,046**	**$ 20,229**
242										

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

			Total (Nominal / 2017$)							
	DCE No.[1]	Description	Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
243	**Final Site Restoration**									
244	SR-6-D-19 01	Obtain Required Permits and Approvals	-	20	410	130	-	-	140	700
245	SR-6-D-19 03	Procure Site Restoration Equipment	-	400	-	-	-	-	100	500
246	SR-6-D-19 12	Install Shoreline Erosion Control and Restoration Features	-	142	10	-	-	-	38	190
247	SR-6-D-19 13	Remove Railroad Tracks, Rails and Ballast	-	35	64	-	-	-	25	123
248	SR-6-D-19 14	Remove Gunite Slope Protection	-	362	267	-	1,728	-	589	2,946
249	SR-6-D-19 15	Remove Access Roads and Parking Lots	-	179	244	-	-	-	106	529
250	SR-6-D-19 16	Finish Grading and Re-Vegetate Site	-	834	987	-	-	-	455	2,276
251	**Final Site Restoration Subtotal**		**$ -**	**$ 1,973**	**$ 1,981**	**$ 130**	**$ 1,728**	**$ -**	**$ 1,453**	**$ 7,267**
252										
253	**Distributed Subtotal**									
254										
255	**Labor-Staffing**									
256	LT-U-1 01	Utility Staff	153,426	544	101,384	1,302	-	59,298	16,414	332,367
257	SNF-U-2 01	Utility Staff	196,990	399	39,185	1,045	-	68,546	18,789	324,954
258	SR-U-3 01	Utility Staff	44,437	24	61,492	68	-	11,056	11,423	128,499
259	**Utility Staff Subtotal**		**$ 394,852**	**$ 967**	**$ 202,061**	**$ 2,415**	**$ -**	**$ 138,899**	**$ 46,625**	**$ 785,820**
260										
261	LT-U-1 03	Security Force	11,563	4	146	17	-	2,200	601	14,532
262	SNF-U-2 04	Security Force	163,052	58	2,487	45	-	54,788	12,148	232,580
263	**Security Force Subtotal**		**$ 174,615**	**$ 62**	**$ 2,633**	**$ 63**	**$ -**	**$ 56,989**	**$ 12,749**	**$ 247,112**
264										
265	**Labor-Staffing Subtotal**		**$ 569,468**	**$ 1,029**	**$ 204,694**	**$ 2,478**	**$ -**	**$ 195,888**	**$ 59,375**	**$ 1,032,932**
266										
267	**Non-Labor**									
268	SNF-U-AM Areva	[2] Areva ISFSI Aging Management	-	-	3,713	-	-	-	557	4,270
269	SNF-U-AM Holtec	[2] Holtec ISFSI Aging Management	-	-	10,400	-	-	-	1,560	11,960
270	**Aging Management Subtotal**		**$ -**	**$ -**	**$ 14,113**	**$ -**	**$ -**	**$ -**	**$ 2,117**	**$ 16,230**
271										
272	LT-U-1 17	Association Fees and Expenses	-	3	2,393	2,193	-	9	540	5,138
273	SNF-U-2 26	[2] Association Fees and Expenses	-	-	212	1,838	-	-	307	2,357
274	SR-U-3 17	[2] Association Fees and Expenses	-	-	481	793	-	-	191	1,466
275	**Association Fees and Expenses Subtotal**		**$ -**	**$ 3**	**$ 3,086**	**$ 4,825**	**$ -**	**$ 9**	**$ 1,039**	**$ 8,961**
276										
277	LT-U-1 15	Community Engagement Panel	382	63	2,324	4,285	-	157	679	7,890
278	SNF-U-2 25	[2] Community Engagement Panel	-	-	26	2,440	-	-	370	2,836
279	SR-U-3 21	[2] Community Engagement Panel	-	-	8	1,933	-	-	291	2,232
280	**Community Engagement Panel Subtotal**		**$ 382**	**$ 63**	**$ 2,358**	**$ 8,658**	**$ -**	**$ 157**	**$ 1,340**	**$ 12,958**
281										

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

	DCE No.[1]		Description		Total (Nominal / 2017$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
282	LT-U-1 08		Contracted Services	[16]	705	9,613	78,768	7,991	-	92	6,641	103,810
283	SNF-U-2 11		Contracted Services	[16]	349	11,718	62,692	18,422	-	165	10,528	103,875
284	SR-U-3 06		Contracted Services	[16]	19	761	21,008	2,452	-	18	3,433	27,690
285	SR-U-Bank	[2]	Bank Fees And Interest		-	-	-	(68)	-	-	-	(68)
286	SR-U-Inv Adj	[2]	Vendor Invoice Adjustment		-	-	-	(213)	-	(1)	-	(214)
287	**Contracted Services Subtotal**				**$ 1,073**	**$ 22,092**	**$ 162,468**	**$ 28,583**	**$ -**	**$ 274**	**$ 20,602**	**$ 235,092**
288												
289	LT-U-1 09		DAW Disposal		-	-	21	-	-	-	-	21
290	SNF-U-2 12		DAW Disposal		-	-	10	-	-	-	-	10
291	**DAW Disposal Subtotal**				**$ -**	**$ -**	**$ 32**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 32**
292												
293	LT-U-1 25		Decommissioning Advisor		-	735	6,854	10	-	25	698	8,322
294	SNF-U-2 28	[2]	Decommissioning Advisor		-	-	292	-	-	-	44	336
295	SR-U-3 22	[2]	Decommissioning Advisor		-	-	1,528	-	-	-	229	1,758
296	**Decommissioning Advisor Subtotal**				**$ -**	**$ 735**	**$ 8,674**	**$ 10**	**$ -**	**$ 25**	**$ 971**	**$ 10,416**
297												
298	LT-U-CO	[2]	DGC Executive Oversight Committee		-	-	2,696	-	-	-	404	3,100
299	SR-U-CO	[2]	DGC Executive Oversight Committee		-	-	746	-	-	-	112	857
300	**DGC Executive Oversight Committee Subtotal**				**$ -**	**$ -**	**$ 3,441**	**$ -**	**$ -**	**$ -**	**$ 516**	**$ 3,958**
301												
302	SNF-U-2 09		Emergency Preparedness Fees		-	22	150	44,615	-	90	5,103	49,980
303	**Emergency Preparedness Fees Subtotal**				**$ -**	**$ 22**	**$ 150**	**$ 44,615**	**$ -**	**$ 90**	**$ 5,103**	**$ 49,980**
304												
305	LT-U-1 10		Energy		-	-	-	46,606	-	137	4,762	51,505
306	SNF-U-2 13		Energy		-	-	-	16,988	-	31	2,036	19,055
307	SR-U-3 07		Energy		-	-	-	14,814	-	-	2,222	17,036
308	**Energy Subtotal**				**$ -**	**$ -**	**$ -**	**$ 78,408**	**$ -**	**$ 168**	**$ 9,020**	**$ 87,596**
309												
310	LT-U-1 24		Environmental Permits and Fees		2	-	344	3,348	-	27	82	3,802
311	SNF-U-2 27	[2]	Environmental Permits and Fees		-	-	676	346	-	-	153	1,176
312	SR-U-3 23	[2]	Environmental Permits and Fees		-	-	193	1,460	-	-	248	1,901
313	**Environmental Permits and Fees Subtotal**				**$ 2**	**$ -**	**$ 1,212**	**$ 5,154**	**$ -**	**$ 27**	**$ 484**	**$ 6,879**
314												
315	SNF-U-GW	[2]	Ground Water Monitoring		-	-	340	-	-	-	51	391
316	SR-U-GW	[2]	Ground Water Monitoring		-	-	120	-	-	-	18	138
317	**Ground Water Monitoring Subtotal**				**$ -**	**$ -**	**$ 460**	**$ -**	**$ -**	**$ -**	**$ 69**	**$ 529**
318												
319	LT-U-1 20		Information Technology	[17]	2,532	1,605	6,001	6,044	-	1,687	1,035	18,905
320	SNF-U-2 20		Information Technology	[17]	-	998	3,730	389	-	-	768	5,885
321	SR-U-3 15		Information Technology	[17]	-	1,670	2,746	649	-	-	760	5,825
322	LT-U-1 21		Telecommunications	[18]	1,275	35	137	88	-	815	-	2,350
323	LT-U-1 22		Personal Computers	[18]	-	9	9	-	-	-	-	18
324	SNF-U-2 22		Personal Computers	[18]	-	7	-	-	-	-	-	7
325	**Information Technology Subtotal**				**$ 3,808**	**$ 4,324**	**$ 12,623**	**$ 7,171**	**$ -**	**$ 2,502**	**$ 2,563**	**$ 32,991**
326												

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

				Total (Nominal / 2017$)							
	DCE No.[1]	Description		Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
327	LT-U-1 05	Insurance		1	-	-	18,981	-	-	1,090	20,072
328	LT-U-1 14	Workers Compensation Insurance	[19]	-	-	-	384	-	-	-	384
329	SNF-U-2 06	Insurance		-	-	-	35,022	-	-	5,030	40,052
330	SR-U-3 04	Insurance		-	-	-	4,533	-	-	680	5,213
331	**Insurance Subtotal**			**$ 1**	**$ -**	**$ -**	**$ 58,921**	**$ -**	**$ -**	**$ 6,800**	**$ 65,722**
332											
333	LT-U-Legal	[2] Third-Party Legal		-	-	8,960	(125)	-	16	1,047	9,899
334	SNF-U-Legal	[2] Third-Party Legal		-	-	9,533	16	-	20	1,119	10,688
335	SR-U-Legal	[2] Third-Party Legal		(836)	-	5,285	6	-	(405)	505	4,555
336	**Third-Party Legal Subtotal**			**$ (836)**	**$ -**	**$ 23,778**	**$ (103)**	**$ -**	**$ (369)**	**$ 2,671**	**$ 25,142**
337											
338	LT-U-1 07	NRC Fees		-	-	4	10,756	-	43	964	11,767
339	SNF-U-2 08	NRC Fees		-	-	30	17,916	-	3	2,574	20,523
340	**NRC Fees Subtotal**			**$ -**	**$ -**	**$ 34**	**$ 28,673**	**$ -**	**$ 46**	**$ 3,538**	**$ 32,291**
341											
342	LT-U-Office	[2] Office Space		-	20	1,000	-	-	-	153	1,173
343	SNF-U-Office	[2] Office Space		-	356	3	-	-	-	54	413
344	SR-U-Office	[2] Office Space		-	104	37	-	-	-	21	162
345	**Office Space Lease Subtotal**			**$ -**	**$ 480**	**$ 1,040**	**$ -**	**$ -**	**$ -**	**$ 228**	**$ 1,748**
346											
347	LT-U-1 04	Security Related Expenses		-	166	216	249	-	2	56	690
348	SNF-U-2 05	Security Related Expenses		1	1,913	6,562	1,305	-	10	1,310	11,102
349	SR-U-3 03	Security Related Expenses		2	124	323	116	-	4	17	586
350	**Security Related Expenses Subtotal**			**$ 4**	**$ 2,203**	**$ 7,101**	**$ 1,671**	**$ -**	**$ 16**	**$ 1,383**	**$ 12,378**
351											
352	SR-U-3 11	Severance		104,551	-	1,816	4,142	-	8,452	4,084	123,044
353	**Severance Subtotal**			**$ 104,551**	**$ -**	**$ 1,816**	**$ 4,142**	**$ -**	**$ 8,452**	**$ 4,084**	**$ 123,044**
354											
355	LT-U-1 06	Site Lease and Easement Expenses		1	-	69	4,102	-	-	350	4,521
356	SNF-U-2 07	Site Lease and Easement Expenses		-	-	-	41,587	-	-	6,238	47,825
357	SR-U-3 05	Site Lease and Easement Expenses		2	-	223	43,225	-	-	5,348	48,798
358	**Site Lease and Easement Expenses Subtotal**			**$ 3**	**$ -**	**$ 292**	**$ 88,914**	**$ -**	**$ -**	**$ 11,936**	**$ 101,145**
359											
360	SNF-U-SFL	[2] Loading Spent Fuel & GTCC Waste To DOE		-	-	28,320	-	-	-	4,248	32,568
361	**Loading Spent Fuel & GTCC Waste To DOE Subtotal**			**$ -**	**$ -**	**$ 28,320**	**$ -**	**$ -**	**$ -**	**$ 4,248**	**$ 32,568**
362											
363	LT-U-1 19	Tools and Equipment		-	-	14	35	-	-	-	49
364	**Tools and Equipment Subtotal**			**$ -**	**$ -**	**$ 14**	**$ 35**	**$ -**	**$ -**	**$ -**	**$ 49**
365											
366	LT-U-1 18	Water	[20]	-	-	-	3,890	-	9	436	4,336
367	SNF-U-2 18	Water	[20]	-	-	-	8,275	-	6	1,119	9,400
368	SR-U-3 13	Water	[20]	-	-	-	2,965	-	-	443	3,408
369	**Water Subtotal**			**$ -**	**$ -**	**$ -**	**$ 15,130**	**$ -**	**$ 15**	**$ 1,998**	**$ 17,143**
370											
371	LT-U-1 02	Utility Staff Health Physics Supplies		-	114	1,012	28	-	8	21	1,183
372	SNF-U-2 02	Utility Staff Health Physics Supplies		-	152	2,305	46	-	13	127	2,643
373	**Utility Staff Health Physics Supplies Subtotal**			**$ -**	**$ 266**	**$ 3,317**	**$ 74**	**$ -**	**$ 21**	**$ 148**	**$ 3,825**
374											
375	**Non-Labor Subtotal**			**$ 108,987**	**$ 30,189**	**$ 274,329**	**$ 374,880**	**$ -**	**$ 11,432**	**$ 80,859**	**$ 880,676**

Appendix C
Table 1
Detailed Cost Table By Cost Type
(Dollars In Thousands, 100% Share)

				Total (Nominal / 2017$)							
	DCE No.[1]		Description	Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
376											
377	**Service Level Agreements**										
378	LT-U-SLA	[2]	Service Level Agreements	32,318	(9)	2,301	30,114	-	9,098	6,278	80,099
379	SNF-U-SLA	[2]	Service Level Agreements	7,908	(9)	2,080	9,175	-	25,896	3,521	48,571
380	SR-U-SLA	[2]	Service Level Agreements	9,783	(1)	132	8,254	-	26,401	4,403	48,973
381	**Service Level Agreements Subtotal**			**$ 50,010**	**$ (19)**	**$ 4,514**	**$ 47,543**	**$ -**	**$ 61,395**	**$ 14,202**	**$ 177,643**
382											
383	**DGC Staffing**										
384	[redacted]			-	-	[redacted]	-	-	-	[redacted]	[redacted]
385				-	-		-	-	-		
386	**Subtotal DGC Staffing**			**$ -**	**$ -**	**$**	**$ -**	**$ -**	**$ -**	**$**	**$**
387											
388	**Undistributed Subtotal**			**$**	**$**	**$**	**$**	**$ -**	**$**	**$**	**$**
389											
390	**Total**			**$**	**$**	**$**	**$**	**$**	**$**	**$**	**$**

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

	DCE No.[1]		Description	Total (2014$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
1	**Completed Projects - 2015 NDCTP**			**$ 1,236**	**$ 2,663**	**$ 88,707**	**$ (134)**	**$ -**	**$ 1,569**	**$ -**	**$ 94,041**
2											
3	LT-2-D-2 18		Planning & Design For Cold and Dark	1,887	1,008	14,875	1,067	-	1,372	-	20,208
4	LT-2-D-2 19		Implement Cold and Dark (Repower Site)	2,083	412	50,494	(458)	-	1,479	-	54,010
5	LT-2-D-2 20		Install 12 kV Service Line to Power Temp Power Ring	1,535	2,746	4,617	413	-	738	-	10,050
6	LT-2-D-2 21		Drain & De-Energize Non-Essential Systems (DEC Process)	2,343	946	1,288	16	-	1,477	-	6,070
7	LT-2-D-2 29		Implement Control Room Modifications (Command Center Relocation)	-	4	332	3	-	3	-	343
8	**Completed Activities - Initial D&D Activities Subtotal**			**$ 7,849**	**$ 5,116**	**$ 71,606**	**$ 1,041**	**$ -**	**$ 5,069**	**$ -**	**$ 90,680**
9											
10	LT-2-D-2 26		Install Spent Fuel Pool System Modifications - Unit 2	136	2,795	1,125	43	-	126	-	4,225
11	LT-2-D-2 27		Install Spent Fuel Pool System Modifications - Unit 3	136	2,795	1,125	43	-	126	-	4,225
12	**Completed Activities - Spent Fuel Islanding Subtotal**			**$ 272**	**$ 5,589**	**$ 2,251**	**$ 85**	**$ -**	**$ 253**	**$ -**	**$ 8,450**
13											
14	LT-2-D-2 07		Prepare Defueled Safety Analysis Report (DSAR)	1	-	1,946	11	-	20	-	1,978
15	**Completed Activities - Phase 2 Regulatory Compliance Subtotal**			**$ 1**	**$ -**	**$ 1,946**	**$ 11**	**$ -**	**$ 20**	**$ -**	**$ 1,978**
16											
17	LT-2-D-2 22		Select Decommissioning General Contractor (DGC)	1,179	7	11,471	406	-	784	-	13,847
18	**Completed Activities - DCG RFP & Prep Subtotal**			**$ 1,179**	**$ 7**	**$ 11,471**	**$ 406**	**$ -**	**$ 784**	**$ -**	**$ 13,847**
19											
20	LT-2-D-LOED	[2]	Large Organism Exclusion Device Modification	66	1,054	171	(3)	-	49	-	1,337
21	LT-D-SPV	[2]	Special Purpose Vehicle Support	-	-	424	1	-	5	-	430
22	LT-3-D-RecB	[2]	Records Backlog	-	-	1,733	183	-	19	-	1,936
23	LT-3-D-S&S	[2]	Simplification & Streamlining Project	1	6	1,262	50	-	7	-	1,325
24	**Completed Activities - Transition Modifications Subtotal**			**$ 67**	**$ 1,060**	**$ 3,589**	**$ 230**	**$ -**	**$ 81**	**$ -**	**$ 5,027**
25											
26	**Completed Projects And Activities Subtotal**			**$ 10,603**	**$ 14,435**	**$ 179,568**	**$ 1,640**	**$ -**	**$ 7,776**	**$ -**	**$ 214,024**
27											
28	**ISFSI & Fuel Transfer Operations**										
29	SNF-1-D-7 02	[3]	Holtec Long Lead Items and Areva Contract Closure	95	16,219	30,966	(12,666)	-	438	986	36,039
30	SNF-2-D-8 07		ISFSI Pad Study	-	-	199	2	-	2	-	203
31	SNF-2-D-8 08	[4]	Design ISFSI Expansion, Fuel Inspection, and Oversight	1,219	102	72,413	2,808	-	879	3,450	80,871
32	SNF-2-D-8 09		Construct ISFSI Expansion	92	5	42,362	263	-	170	4,061	46,953
33	SNF-2-D-8 10	[5]	Fabrication of Spent Fuel Canisters - Unit 2	24	1,696	25,947	9,012	-	563	305	37,547
34	SNF-2-D-8 11	[5]	Fabrication of Spent Fuel Canisters - Unit 3	23	1,696	18,782	8,943	-	487	508	30,439
35	SNF-2-D-8 12	[6]	Load Fuel Canisters and Fuel Transfer Operations - Unit 2	-	-	16,574	(1)	-	-	2,505	19,078
36	SNF-2-D-8 13	[6]	Load Fuel Canisters and Fuel Transfer Operations - Unit 3	-	-	16,574	-	-	-	2,505	19,079
37	**ISFSI & Fuel Transfer Operations Subtotal**			**$ 1,453**	**$ 19,719**	**$ 223,817**	**$ 8,362**	**$ -**	**$ 2,540**	**$ 14,321**	**$ 270,210**
38											
39	**Decontamination, Demolition, & Disposal**										
40	[redacted]		Prepare Integrated Work Sequence and Schedule for Decommissioning	-	-	[redacted]	-	-	-	[redacted]	[redacted]
41			Modify Containment Access- Unit 2	-	-		-	-	-		
42			Modify Containment Access- Unit 3	-	-		-	-	-		
43			Remove and Dispose of Missile Shields - Unit 2	-	-		-	[redacted]	-		
44			Remove and Dispose of Reactor Head - Unit 2	-	-		-		-		
45			Remove and Dispose of Missile Shields - Unit 3	-	-		-		-		
46			Remove and Dispose of Reactor Head - Unit 3	-	-		-		-		
47			Prepare Activity Specifications - U2	-	-		-	-	-		
48		[2]	Waste Contracts	-	-		-	-	-		
49			Install GARDIAN System	-	-		-	-	-		
50	**Decontamination, Demolition, & Disposal - Initial D&D Activities Subtotal**			**$ -**	**$ -**	**$**	**$ -**	**$**	**$ -**	**$**	**$**

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

	DCE No.[1]	Description	Total (2014$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
51										
52	[redacted]	Design, Specify, and Procure Special Items and Materials		-	-	-	-	-	[redacted]	[redacted]
53		Test Special Cutting and Handling Equipment and Train Operators		-	-	-	-	-		
54		Finalize Internals and Vessel Segmenting Details - Unit 2		-	-	-	-	-		
55		Segment, Package and Dispose of Reactor Internals - Unit 2		-	-	-	[redacted]	-		
56		Segment, Package and Dispose of Reactor Internals - Unit 3		-	-	-		-		
57	**Decontamination, Demolition, & Disposal - Internals and Vessel Segmentation Subtotal**		$	- $	- $	- $	- $	- $		$
58										
59	[redacted]	Remove Underground Diesel Tank - Unit 2		-	-	-	-	-		
60		Remove Underground Diesel Tank - Unit 3		-	-	-	-	-		
61		Remove and Dispose of Spent Fuel Storage Racks - Unit 2		-	-	-	[redacted]	-		
62		Remove and Dispose of Spent Fuel Storage Racks - Unit 3		-	-	-		-		
63		Drain Spent Fuel Pool and Process Liquid Waste - Unit 2		-	-	-	-	-		
64		Drain Spent Fuel Pool and Process Liquid Waste - Unit 3		-	-	-	-	-		
65		Remove Protected Area Security Fencing		-	-	-	-	-		
66	**Decontamination, Demolition, & Disposal - Removal Of Spent Fuel Systems/Equipment Subtotal**		$	- $	- $	- $	[redacted] $	- $		$
67										
68	[redacted]	Remove and Dispose of Steam Generators - Unit 2		-	-	-		-		
69		Remove and Dispose of Steam Generators - Unit 3		-	-	-		-		
70	**Decontamination, Demolition, & Disposal - Steam Generator Removal Subtotal**		$	- $	- $	- $	$	- $		$
71										
72	[redacted]	Upgrade Rail Spur		-	-	-	-	-		
73		Remove, Package and Dispose of Non-Essential Systems - Unit 2		-	-	-	[redacted]	-		
74		Remove, Package and Dispose of Non-Essential Systems - Unit 3		-	-	-		-		
75	**Decontamination, Demolition, & Disposal - Non-Essential System Removal Subtotal**		$	- $	- $	- $	$	- $		$
76										
77	[redacted]	Remove, Package and Dispose of Essential Systems		-	-	-		-		
78		Reactor Vessel Insulation Removal and Disposal - Unit 2		-	-	-		-		
79		Segment, Package and Dispose of Reactor Pressure Vessel - Unit 2		-	-	-		-		
80		Reactor Vessel Insulation Removal and Disposal - Unit 3		-	-	-		-		
81		Segment, Package and Dispose of Reactor Pressure Vessel - Unit 3		-	-	-		-		
82		Remove and Dispose of Pressurizer - Unit 2		-	-	-		-		
83		Remove and Dispose of Pressurizer - Unit 3		-	-	-		-		
84		Remove and Dispose of Turbine Gantry Crane - Unit 2		-	-	-		-		
85		Remove and Dispose of Turbine Gantry Crane - Unit 3		-	-	-		-		
86	**Decontamination, Demolition, & Disposal - Large Component Removal Subtotal**		$	- $	- $	- $	$	- $		$
87										
88	[redacted]	Demolish Service Building (K-10, 20, 30)		-	-	-		-		
89		Demolish South Security Processing Facility (K-70)		-	-	-		-		
90		Demolish South Yard Area Buildings T-10, 20, 60 and Haz Mat		-	-	-		-		
91		Procure Clean Building Demolition Equipment		-	-	-	-	-		
92		Demolish Diesel Generator Building - Unit 3		-	-	-	[redacted]	-		
93		Demolish Diesel Generator Building - Unit 2		-	-	-		-		
94		Demolish Condensate Building and Transformer Pads - Unit 2		-	-	-		-		
95		Demolish Full Flow Area and Turbine Building - Unit 2		-	-	-		-		
96		Demolish AWS Building		-	-	-		-		
97		Demolish Building L-50		-	-	-		-		

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

	DCE No.[1]	Description	Total (2014$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
98		Demolish Maintenance Building 4 (B-64/B-65)	-	-		-		-		
99		Demolish Maintenance Building 5 (B-62/B-63)	-	-		-		-		
100		Demolish Outage Control Center	-	-		-		-		
101		Demolish Maintenance Building 2 (B-49/B-50)	-	-		-		-		
102		Demolish Maintenance Building 1 (B-43/B-44)	-	-		-		-		
103		Demolish Auxiliary Radwaste Building - Common	-	-		-		-		
104		Demolish Auxiliary Control Building - Common	-	-		-		-		
105		Remove Systems and Demolish Make-Up Demineralizer Structures	-	-		-		-		
106		Install Concrete Plugs in Intake and Discharge Structures	-	-		-	-	-		
107		Demolish Intake and Discharge Structures to 3-Feet Below Grade	-	-		-		-		
108	**Decontamination, Demolition, & Disposal - Initial Plant Building Demo Subtotal**		$ -	$ -	$	-	$	-	$	$
109										
110		Decon Containment Building - Unit 3	-	-		-		-		
111		Decon Penetration Building - Unit 3	-	-		-		-		
112		Decon Safety Equipment and MSIV Building - Unit 3	-	-		-		-		
113		Decon Fuel Handling Building - Unit 3	-	-		-		-		
114		Decon Containment Building - Unit 2	-	-		-		-		
115		Decon Penetration Building - Unit 2	-	-		-		-		
116		Decon Safety Equipment and MSIV Building - Unit 2	-	-		-		-		
117		Decon Fuel Handling Building - Unit 2	-	-		-		-		
118		Decon Turbine Building - Unit 2	-	-		-		-		
119		Decon Auxiliary Radwaste Building - Common	-	-		-		-		
120		Decon Auxiliary Control Building - Common	-	-		-		-		
121	**Decontamination, Demolition, & Disposal - Building Decontamination Subtotal**		$ -	$ -	$	-	$	-	$	$
122										
123		Remove Protected Area Pavement	-	-		-		-		
124		Demolish Condensate Building and Transformer Pads - Unit 3	-	-		-		-		
125		Demolish Full Flow Area and Turbine Building - Unit 3	-	-		-		-		
126		Demolish Unit 3 Fuel Handling Building to 3-Feet Below Grade	-	-		-		-		
127		Demolish Penetration Building - Unit 3	-	-		-		-		
128		Demolish Unit 2 Fuel Handling Building to 3-Feet Below Grade	-	-		-		-		
129		Demolish Penetration Building - Unit 2	-	-		-		-		
130	**Decontamination, Demolition, & Disposal - Final Plant Building Demo Subtotal**		$ -	$ -	$	-	$	-	$	$
131										
132	[2]	Offshore Conduit Diffuser and Risers	-	-		-	-	-		
133										
134	[2]	Backfill	-	-		-	-	-		
135										
136		Demolish Staging Warehouse	-	-		-		-		
137		Demolish Administration Building (K-40/50)	-	-		-		-		
138		Detension and Remove Unit 3 Containment Building Tendons	-	-		-		-		
139		Demolish Safety Equipment and MSIV Building - Unit 3	-	-		-		-		
140		Demolish Unit 3 Containment Building to 3-Feet Below Grade	-	-		-		-		
141		Detension and Remove Unit 2 Containment Building Tendons	-	-		-		-		
142		Demolish Safety and MSIV Equipment Building - Unit 2	-	-		-		-		
143		Demolish Unit 2 Containment Building to 3-Feet Below Grade	-	-		-		-		
144	**Decontamination, Demolition, & Disposal - Containment Building Demo Subtotal**		$ -	$ -	$	-	$	-	$	$
145										

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

	DCE No.[1]		Description		Total (2014$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
146	[redacted]		Prepare License Termination Plan		-	-	[redacted]	-	-	-	[redacted]	[redacted]
147			Final Status Survey		-	-		-	[redacted]	-		
148			Subsurface Structure Removal Engineering Planning and Design		-	-		-	-	-		
149	**Decontamination, Demolition, & Disposal - Final Survey/License Termination Subtotal**				$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]
150												
151	[redacted]	[2]	Waste Taxes (Pass Through)		-	-	-	-	[redacted]	-	[redacted]	[redacted]
152		[2]	Waste Taxes (Pass Through)		-	-	-	-		-		
153	**Decontamination, Demolition, & Disposal - Waste Subtotal**				$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]
154												
155	[redacted]				-	-	[redacted]	-	-	-	[redacted]	[redacted]
156												
157	**Decontamination, Demolition, & Disposal Subtotal**				$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]
158												
159	**Other Projects**											
160	SNF-2-D-AM Areva	[2]	Areva ISFSI Relicensing	[7]	-	-	11,763	7	-	-	2,346	14,117
161	SNF-2-D-AM Holtec 1	[2]	Holtec ISFSI I&M Program Development	[7]	-	-	13,964	24	-	3	2,733	16,724
162	SNF-2-D-AM Holtec 2	[2]	Holtec ISFSI Relicensing		-	-	4,686	-	-	-	961	5,647
163	**ISFSI Aging Management Subtotal**				**$ -**	**$ -**	**$ 30,414**	**$ 32**	**$ -**	**$ 3**	**$ 6,040**	**$ 36,489**
164												
165	SNF-2-D-EP Holtec	[2]	Environmental Permitting - Holtec		-	-	2,812	-	-	-	577	3,388
166	SNF-2-D-EP Areva	[2]	Environmental Permitting - Areva		-	-	1,546	-	-	-	317	1,864
167	**Coastal Development Permit Extension Subtotal**				**$ -**	**$ -**	**$ 4,358**	**$ -**	**$ -**	**$ -**	**$ 894**	**$ 5,252**
168												
169	SNF-2-D-GTCC	[2]	GTCC Waste Storage		-	-	21,197	-	-	-	5,435	26,632
170												
171	SR-1-D-14 01		Mesa Site Phase I and II Site Assessment and Lease Surrender	[8]	494	-	6,784	27	-	163	1,075	8,542
172	SR-1-D-14 02		Disposition Hazardous Waste from Mesa Site		113	-	9	-	-	73	-	195
173	SR-1-D-14 03		Mesa Site Characterization Survey		15	-	133	(102)	-	10	-	56
174	SR-2-D-15 02		Obtain Required Permits - Mesa	[9]	-	-	54	26	-	1	-	81
175	SR-2-D-15 09		Mesa Buildings - Demo, Maintenance	[10]	254	42	8,558	62	-	97	524	9,537
176	SR-2-D-15 11		Demolish Mesa Roads and Parking Lots		-	381	554	-	-	-	190	1,125
177	SR-2-D-15 12		Finish Grading and Re-vegetate Mesa Site		-	385	285	-	-	-	135	805
178	**Mesa Site Turnover Subtotal**				**$ 875**	**$ 807**	**$ 16,377**	**$ 14**	**$ -**	**$ 344**	**$ 1,923**	**$ 20,341**
179												
180	LT-3-D-DCE	[2]	DCE Update		-	-	2,046	360	-	-	181	2,588
181	SNF-D-DCE	[2]	DCE Update		-	-	937	-	-	-	144	1,081
182	**DCE Update Subtotal**				**$ -**	**$ -**	**$ 2,983**	**$ 360**	**$ -**	**$ -**	**$ 326**	**$ 3,669**
183												
184	SR-3-D-16 05		Obtain CEQA Permit & Approvals	[11]	902	15	5,573	325	-	414	685	7,914
185	SR-3-D-16 03		Initial Real Estate Authorization Renewal and Plant Easement	[12]	2,231	-	8,836	616	-	607	2,137	14,427
186	SR-D-NEPA 2	[2]	Plant Lease Extension		1,309	-	1,477	43	-	388	660	3,878
187	SR-D-NEPA 3	[2]	Plant Lease Amendment For Final Site Restoration		1,558	-	5,185	52	-	462	1,488	8,745
188	SNF-D-GTCC Disp	[2]	GTCC Disposal		-	-	33,741	-	-	-	6,921	40,662
189	SNF-2-D-CDP	[2]	ISFSI CDP Settlement		-	-	3,508	769	-	-	-	4,277
190	SR-D-RFP	[2]	Substructure Removal Contractor Procurement		4,444	56	-	-	-	1,318	1,193	7,011
191	SNF-1-D-7 05		Cyber Security Modifications		337	670	7,959	81	-	332	-	9,380
192	SNF-D-NIA Sump	[2]	NIA Sump Modifications		-	-	937	-	-	-	144	1,081
193	**Other Projects Subtotal**				**$ 11,657**	**$ 1,549**	**$ 142,546**	**$ 2,293**	**$ -**	**$ 3,868**	**$ 27,845**	**$ 189,758**
194												

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

				Total (2014$)							
	DCE No.[1]	Description		Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
195	**Substructure Removal**										
196	SR-D-BKFL REM	[2] Backfill Removal		3,147	2,608	-	-	-	933	1,698	8,386
197	SR-5-D-18 02	Install Sheet Piling and Excavation Shoring		-	19,594	9,635	-	-	-	7,369	36,599
198	SR-5-D-18 03	Install Dewatering System and Effluent Treatment and Discharge Controls		-	-	-	27,926	-	-	6,981	34,907
199	SR-5-D-18 04	Demolish and Backfill Unit 3 Condensate Storage Area Below -3 Feet		-	280	194	-	533	-	256	1,264
200	SR-5-D-18 05	Demolish and Backfill Unit 3 Diesel Generator Building Below -3 Feet		-	159	111	-	259	-	135	664
201	SR-5-D-18 06	Demolish and Backfill Unit 3 Fuel Handling Building Below -3 Feet		-	431	322	-	879	-	416	2,048
202	SR-5-D-18 07	Demolish and Backfill Unit 3 Radwaste and Control Building Below -3 Feet		-	1,137	995	-	1,705	-	976	4,813
203	SR-5-D-18 08	Demolish and Backfill Unit 3 Turbine Building Structure Below 9 Ft Elevation		-	5,165	4,219	-	7,386	-	4,267	21,037
204	SR-5-D-18 09	Demolish and Backfill Unit 3 Safety Equipment Building Below -3 Feet		-	809	776	-	3,861	-	1,391	6,838
205	SR-5-D-18 10	Demolish and Backfill Unit 3 Penetration Area Below -3 Feet		-	379	303	-	751	-	365	1,798
206	SR-5-D-18 11	Demolish and Backfill Unit 3 Full Flow Building Below -3 Feet		-	143	98	-	240	-	122	603
207	SR-5-D-18 12	Demolish and Backfill Unit 3 Containment Building Below -3 Feet		-	1,719	1,272	-	4,731	-	1,969	9,692
208	SR-5-D-18 13	Demolish and Backfill Unit 2 Condensate Storage Area Below -3 Feet		-	280	194	-	533	-	256	1,264
209	SR-5-D-18 14	Demolish and Backfill Unit 2 Diesel Generator Building Below -3 Feet		-	159	111	-	259	-	135	664
210	SR-5-D-18 15	Demolish and Backfill Unit 2 Fuel Handling Building Below -3 Feet		-	431	322	-	879	-	416	2,048
211	SR-5-D-18 16	Demolish and Backfill Unit 2 Radwaste and Control Building Below -3 Feet		-	1,233	1,030	-	1,705	-	1,009	4,976
212	SR-5-D-18 17	Demolish and Backfill Unit 2 Turbine Building Structure Below 9 Ft Elevation		-	5,165	4,219	-	7,386	-	4,267	21,038
213	SR-5-D-18 18	Demolish and Backfill Unit 2 Safety Equipment Building Below -3 Feet		-	809	776	-	3,861	-	1,391	6,838
214	SR-5-D-18 19	Demolish and Backfill Unit 2 Penetration Area Below -3 Feet		-	379	303	-	751	-	365	1,798
215	SR-5-D-18 20	Demolish and Backfill Unit 2 Full Flow Building Below -3 Feet		-	390	232	-	240	-	219	1,081
216	SR-5-D-18 21	Demolish and Backfill Unit 2 Containment Building Below -3 Feet		-	1,716	1,271	-	4,731	-	1,968	9,686
217	SR-5-D-18 22	Demolish and Backfill Intake Structure Below -3 Feet		-	10,013	7,373	-	23,749	-	10,483	51,618
218	SR-5-D-18 24	Remove Sheet Piling and Excavation Shoring		-	-	11,216	-	-	-	2,876	14,091
219	SR-5-D-18 25	Remove Dewatering System and Effluent Treatment		-	-	-	6,678	-	-	1,669	8,347
220	SR-6-D-19 06	Remove and Stockpile Existing Seawall Erosion Protection		-	10	5	-	-	-	4	20
221	SR-6-D-19 07	Remove Unit 2 and 3 Seawall and Pedestrian Walkway		-	2,914	2,826	(38)	4,606	-	2,618	12,927
222	SR-6-D-19 08	Remove Remaining Intake and Outfall Box Culvert		-	446	210	(18)	2,211	-	725	3,574
223	SR-6-D-19 10	Backfill and Compaction of Excavation		-	2,131	1,401	-	-	-	892	4,424
224	**Substructure Removal Subtotal**			**$ 3,147**	**$ 58,501**	**$ 49,416**	**$ 34,547**	**$ 71,258**	**$ 933**	**$ 55,239**	**$ 273,042**
225											
226	**Offshore Conduit Removal**										
227	SR-3-D-16 01	Hydrogeologic Investigation and Outfall Conduit Survey		-	125	283	100	-	-	129	637
228	SR-5-D-18 23	Remove Off Shore Intake and Outfall Conduits		-	42,198	10,838	(163)	19,788	-	18,334	90,995
229	**Offshore Conduit Removal Subtotal**			**$ -**	**$ 42,323**	**$ 11,121**	**$ (63)**	**$ 19,788**	**$ -**	**$ 18,463**	**$ 91,631**
230											
231	**ISFSI Demolition**										
232	SNF D&D-1-D-12 01	Preparation and NRC Review of License Termination Plan		-	-	111	155	-	-	67	333
233	SNF D&D-2-D-13 01	Install GARDIAN Bulk Assay System		-	-	-	525	-	-	131	656
234	SNF D&D-2-D-13 02	Decon Areva Modules	[13]	-	45	104	-	136	-	72	357
235	SNF D&D-2-D-13 03	Final Status Survey of ISFSI		-	78	488	-	-	-	145	711
236	SNF D&D-2-D-13 04	Clean Demo of Areva ISFSI Pad and Modules	[14]	-	1,009	1,802	-	1,190	-	1,019	5,020
237	SNF D&D-2-D-13 05	Demolish ISFSI Security Building	[15]	-	255	186	-	495	-	238	1,174
238	SNF D&D-2-D-13 06	Restore ISFSI Site		-	492	325	-	-	-	206	1,023
239	SNF D&D-2-D-13 07	Preparation of Final Report on Decommissioning and NRC Review		-	-	52	-	-	-	13	65
240	SNF D&D-2-D-13 08	[2] Clean Demo of Holtec ISFSI Pad and Modules		-	1,871	1,361	-	4,602	-	1,997	9,831
241	**ISFSI Demolition Subtotal**			**$ -**	**$ 3,750**	**$ 4,429**	**$ 680**	**$ 6,423**	**$ -**	**$ 3,889**	**$ 19,171**
242											

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

				Total (2014$)							
	DCE No.[1]		Description	Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
243	**Final Site Restoration**										
244	SR-6-D-19 01		Obtain Required Permits and Approvals	-	19	384	125	-	-	135	663
245	SR-6-D-19 03		Procure Site Restoration Equipment	-	385	-	-	-	-	96	481
246	SR-6-D-19 12		Install Shoreline Erosion Control and Restoration Features	-	137	9	-	-	-	37	182
247	SR-6-D-19 13		Remove Railroad Tracks, Rails and Ballast	-	33	60	-	-	-	24	116
248	SR-6-D-19 14		Remove Gunite Slope Protection	-	348	164	(14)	1,728	-	566	2,793
249	SR-6-D-19 15		Remove Access Roads and Parking Lots	-	173	229	-	-	-	102	503
250	SR-6-D-19 16		Finish Grading and Re-Vegetate Site	-	801	925	-	-	-	438	2,164
251	**Final Site Restoration Subtotal**			**$ -**	**$ 1,897**	**$ 1,772**	**$ 111**	**$ 1,728**	**$ -**	**$ 1,397**	**$ 6,905**
252											
253	**Distributed Subtotal**										
254											
255	**Labor-Staffing**										
256	LT-U-1 01		Utility Staff	147,700	538	95,923	1,316	-	57,551	15,777	318,805
257	SNF-U-2 01		Utility Staff	187,798	394	37,206	1,074	-	65,874	18,060	310,406
258	SR-U-3 01		Utility Staff	41,681	24	57,641	66	-	10,379	10,980	120,770
259	**Utility Staff Subtotal**			**$ 377,179**	**$ 956**	**$ 190,770**	**$ 2,457**	**$ -**	**$ 133,803**	**$ 44,817**	**$ 749,981**
260											
261	LT-U-1 03		Security Force	11,010	4	138	18	-	2,128	577	13,875
262	SNF-U-2 04		Security Force	155,557	58	2,344	45	-	52,636	11,677	222,317
263	**Security Force Subtotal**			**$ 166,567**	**$ 61**	**$ 2,482**	**$ 63**	**$ -**	**$ 54,764**	**$ 12,255**	**$ 236,192**
264											
265	**Labor-Staffing Subtotal**			**$ 543,746**	**$ 1,017**	**$ 193,252**	**$ 2,519**	**$ -**	**$ 188,567**	**$ 57,071**	**$ 986,172**
266											
267	**Non-Labor**										
268	SNF-U-AM Areva	[2]	Areva ISFSI Aging Management	-	-	3,480	-	-	-	535	4,015
269	SNF-U-AM Holtec	[2]	Holtec ISFSI Aging Management	-	-	9,747	-	-	-	1,499	11,247
270	**Aging Management Subtotal**			**$ -**	**$ -**	**$ 13,227**	**$ -**	**$ -**	**$ -**	**$ 2,035**	**$ 15,262**
271											
272	LT-U-1 17		Association Fees and Expenses	-	3	2,253	2,122	-	8	519	4,906
273	SNF-U-2 26	[2]	Association Fees and Expenses	-	-	198	1,767	-	-	296	2,261
274	SR-U-3 17	[2]	Association Fees and Expenses	-	-	451	762	-	-	184	1,397
275	**Association Fees and Expenses Subtotal**			**$ -**	**$ 3**	**$ 2,903**	**$ 4,651**	**$ -**	**$ 8**	**$ 999**	**$ 8,564**
276											
277	LT-U-1 15		Community Engagement Panel	382	63	2,234	4,128	-	156	653	7,615
278	SNF-U-2 25	[2]	Community Engagement Panel	-	-	24	2,345	-	-	356	2,725
279	SR-U-3 21	[2]	Community Engagement Panel	-	-	7	1,858	-	-	280	2,145
280	**Community Engagement Panel Subtotal**			**$ 382**	**$ 63**	**$ 2,265**	**$ 8,332**	**$ -**	**$ 156**	**$ 1,288**	**$ 12,486**
281											

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

				Total (2014$)							
	DCE No.[1]		Description	Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
282	LT-U-1 08		Contracted Services [16]	684	9,499	75,723	7,883	-	75	6,383	100,247
283	SNF-U-2 11		Contracted Services [16]	340	11,309	59,271	17,865	-	155	10,120	99,060
284	SR-U-3 06		Contracted Services [16]	18	732	19,705	2,361	-	17	3,300	26,134
285	SR-U-Bank	[2]	Bank Fees And Interest	-	-	-	(67)	-	-	-	(67)
286	SR-U-Inv Adj	[2]	Vendor Invoice Adjustment	-	-	-	(209)	-	(1)	-	(210)
287	**Contracted Services Subtotal**			**$ 1,042**	**$ 21,540**	**$ 154,700**	**$ 27,833**	**$ -**	**$ 247**	**$ 19,803**	**$ 225,164**
288											
289	LT-U-1 09		DAW Disposal	-	-	20	-	-	-	-	20
290	SNF-U-2 12		DAW Disposal	-	-	10	-	-	-	-	10
291	**DAW Disposal Subtotal**			**$ -**	**$ -**	**$ 30**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 30**
292											
293	LT-U-1 25		Decommissioning Advisor	-	730	6,487	16	-	25	671	7,930
294	SNF-U-2 28	[2]	Decommissioning Advisor	-	-	274	-	-	-	42	316
295	SR-U-3 22	[2]	Decommissioning Advisor	-	-	1,432	-	-	-	220	1,653
296	**Decommissioning Advisor Subtotal**			**$ -**	**$ 730**	**$ 8,193**	**$ 16**	**$ -**	**$ 25**	**$ 934**	**$ 9,899**
297											
298	LT-U-CO	[2]	DGC Executive Oversight Committee	-	-	2,527	-	-	-	389	2,915
299	SR-U-CO	[2]	DGC Executive Oversight Committee	-	-	699	-	-	-	107	806
300	**DGC Executive Oversight Committee Subtotal**			**$ -**	**$ -**	**$ 3,225**	**$ -**	**$ -**	**$ -**	**$ 496**	**$ 3,722**
301											
302	SNF-U-2 09		Emergency Preparedness Fees	-	22	144	43,181	-	89	4,905	48,341
303	**Emergency Preparedness Fees Subtotal**			**$ -**	**$ 22**	**$ 144**	**$ 43,181**	**$ -**	**$ 89**	**$ 4,905**	**$ 48,341**
304											
305	LT-U-1 10		Energy	-	-	-	45,237	-	134	4,577	49,948
306	SNF-U-2 13		Energy	-	-	-	16,421	-	30	1,957	18,409
307	SR-U-3 07		Energy	-	-	-	14,239	-	-	2,136	16,375
308	**Energy Subtotal**			**$ -**	**$ -**	**$ -**	**$ 75,897**	**$ -**	**$ 164**	**$ 8,670**	**$ 84,732**
309											
310	LT-U-1 24		Environmental Permits and Fees	2	-	334	3,317	-	26	79	3,758
311	SNF-U-2 27	[2]	Environmental Permits and Fees	-	-	633	333	-	-	147	1,114
312	SR-U-3 23	[2]	Environmental Permits and Fees	-	-	181	1,403	-	-	238	1,822
313	**Environmental Permits and Fees Subtotal**			**$ 2**	**$ -**	**$ 1,149**	**$ 5,053**	**$ -**	**$ 26**	**$ 465**	**$ 6,695**
314											
315	SNF-U-GW	[2]	Ground Water Monitoring	-	-	319	-	-	-	49	368
316	SR-U-GW	[2]	Ground Water Monitoring	-	-	112	-	-	-	17	130
317	**Ground Water Monitoring Subtotal**			**$ -**	**$ -**	**$ 431**	**$ -**	**$ -**	**$ -**	**$ 66**	**$ 497**
318											
319	LT-U-1 20		Information Technology [17]	2,524	1,547	5,684	5,993	-	1,680	995	18,424
320	SNF-U-2 20		Information Technology [17]	-	960	3,496	374	-	-	738	5,568
321	SR-U-3 15		Information Technology [17]	-	1,605	2,574	624	-	-	730	5,533
322	LT-U-1 21		Telecommunications [18]	1,275	35	137	88	-	815	-	2,350
323	LT-U-1 22		Personal Computers [18]	-	9	9	-	-	-	-	18
324	SNF-U-2 22		Personal Computers [18]	-	7	-	-	-	-	-	7
325	**Information Technology Subtotal**			**$ 3,799**	**$ 4,163**	**$ 11,900**	**$ 7,080**	**$ -**	**$ 2,496**	**$ 2,463**	**$ 31,900**
326											

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

				Total (2014$)							
	DCE No.[1]	Description		Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
327	LT-U-1 05	Insurance		1	-	-	18,675	-	-	1,048	19,723
328	LT-U-1 14	Workers Compensation Insurance	(19)	-	-	-	381	-	-	-	381
329	SNF-U-2 06	Insurance		-	-	-	33,712	-	-	4,835	38,547
330	SR-U-3 04	Insurance		-	-	-	4,358	-	-	654	5,011
331	**Insurance Subtotal**			**$ 1**	**$ -**	**$ -**	**$ 57,126**	**$ -**	**$ -**	**$ 6,536**	**$ 63,663**
332											
333	LT-U-Legal	(2) Third-Party Legal		-	-	8,460	(122)	-	16	1,006	9,359
334	SNF-U-Legal	(2) Third-Party Legal		-	-	9,013	15	-	19	1,076	10,123
335	SR-U-Legal	(2) Third-Party Legal		(802)	-	5,013	7	-	(389)	486	4,315
336	**Third-Party Legal Subtotal**			**$ (802)**	**$ -**	**$ 22,486**	**$ (100)**	**$ -**	**$ (353)**	**$ 2,568**	**$ 23,799**
337											
338	LT-U-1 07	NRC Fees		-	-	4	10,480	-	42	927	11,452
339	SNF-U-2 08	NRC Fees		-	-	28	17,229	-	3	2,474	19,735
340	**NRC Fees Subtotal**			**$ -**	**$ -**	**$ 32**	**$ 27,709**	**$ -**	**$ 45**	**$ 3,401**	**$ 31,187**
341											
342	LT-U-Office	(2) Office Space		-	19	937	-	-	-	147	1,104
343	SNF-U-Office	(2) Office Space		-	343	3	-	-	-	52	397
344	SR-U-Office	(2) Office Space		-	100	35	-	-	-	20	154
345	**Office Space Lease Subtotal**			**$ -**	**$ 461**	**$ 975**	**$ -**	**$ -**	**$ -**	**$ 219**	**$ 1,655**
346											
347	LT-U-1 04	Security Related Expenses		-	160	205	245	-	2	54	667
348	SNF-U-2 05	Security Related Expenses		1	1,847	6,180	1,261	-	10	1,259	10,559
349	SR-U-3 03	Security Related Expenses		2	121	309	114	-	4	16	566
350	**Security Related Expenses Subtotal**			**$ 4**	**$ 2,129**	**$ 6,694**	**$ 1,620**	**$ -**	**$ 16**	**$ 1,329**	**$ 11,792**
351											
352	SR-U-3 11	Severance		102,979	-	1,796	4,018	-	8,329	3,925	121,047
353	**Severance Subtotal**			**$ 102,979**	**$ -**	**$ 1,796**	**$ 4,018**	**$ -**	**$ 8,329**	**$ 3,925**	**$ 121,047**
354											
355	LT-U-1 06	Site Lease and Easement Expenses		1	-	68	3,996	-	-	336	4,401
356	SNF-U-2 07	Site Lease and Easement Expenses		-	-	-	39,974	-	-	5,996	45,970
357	SR-U-3 05	Site Lease and Easement Expenses		2	-	218	41,749	-	-	5,141	47,110
358	**Site Lease and Easement Expenses Subtotal**			**$ 3**	**$ -**	**$ 286**	**$ 85,719**	**$ -**	**$ -**	**$ 11,473**	**$ 97,481**
359											
360	SNF-U-SFL	(2) Loading Spent Fuel & GTCC Waste To DOE		-	-	26,543	-	-	-	4,083	30,626
361	**Loading Spent Fuel & GTCC Waste To DOE Subtotal**			**$ -**	**$ -**	**$ 26,543**	**$ -**	**$ -**	**$ -**	**$ 4,083**	**$ 30,626**
362											
363	LT-U-1 19	Tools and Equipment		-	-	14	34	-	-	-	49
364	**Tools and Equipment Subtotal**			**$ -**	**$ -**	**$ 14**	**$ 34**	**$ -**	**$ -**	**$ -**	**$ 49**
365											
366	LT-U-1 18	Water	(20)	-	-	-	3,773	-	9	419	4,201
367	SNF-U-2 18	Water	(20)	-	-	-	7,975	-	6	1,076	9,056
368	SR-U-3 13	Water	(20)	-	-	-	2,850	-	-	426	3,276
369	**Water Subtotal**			**$ -**	**$ -**	**$ -**	**$ 14,598**	**$ -**	**$ 15**	**$ 1,921**	**$ 16,534**
370											
371	LT-U-1 02	Utility Staff Health Physics Supplies		-	113	970	28	-	8	20	1,139
372	SNF-U-2 02	Utility Staff Health Physics Supplies		-	150	2,192	47	-	12	122	2,524
373	**Utility Staff Health Physics Supplies Subtotal**			**$ -**	**$ 263**	**$ 3,162**	**$ 75**	**$ -**	**$ 20**	**$ 142**	**$ 3,663**
374											
375	**Non-Labor Subtotal**			**$ 107,408**	**$ 29,374**	**$ 260,155**	**$ 362,842**	**$ -**	**$ 11,283**	**$ 77,722**	**$ 848,786**

Appendix C
Table 2
Detailed Cost Table By Cost Type
(2014 Dollars In Thousands, 100% Share)

	DCE No.[1]	Description	Total (2014$) Labor	Material	Contract	Other	Disposal	Overheads	Contingency	Total
376										
377	**Service Level Agreements**									
378	LT-U-SLA	[2] Service Level Agreements	30,319	(9)	2,204	28,976	-	8,542	6,034	76,066
379	SNF-U-SLA	[2] Service Level Agreements	7,435	(8)	1,993	8,847	-	24,284	3,385	45,935
380	SR-U-SLA	[2] Service Level Agreements	9,171	-	127	7,936	-	24,745	4,232	46,211
381	**Service Level Agreements Subtotal**		**$ 46,925**	**$ (17)**	**$ 4,324**	**$ 45,759**	**$ -**	**$ 57,571**	**$ 13,651**	**$ 168,212**
382										
383	**DGC Staffing**									
384	[redacted]		-	-	[redacted]	-	-	-	[redacted]	[redacted]
385	[redacted]		-	-		-	-	-		
386	**Subtotal DGC Staffing**		**$ -**	**$ -**	**$**	**$ -**	**$ -**	**$ -**	**$**	**$**
387										
388	**Undistributed Subtotal**		**$** [redacted]	**$** [redacted]	**$**	**$** [redacted]	**$ -**	**$** [redacted]	**$**	**$**
389										
390	**Total**		**$**	**$**	**$**	**$**	**$**	**$**	**$**	**$**

Notes To Appendix C

Notes:

(1) The DCE line numbers align to the line numbers in Appendix D of the 2014 DCE. The DCE line numbers indicate the corresponding 2014 DCE (1) NRC cost account, (2) 2014 DCE period, (3) cost type (i.e., distributed or undistributed), and (4) line number. For example, "LT-2-D-2.17" in Appendix C of this DCE corresponds to License Termination Period 2 distributed cost line number 2.17 in Appendix D of the 2014 DCE.

(2) These line items were not included in the 2014 DCE, and therefore a new DCE No. has been created.

(3) The description for DCE line number SNF-1-D-7.02 in the 2014 DCE of "Design and Fabricate Spent Fuel Canisters" has been updated to "Holtec Long Lead Items and Areva Contract Closure" to better reflect the associated costs.

(4) The description for DCE line number SNF-2-D-8.08 in the 2014 DCE of "Design ISFSI Expansion" has been updated to "Design ISFSI Expansion, Fuel Inspection, and Oversight" to better reflect the associated costs.

(5) The description for DCE line numbers SNF-2-D-8.10 and SNF-2-D-8.11 in the 2014 DCE of "Purchase and Fabrication of Spent Fuel Canisters and AHSMs" for Units 2 & 3, respectively, have been updated to "Fabrication of Spent Fuel Canisters" to better reflect the associated costs.

(6) The description for DCE line numbers SNF-2-D-8.12 and SNF-2-D-8.13 in the 2014 DCE of "Deliver and Load Spent Fuel Canisters and Transfer to ISFSI" for Units 2 & 3, respectively, have been updated to "Load Fuel Canisters and Fuel Transfer Operations" to better reflect the associated costs.

(7) In Advice Letter 3589-E, Aging Management recorded costs were included in DCE No. SNF-2-D-AM. In the 2017 DCE, Areva and Holtec Aging Management costs are estimated separately, and therefore the Areva and Holtec recorded costs are also shown separately and are included in DCE Nos. SNF-2-D-AM Areva and SNF-2-D-AM Holtec 1.

(8) The description for DCE line number SR-1-D-14.01 in the 2014 DCE of "Mesa Site Phase I and II Site Assessment" has been updated to "Mesa Site Phase I and II Site Assessment and Lease Surrender" to better reflect the associated costs.

(9) The description for DCE line number SR-2-D-15.02 in the 2014 DCE of "Obtain Required Permits For Mesa, South Access and South Yard" has been updated to "Obtain Required Permits - Mesa" to better reflect the associated costs.

(10) The description for DCE line number SR-2-D-15.09 in the 2014 DCE of "Demolish Mesa Buildings" has been updated to "Mesa Buildings - Demo, Maintenance" to better reflect the associated costs.

(11) The description for DCE line number SR-3-D-16.05 in the 2014 DCE of "Obtain Required Permits and Approvals" has been updated to "Obtain CEQA Permit & Approvals" to better reflect the associated costs.

(12) The description for DCE line number SR-3-D-16.03 in the 2014 DCE of "Environmental Impacts Analyses for Lease Termination Activities" has been updated to "Initial Real Estate Authorization Renewal and Plant Easement" to better reflect the associated costs.

(13) The description for DCE line number SNF D&D-2-D-13.02 in the 2014 DCE of "Decon AHSMs" has been updated to "Decon Areva Modules" to better reflect the associated costs.

(14) The description for DCE line number SNF D&D-2-D-13.04 in the 2014 DCE of "Clean Demolition of ISFSI AHSMs and Pad" has been updated to "Clean Demo of Areva ISFSI Pad and Modules" to better reflect the associated costs.

(15) The description for DCE line number SNF D&D-2-D-13.05 in the 2014 DCE of "Clean Demolition of ISFSI Support Structures" has been updated to "Demolish ISFSI Security Building" to better reflect the associated costs.

(16) The description for DCE line numbers LT-U-1.08, SNF-U-2.11, and SR-U-3.06 in the 2014 DCE of "Materials and Services" has been updated to "Contracted Services" to better reflect the associated costs.

(17) The description for DCE line numbers LT-U-1.20, SNF-U-2.20, and SR-U-3.15 in the 2014 DCE of "Non-Process Computers" has been updated to "Information Technology" to better reflect the associated costs.

(18) All estimated (i.e., 2017-2051) undistributed Information Technology costs that are not covered by the IT Service Level Agreement are captured in DCE line items LT-U-1.20, SNF-U-2.20, and SR-U-3.15, "Information Technology," and therefore DCE line items LT-U-1.21, LT-U-1.22, and SNF-U-2.22 for Telecommunications and Personal Computers do not include any estimated costs.

(19) Estimated costs (i.e., 2017-2051) for workers compensation insurance are included in DCE line items LT-U-1.05, SNF-U-2.06, and SR-U-3.04, "Insurance."

(20) The description for DCE line numbers LT-U-1.18, SNF-U-2.18, and SR-U-3.13 in the 2014 DCE of "Utilities (Water, Gas, Phone)" has been updated to "Water" to better reflect the associated costs.

(21) The undistributed DGC staffing costs associated with the fixed price contract are included in the distributed project for Decontamination, Demolition, & Disposal.

Appendix D

Annual Cash Flow Tables By NRC Cost Category

Appendix D
Table 1-A
Annual Cash Flow Table By NRC Cost Category - Unit 2

Nominal / 2017 Dollars in Thousands

Period	Year	License Termination	Spent Fuel Management	Site Restoration	Total
Pd 1 - Initial Activities	2013	$ 40,388	$ 40,591	$ 40,988	$ 121,967
	2014	56,443	39,579	12,731	108,753
	2015	63,557	55,132	25,520	144,209
	2016	43,464	62,700	1,044	107,208
Pd 2 -Transition & Pool Storage	2017	104,155	67,490	4,667	176,313
	2018	61,943	68,965	3,710	134,618
Pd 3	2019	49,280	27,254	9,911	86,445
Pd 4 - D&D and Dry Storage	2020	58,306	15,799	1,847	75,951
	2021	141,012	8,718	2,240	151,971
	2022	153,239	8,077	22,202	183,517
	2023	65,533	5,536	52,406	123,475
	2024	40,938	5,423	32,450	78,811
	2025	31,276	5,344	24,942	61,562
	2026	60,901	5,747	15,901	82,548
	2027	17,045	5,536	41,145	63,726
	2028	19,853	5,678	1,871	27,402
Pd 5 - Dry Storage	2029	-	9,883	1,241	11,124
	2030	-	9,842	-	9,842
	2031	-	10,224	20	10,244
	2032	-	10,528	24	10,552
	2033	-	12,192	18	12,209
	2034	-	12,170	18	12,187
	2035	-	13,401	20	13,422
	2036	-	12,628	-	12,628
	2037	-	11,127	-	11,127
	2038	-	10,971	-	10,971
	2039	-	11,445	-	11,445
	2040	-	11,363	68	11,431
	2041	-	10,905	45	10,950
	2042	-	11,626	43	11,669
	2043	-	11,629	27	11,656
	2044	-	11,041	4,317	15,359
	2045	-	10,440	4,308	14,748
Pd 6 - Civil Works Project	2046	-	8,600	29,378	37,977
	2047	-	7,150	76,564	83,714
	2048	-	8,454	62,150	70,604
	2049	-	35,143	14,931	50,074
Pd 7 - ISFSI Demolition & Final Site Restoration	2050	-	12,763	12,744	25,507
	2051	-	6,125	23,682	29,807
	Total	**$ 1,007,333**	**$ 697,217**	**$ 523,173**	**$ 2,227,722**

Appendix D
Table 1-B
Annual Cash Flow Table By NRC Cost Category - Unit 3

Nominal / 2017 Dollars in Thousands

Period	Year	License Termination	Spent Fuel Management	Site Restoration	Total
Pd 1 - Initial Activities	2013	$ 40,388	$ 40,161	$ 40,988	$ 121,538
	2014	56,270	39,421	12,731	108,422
	2015	63,601	47,813	27,164	138,577
	2016	43,688	65,477	5,157	114,322
Pd 2 -Transition & Pool Storage	2017	99,851	69,885	15,574	185,310
	2018	62,289	70,530	11,543	144,362
Pd 3	2019	52,448	28,927	16,145	97,520
Pd 4 - D&D and Dry Storage	2020	76,967	17,443	5,994	100,404
	2021	122,673	10,562	8,131	141,366
	2022	118,848	9,931	27,672	156,451
	2023	65,340	7,406	55,726	128,472
	2024	46,564	7,293	39,281	93,137
	2025	53,899	7,214	37,747	98,860
	2026	51,797	6,684	23,721	82,202
	2027	23,351	6,473	40,386	70,210
	2028	19,859	6,615	1,895	28,369
Pd 5 - Dry Storage	2029	-	10,908	1,241	12,150
	2030	-	10,811	-	10,811
	2031	-	11,192	834	12,027
	2032	-	11,568	1,011	12,579
	2033	-	13,203	749	13,952
	2034	-	13,174	757	13,930
	2035	-	14,552	867	15,420
	2036	-	13,700	-	13,700
	2037	-	12,199	-	12,199
	2038	-	12,100	-	12,100
	2039	-	12,517	-	12,517
	2040	-	12,435	2,879	15,314
	2041	-	12,034	1,916	13,950
	2042	-	12,698	1,804	14,502
	2043	-	12,701	1,123	13,824
	2044	-	12,688	9,105	21,794
	2045	-	11,972	8,718	20,690
Pd 6 - Civil Works Project	2046	-	9,654	29,648	39,302
	2047	-	8,492	76,834	85,326
	2048	-	9,508	61,774	71,282
	2049	-	36,198	34,134	70,331
Pd 7 - ISFSI Demolition & Final Site Restoration	2050	-	12,763	66,431	79,194
	2051	-	6,125	72,005	78,130
	Total	**$ 997,833**	**$ 735,025**	**$ 741,683**	**$ 2,474,542**

Appendix D
Table 2-A
Annual Cash Flow Table By NRC Cost Category - Unit 2

2014 Dollars in Thousands

Period	Year	License Termination	Spent Fuel Management	Site Restoration	Total
Pd 1 - Initial Activities	2013	$ 40,388	$ 40,591	$ 40,988	$ 121,967
	2014	56,443	39,579	12,731	108,753
	2015	62,388	54,147	25,017	141,552
	2016	41,851	60,067	1,026	102,945
Pd 2 -Transition & Pool Storage	2017	97,798	63,427	4,397	165,622
	2018	58,415	64,919	3,512	126,845
Pd 3					
Pd 4 - D&D and Dry Storage	2019	46,449	25,691	9,376	81,515
	2020	54,947	14,904	1,767	71,617
	2021	132,808	8,224	2,138	143,170
	2022	144,304	7,618	20,915	172,837
	2023	61,728	5,225	49,370	116,323
	2024	38,580	5,120	30,609	74,309
	2025	29,487	5,044	23,539	58,070
	2026	57,385	5,423	15,014	77,822
	2027	16,089	5,226	38,808	60,123
	2028	18,764	5,358	1,787	25,909
Pd 5 - Dry Storage	2029	-	9,361	1,170	10,531
	2030	-	9,325	-	9,325
	2031	-	9,680	19	9,698
	2032	-	9,965	22	9,988
	2033	-	11,534	17	11,550
	2034	-	11,513	17	11,529
	2035	-	12,671	19	12,691
	2036	-	11,946	-	11,946
	2037	-	10,530	-	10,530
	2038	-	10,383	-	10,383
	2039	-	10,835	-	10,835
	2040	-	10,754	64	10,818
	2041	-	10,323	43	10,365
	2042	-	11,004	40	11,044
	2043	-	11,003	25	11,028
	2044	-	10,452	4,057	14,510
	2045	-	9,889	4,049	13,938
Pd 6 - Civil Works Project	2046	-	8,106	27,855	35,962
	2047	-	6,743	72,797	79,540
	2048	-	7,972	58,788	66,760
	2049	-	33,100	14,123	47,223
Pd 7 - ISFSI Demolition & Final Site Restoration	2050	-	12,071	12,050	24,121
	2051	-	5,804	22,433	28,238
	Total	**$ 957,823**	**$ 665,525**	**$ 498,584**	**$ 2,121,932**

Appendix D
Table 2-B
Annual Cash Flow Table By NRC Cost Category - Unit 3

2014 Dollars in Thousands

Period	Year	License Termination	Spent Fuel Management	Site Restoration	Total
Pd 1 - Initial Activities	2013	$ 40,388	$ 40,161	$ 40,988	$ 121,538
	2014	56,270	39,421	12,731	108,422
	2015	62,436	46,872	26,631	135,939
	2016	42,075	63,001	4,981	110,057
Pd 2 -Transition & Pool Storage	2017	93,754	65,719	14,650	174,122
	2018	58,747	66,431	10,886	136,065
Pd 3					
Pd 4 - D&D and Dry Storage	2019	49,431	27,304	15,243	91,978
	2020	72,511	16,489	5,671	94,671
	2021	115,546	9,997	7,703	133,246
	2022	111,934	9,400	26,065	147,399
	2023	61,546	7,022	52,495	121,063
	2024	43,875	6,917	37,039	87,831
	2025	50,781	6,841	35,592	93,213
	2026	48,817	6,323	22,375	77,514
	2027	22,025	6,126	38,094	66,245
	2028	18,770	6,258	1,810	26,839
Pd 5 - Dry Storage	2029	-	10,345	1,170	11,515
	2030	-	10,255	-	10,255
	2031	-	10,610	786	11,396
	2032	-	10,963	952	11,916
	2033	-	12,505	705	13,210
	2034	-	12,477	712	13,189
	2035	-	13,776	816	14,592
	2036	-	12,976	-	12,976
	2037	-	11,560	-	11,560
	2038	-	11,467	-	11,467
	2039	-	11,865	-	11,865
	2040	-	11,784	2,710	14,494
	2041	-	11,407	1,803	13,210
	2042	-	12,034	1,698	13,732
	2043	-	12,033	1,057	13,090
	2044	-	12,023	8,565	20,588
	2045	-	11,351	8,201	19,552
Pd 6 - Civil Works Project	2046	-	9,120	28,115	37,235
	2047	-	8,027	73,056	81,083
	2048	-	8,986	58,430	67,416
	2049	-	34,114	32,373	66,487
Pd 7 - ISFSI Demolition & Final Site Restoration	2050	-	12,071	63,258	75,328
	2051	-	5,804	68,532	74,336
	Total	**$ 948,906**	**$ 701,836**	**$ 705,892**	**$ 2,356,634**

Appendix E

Share Of Liability For SONGS Participants

Appendix E
Share Of Liability For SONGS Participants

Cost Categories	SDG&E	Riverside	Anaheim	SCE
SONGS 1	20%	0%	0%	80%
SONGS 2	20%	1.79%	2.4737%	75.7363%
SONGS 3	20%	1.79%	2.4625%	75.4775%
Common Facilities (Units 2 & 3)	20%	1.79%	2.4681%	75.7419%
SONGS 1 Fuel	20%	0%	0%	80%
SONGS 2/3 Fuel	20%	1.79%	2.3398%	75.8702%
ISFSI Maintenance and D&D	20%	1.6066%	2.2686%	76.1248%
San Diego Switchyard	100%	0%	0%	0%
Edison Switchyard	0%	0%	0%	100%
Interconnection Facilities	50%	0%	0%	50%
Nuclear Fuel Cancellation Charges	20%	1.79%	0%	78.21%

Note:
SDG&E, Riverside, and Anaheim incur additional costs related to oversight activities that are not included in the 2017 DCE.

Appendix C

Reconciliation - Confidential

Southern California Edison
SONGS 2&3 2017 Decommissioning Cost Estimate
Reconciliation Of Kenrich 2017 SONGS 2&3 DCE To SCE Testimony
(2014 Dollars In Millions, 100% Share)

	Description	2017 DCE Kenrich Report (2014 $)	Adjustments (2014 $) DGC Staffing Adjustment	Cold & Dark Adjustment	Non-Labor Adjustment	Other Projects Adjustment	2017 DCE SCE Testimony (2014 $)
1	**Distributed Projects**						
2	ISFSI & Fuel Transfer Operations	$ 270.2	$ -	$ -	$ -	$ -	$ 270.2
3	Final Site Restoration	6.9	-	-	-	-	6.9
4	ISFSI Aging Management	-	-	-	-	36.5	36.5
6	Substructure Removal	273.0	-	-	-	-	273.0
7	Other Projects	189.8	-	-	-	(90.2)	99.6
8	GTCC Waste Storage	-	-	-	-	26.6	26.6
9	Plant Easement/Lease Renewals	-	-	-	-	27.1	27.1
10	Offshore Conduit Removal	91.6	-	-	-	-	91.6
11	ISFSI Demolition	19.2	-	-	-	-	19.2
12	Completed Projects	214.0	-	(90.7)	-	-	123.3
14							
15	**Undistributed Activities**						
16	Contracted Services	$ -	$ -	$ -	$ 225.2	$ -	$ 225.2
17	Service Level Agreements	168.2	-	-	-	-	168.2
19	Labor-Staffing	986.2	-	-	-	-	986.2
20	All Other Non-Labor	848.8	-	-	(225.2)	-	623.6
22							
23	**Total**	**$ 4,478.6**	$ -	$ -	$ -	$ -	**$ 4,478.6**

General Note:
Totals may not reconcile due to rounding.

Appendix D

Declaration of Todd R. Adler Regarding the Confidentiality of Certain Data

SCE's 2018 NUCLEAR DECOMMISSIONING COST TRIENNIAL PROCEEDING

DECLARATION OF TODD R. ADLER

REGARDING THE CONFIDENTIALITY OF CERTAIN DATA

I, Todd R. Adler, declare and state:

1. I am employed by Southern California Edison (SCE) as a Principal Manager for Nuclear Projects Management, San Onofre Nuclear Generating Station (SONGS). In my position as Principal Manager, I have responsibility regarding the Decommissioning General Contractor (DGC) Agreement between SCE, Energy*Solutions* Services, Inc. (Energy*Solutions*), and AECOM Energy & Construction, Inc. (AECOM), dated December 20, 2016 (DGC Agreement). EnergySolutions and AECOM formed a joint venture known as SONGS Decommissioning*Solutions* (SDS). I also am familiar with the Independent Spent Fuel Storage Installation (ISFSI) Agreement between SCE and Holtec International (ISFSI Agreement), dated December 5, 2015. I had responsibility for overseeing and reviewing Exhibits SCE-03 and SCE-05, which contain certain confidential information pertaining to the DGC Agreement and ISFSI Agreement. Thomas J. Palmisano, Vice President of SONGS Decommissioning and Chief Nuclear Officer, delegated authority to me to sign this declaration regarding the confidentiality of this information, as described below.

2. I am making this declaration in accordance with the instructions set forth in Decision 16-08-024 and Decision 17-09-023 of R. 14-11-001, which were issued August 25, 2016, and September 28, 2017, respectively, and govern the submission of confidential documents to the Commission.

3. I have personal knowledge of the facts and representations herein and, if called upon to testify, could and would do so, except for those facts expressly stated to be based upon information and belief, and as to those matters, I believe them to be true.

4. Listed below are the data for which SCE is seeking confidential protection and the basis for SCE's confidentiality request. Paragraphs 5-10 also provide additional reasons supporting SCE's confidentiality claim.

Location of Confidential Data	Pages (if available)	Description of Information that is Confidential	Basis for SCE's Confidentiality Claim
Exhibit SCE-03	8, 14, 20-21, 37-38 Appendix B, DCE, pp. B-9, 18-19, 21, 23, 34-35, 45-47, 49, 60-63, 65, 68-72, 74, 77. Appendix C, p. C-1.	1. DGC Agreement contract terms, including decommissioning plans and pricing terms contained therein. 2. Contingency and cost-estimating information pertaining to the DGC Agreement and ISFSI Agreement.	California Gov. Code § 6255 (the public interest served by not disclosing the information is clearly outweighed by the public interest served by disclosure of the record).
Exhibit SCE-05	34	1. DGC Agreement contract terms, including decommissioning plans and pricing terms contained therein.	California Gov. Code § 6255 (the public interest served by not disclosing the information is clearly outweighed by the public interest served by disclosure of the record).

5. Both the DGC Agreement and ISFSI Agreement require SCE to make reasonable efforts to protect the confidentiality of the terms and conditions in the agreements. The agreements require confidentiality because they contain commercially sensitive pricing terms and proprietary information, such as work sequencing and scope. If this information was publicly disclosed without protection, competitors, including potential vendors for decommissioning sub-contract work and other activities, could mis-use the information to the detriment of SCE's customers. For example, if a vendor seeking to bid on a subcontract or another activity knew the DGC Agreement or ISFSI Agreement pricing terms, the vendor would have an opportunity to adjust its bid prices (e.g., the vendor could bid higher than it otherwise may have bid).

6. Public release of this information could also hinder SCE's ability to obtain favorable contract terms for related decommissioning work not covered under the DGC Agreement and ISFSI Agreement. For example, if a vendor (who SCE has not yet contracted with for SONGS decommissioning) was aware of various terms in the DGC Agreement and ISFSI Agreement, the

vendor could mis-use this information during contract negotiations to extract terms favorable to the vendor that the vendor may not have otherwise sought.

7. Finally, it is also in the best interest of the long-term success of the SONGS decommissioning project that SDS and Holtec remain commercially competitive throughout the terms of the DGC Agreement and ISFSI Agreement, respectively. Both agreements are long-term agreements that will require SDS' and Holtec's continued performance for the next decade and beyond. If information regarding the agreements was disclosed without protection, their competitors could mis-use the information against them during the bidding process for other decommissioning projects across the world and potentially threaten the financial health of both companies. This in turn could threaten the companies' ability to complete contractually required services for SONGS in the future without interruption.

8. The other category of information that SCE seeks to maintain as confidential is contingency. SCE has applied various contingency amounts on the remaining decommissioning work identified in the 2017 SONGS 2&3 decommissioning cost estimate (DCE) submitted in this proceeding, including work to be completed under the DGC Agreement and ISFSI Agreement. The contingency reflects SCE's judgment of potential costs, based on the technical complexity, contracting status, estimating approach, and timing, of the remaining work scope. It is in SCE customers' interest for contingency included for the DGC Agreement and ISFSI Agreement to be protected as confidential, because the disclosure of the information without protection could allow vendors to mis-use the information to the detriment of SCE's customers. For example, if a vendor (including SDS, Holtec, or one of their competitors) knew the contingency SCE has applied in the 2017 DCE to work to be completed under the DGC Agreement and ISFSI Agreement, the vendor would have an opportunity to manipulate its negotiating strategy pertaining to new contracts and/or change orders regarding that work (e.g., the vendor could demand higher prices than it otherwise would have demanded).

9. The confidential information identified in Paragraph 4 cannot be provided in a form that can be further aggregated, redacted, summarized, masked, or otherwise protected in a manner that would allow partial disclosure of the data while protecting confidential information.

10. For the reasons described above, the confidential information should be protected from public disclosure. Information regarding the DGC Agreement and ISFSI Agreement, including the pricing terms of those agreements and contingency SCE applied in the 2017 DCE for work remaining under those agreements, is market sensitive information that should remain confidential under GO-66-C Section 2.2(b) ("unfair business advantage") and GO 66-C Section 2.8 ("Information obtained in confidence from other than a business regulated by this Commission where the disclosure would be against the public interest").

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on March 13, 2018 at San Onofre Nuclear Generating Station, near San Clemente, California.

/s/ Todd R. Adler
Todd R. Adler

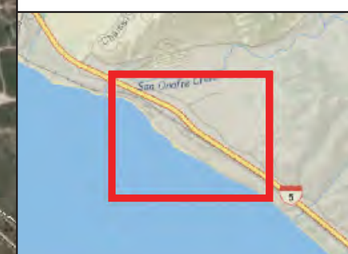
Appendix E

SONGS Mesa Lease and Station Easement Boundaries

SONGS

Mesa Lease and Station Easement Boundaries

- Parcel 5
- Parcel 6
- Parcel 7
- Parcels 8 and 9
- Plant Site



0 0.05 0.1 0.2 Miles

1 in = 0.1 miles

Date: 3/12/2018
File Name: SONGS_ParcelMap_bw.mxd
Version #: 03
Created By: E. Garcia
Real Properties Geospatial Analysis

Features depicted herein are planning level accuracy, and intended for informational purposes only. Distances and locations may be distorted at this scale. Always consult with the proper legal documents
or agencies regarding such features. Real Properties Department
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EXHIBIT 20

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Al Bates
Manager, Regulatory Affairs &
Oversight

10 CFR 50.82
10 CFR 72.30

March 20, 2018

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

Subject: **Docket Nos. 50-206, 50-361, 50-362, and 72-41**
10 CFR 50.82(a)(8)(v-vii) and 10 CFR 72.30(c)
Decommissioning Funding Status Report
San Onofre Nuclear Generating Station Units 1, 2, and 3
and Independent Spent Fuel Storage Installation

Dear Sir or Madam:

As required by 10 CFR 50.82(a)(8)(v), 10 CFR 50.82(a)(8)(vii), and 10 CFR 72.30(c), this letter provides the status of the decommissioning funding for San Onofre Nuclear Generating Station (San Onofre) Units 1, 2, and 3 and the San Onofre Independent Spent Fuel Storage Installation (ISFSI) as of December 31, 2017

Based on the requirements in 10 CFR 50.82(a)(8)(v) and 10 CFR 50.82(a)(8)(vii), this information is reported on an annual basis for SONGS Units 1, 2, and 3 because the units were permanently shut down and site-specific decommissioning cost estimates (DCEs) have been submitted for each of these units. In addition, based on the requirements in 10 CFR 72.30(c), information demonstrating the adequacy of funding for the San Onofre ISFSI is reported at intervals not to exceed three years, and is included. The required information for Southern California Edison, San Diego Gas & Electric, the City of Anaheim, and the City of Riverside is provided in the Enclosure.

There are no commitments contained in this letter or its enclosure.

If you have any questions regarding this matter, please contact me at (949) 368-6945.

Sincerely,

A001
NMSS01
NMSS26
NRR
NMSS

Enclosure: San Onofre Nuclear Generating Station Units 1, 2, and 3 and ISFSI Decommissioning Funding Status Report for Calendar Year 2017

cc: K. Kennedy, Regional Administrator, NRC Region IV
M. G. Vaaler, NRC Project Manager, San Onofre Units 1, 2, and 3
W. C. Allen, NRC Project Manager, San Onofre ISFSI

Enclosure

San Onofre Nuclear Generating Station Units 1, 2, and 3 and Independent Spent Fuel Storage Installation (ISFSI) Decommissioning Funding Status Report for Calendar Year 2017

San Onofre Nuclear Generating Station Units 1, 2, and 3
and Independent Spent Fuel Storage Installation (ISFSI)
Decommissioning Funding Status Report
For Calendar Year 2017

San Onofre Unit 1 was a pressurized water reactor (PWR) rated at 1347 MWt. San Onofre Units 2 and 3 were pressurized water reactors (PWR) rated at 3438 MWt. Provided below is the information required by 10 CFR 50.82(a)(8)(v) and (vii) for San Onofre Units 1, 2, and 3; and the information required by 10 CFR 72.30(b) for the San Onofre ISFSI. This information is reported every year for San Onofre Units 1, 2, and 3 because site-specific decommissioning cost estimates (DCEs) have been submitted for them and they are currently being decommissioned.

The San Onofre ISFSI is located on the partially decommissioned site of San Onofre Unit 1, and is operated under a 10 CFR 72 General License issued to the holders of a 10 CFR 50 license.

The SONGS Unit 1 co-owners are reported as follows:

Southern California Edison (SCE)	80.00 %
San Diego Gas & Electric (SDG&E)	20.00 %
	100.00 %

The San Onofre Units 2 and 3 co-owners are reported as follows:

Southern California Edison (SCE)	78.21 %
San Diego Gas & Electric (SDG&E)	20.00 %
City of Anaheim (Anaheim)	0.00 %
City of Riverside (Riverside)	1.79 %

The decommissioning liability is shared between the current owners and former owner, Anaheim, as set forth below for each unit:

Owner	Unit 1 Decommissioning Liability	Unit 2 Decommissioning Liability	Unit 3 Decommissioning Liability
SCE	80.00%	75.7363%	75.7475%
SDG&E	20.00%	20.0000%	20.0000%
Anaheim	0.00%	2.4737%	2.4625%
Riverside	0.00%	1.7900%	1.7900%

All dollar amounts are in 100% share, 2017 dollars.

1) The estimated costs to decommission San Onofre Units 1, 2, and 3, and the San Onofre ISFSI, including all decommissioning and spent fuel storage costs estimated to be required pursuant to 10 CFR 50.75(b) and (c); 10 CFR 50.54(bb); and 10 CFR 72.30(b) are shown below:

The site-specific estimates for decommissioning include the following radiological decommissioning costs associated with terminating the site license pursuant to 10 CFR 50.75(b); non-radiological site restoration costs; spent fuel storage costs pursuant to 10 CFR 50.54(bb); and ISFSI decommissioning costs pursuant to 10 CFR 72.30(b):

	San Onofre Unit 1[1]
Estimate of License Termination Costs	$ 76.8 million
Less: Lic. Term. Costs during 2017	$ 1.3 million
"To Go" License Termination Costs	$ 75.5 million
Estimate of Site Restoration Costs	$ 92.6 million
Less: Site Restor. Costs during 2017	$ 0.3 million
"To Go" Site Restoration Costs	$ 92.3 million
Estimate of Fuel Storage Costs	$ 46.0 million
Less: Fuel Storage Costs during 2017	$ 0.4 million
"To Go" Fuel Storage Costs	$ 45.6 million
Estimate of ISFSI Decommissioning Costs	$ 5.3 million
Total Unit 1 "To Go" Costs as of 1/1/2018	$ 218.7 million

	San Onofre Unit 2[2]
Estimate of License Termination Costs	$1,017.0 million
Less: Lic. Term. Costs through 12/31/2017	$ 305.2 million
"To Go" License Termination Costs	$ 711.8 million
Estimate of Site Restoration Costs	$ 527.8 million
Less: Site Restor. Costs through 12/31/2017	$ 90.5 million
"To Go" Site Restoration Costs	$ 437.3 million
Estimate of Fuel Storage Costs	$ 687.0 million
Less: Fuel Storage Costs through 12/31/2017	$ 259.0 million
"To Go" Fuel Storage Costs	$ 428.0 million
Estimate of ISFSI Decommissioning Costs	$ 18.9 million
Total Unit 2 "To Go" Costs as of 1/1/2018	$1,596.0 million

	San Onofre Unit 3[2]
Estimate of License Termination Costs	$1,007.5 million
Less: Lic. Term. Costs through 12/31/2017	$ 302.5 million
"To Go" License Termination Costs	$ 705.0 million
Estimate of Site Restoration Costs	$ 746.6 million
Less: Site Restor. Costs through 12/31/2017	$ 102.2 million
"To Go" Site Restoration Costs	$ 644.4 million
Estimate of Fuel Storage Costs	$ 724.6 million
Less: Fuel Storage Costs through 12/31/2017	$ 254.7 million
"To Go" Fuel Storage Costs	$ 469.9 million
Estimate of ISFSI Decommissioning Costs	$ 18.9 million
Total Unit 3 "To Go" Costs as of 1/1/2018	$1,838.2 million

The site-specific decommissioning cost estimates for San Onofre Units 1, 2, and 3 and the San Onofre ISFSI include: (1) the cost to perform all decommissioning activities; (2) the cost of meeting the 10 CFR 20.1402 radiological criteria for unrestricted site use; and (3) adequate contingency factors for all costs.

2) Each San Onofre co-owner has established one or more external sinking trust fund accounts as provided in 10 CFR 50.75(e)(1)(ii) for their respective shares of the San Onofre Units 1, 2, and 3 decommissioning obligation, which also includes the San Onofre ISFSI. The Decommissioning Trust Fund amounts remaining at the end of calendar year 2017 (net of pending Trust Fund withdrawals and estimated capital gains taxes) are:[3][4][5]

Co-Owner	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
SCE	$ 303.5 million	$ 1,180.4 million	$ 1,370.9 million
SDG&E [5]	$ 150.5 million	$ 357.5 million	$ 412.5 million
Anaheim [5]	N/A	$ 52.2 million	$ 52.2 million
Riverside [5]	N/A	$ 27.9 million	$ 30.8 million
TOTAL	$ 454.0 million	$ 1,618.0 million	$ 1,866.4 million

3) Each San Onofre co-owner deposits its decommissioning fund contributions into their respective external sinking fund accounts as provided in 10 CFR 50.75(e)(1)(ii). The annual amounts projected to be collected in 2018 are:

Co-Owner	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
SCE	$ 0.0 million	$ 0.0 million	$ 0.0 million
SDG&E [5]	$ 0.0 million	$ 0.0 million	$ 0.0 million
Anaheim [5]	N/A	$ 0.0 million	$ 0.0 million
Riverside [5]	N/A	$ 0.0 million	$ 0.0 million
TOTAL	$ 0.0 million	$ 0.0 million	$ 0.0 million

4) The amounts spent on San Onofre Units 1, 2, and 3 decommissioning work performed during 2017 are summarized below:

Cost Category	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
License Term.	$ 1.5 million	$ 91.7 million	$ 88.9 million
Site Restoration	$ 0.9 million	$ 5.5 million	$ 11.3 million
Spent Fuel Storage	$ 0.6 million	$ 52.3 million	$ 53.3 million
ISFSI Decom.	$ 0.0 million	$ 0.0 million	$ 0.0 million
TOTAL	$ 3.0 million	$ 149.5 million	$ 153.5 million

5) The composite escalation rate and after tax investment rates of return for San Onofre Units 1, 2, and 3 Decommissioning are summarized below:

Composite Rate	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
Rate of Return	3.17%	3.32%	3.32%
Escalation	2.69%	2.91%	2.91%
Real Earnings Rate	0.48%	0.41%	0.41%

The composite investment rates of return less the composite escalation rates yield composite real earnings rates less than the 2% real rate of return allowed under 10 CFR 50.75(e)(1)(ii).

6) None of the co-owners of San Onofre Units 1, 2, and 3 or the San Onofre ISFSI is relying on any contracts for the purposes of providing decommissioning funding pursuant to 10 CFR 50.75(e)(1)(v). There have been no modifications to the method of providing financial assurance.

7) The amounts of decommissioning funds available as of December 31, 2017 for San Onofre Units 1, 2, and 3 License Termination, Site Restoration, Spent (Irradiated) Fuel Management, and ISFSI Decommissioning costs are shown in the tables below:[4]

San Onofre Unit 1	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2017 Net Trust Balance
License Termination Costs	$ 75.5 million	34.5%	$ 156.7 million
Site Restoration Costs	$ 92.3 million	42.2%	$ 191.7 million
Spent Fuel Management Costs	$ 45.6 million	20.8%	$ 94.6 million
ISFSI Decommissioning Costs	$ 5.3 million	2.4%	$ 11.0 million
TOTAL	$ 218.7 million	100.0%	$ 454.0 million

San Onofre Unit 2	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2017 Net Trust Balance
License Termination Costs	$ 711.8 million	44.6%	$ 721.6 million
Site Restoration Costs	$ 437.4 million	27.4%	$ 443.4 million
Spent Fuel Management Costs	$ 428.0 million	26.8%	$ 433.9 million
ISFSI Decommissioning Costs	$ 18.8 million	1.2%	$ 19.1 million
TOTAL	$ 1,596.0 million	100.0%	$ 1,618.0 million

San Onofre Unit 3	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2017 Net Trust Balance
License Termination Costs	$ 705.0 million	38.4%	$ 715.8 million
Site Restoration Costs	$ 644.4 million	35.0%	$ 654.2 million
Spent Fuel Management Costs	$ 469.9 million	25.6%	$ 477.2 million
ISFSI Decommissioning Costs	$ 18.9 million	1.0%	$ 19.2 million
TOTAL	$ 1,838.2 million	100.0%	$ 1,866.4 million

8) Key assumptions pertaining to spent fuel storage and ISFSI decommissioning:

San Onofre Unit 1:

- Permanently retired on November 30, 1992
- 395 fuel assemblies in 17 canisters are located in the SONGS ISFSI
- 1 canister of Greater Than Class C (GTCC) waste is located in the SONGS ISFSI
- The U.S. Department of Energy (DOE) will commence transporting spent fuel assemblies in 2028[6]
- DOE will remove last SONGS Unit 1 fuel from the ISFSI by 2034

San Onofre Unit 2:

- Permanently ceased operations on June 7, 2013
- 408 fuel assemblies in 17 canisters are currently located in the SONGS ISFSI
- Transfer of the remaining 1,318 fuel assemblies from the spent fuel pool to the SONGS ISFSI commenced in January 2018 and is scheduled to be completed by mid-2019
- Greater Than Class C (GTCC) waste will be placed in the SONGS ISFSI per schedule to be developed by Decommissioning General Contractor
- DOE will commence transporting spent fuel assemblies in 2028[6]
- DOE will remove last SONGS Units 2 & 3 fuel from the ISFSI by 2049

San Onofre Unit 3:

- Permanently ceased operations on June 7, 2013
- 384 fuel assemblies in 16 canisters are currently located in the SONGS ISFSI
- Transfer of the remaining 1,350 fuel assemblies from the spent fuel pool to the SONGS ISFSI commenced in January 2018 and is scheduled to be completed by mid-2019
- Greater Than Class C (GTCC) waste will be placed in the SONGS ISFSI per schedule to be developed by Decommissioning General Contractor
- DOE will commence transporting spent fuel assemblies in 2028[6]
- DOE will remove last SONGS Units 2 & 3 fuel from the ISFSI by 2049

San Onofre ISFSI:

- The San Onofre ISFSI will be decommissioned and the remaining plant and ISFSI site will be decontaminated to meet 10 CFR 20.1402 site release criteria for unrestricted use as required to terminate the Part 50 General License by 2051.

Notes:

(1) The new site-specific decommissioning cost estimate for San Onofre Unit 1 that was submitted to the California Public Utilities Commission (CPUC) on March 15, 2018, includes the radiological costs associated with terminating the site license, non-radiological costs, and fuel storage costs.

(2) The new site-specific decommissioning cost estimate for San Onofre Units 2 and 3 that was submitted to the CPUC on March 15, 2018 includes the radiological costs associated with terminating the site license, non-radiological costs, and fuel storage costs.

(3) During the period between June 7, 2013 and December 31, 2017, SCE incurred costs of $654.8 million for San Onofre Unit 2 and $659.4 million for San Onofre Unit 3 (100% share, 2017$). Some of the San Onofre decommissioning co-owners have not yet withdrawn funds for all or part of these costs from their Decommissioning Trusts. Therefore, the Net Balances are the differences between the December 31, 2017 Decommissioning Trust Balances and the 2013-2017 incurred or accrued costs.

(4) Pursuant to 10 CFR 72.30(e)(5), power reactor licensees are authorized to use the financial assurance methods provided for in 10 CFR 50.75(e). All four San Onofre co-owners recover the cost of decommissioning pursuant to cost-of-service rate regulation and, therefore, are eligible to provide assurance using the external sinking fund method provided for in 10 CFR 50.75(e)(1)(ii). To the extent the decommissioning costs are fully funded and annual deposits are no longer required, the Co-Participants provide assurance using the prepayment method provided for in 10 CFR 50.75(e)(1)(i).

SCE and SDG&E are also required to accumulate sufficient funds to decommission the SONGS facility under the California Nuclear Facilities Decommissioning Act, CA Public Utilities Code Section 8321, et seq. The CPUC has construed the SONGS decommissioning obligation to include: (1) radiological decommissioning as required to terminate the NRC licenses, (2) spent fuel storage (including ISFSI decommissioning), and (3) site restoration as required to terminate the SONGS site lease contracts granted by the U.S. Department of the Navy and the California State Lands Commission.

Under CA Public Utilities Code Section 8326(a)(2), SCE and SDG&E are required to update their site-specific nuclear facility decommissioning cost estimates periodically to reflect changes in decommissioning regulation, technology, and economics, for the purpose of adjusting contribution levels to their decommissioning trust.

Under CA Public Utilities Code Sections 8326(b), 8327, 8328, and 8329, the CPUC periodically reviews SCE and SDG&E's site-specific decommissioning cost estimates for the purpose of considering changes in electrical rates to ensure that sufficient funds will be available for payment of all decommissioning costs. The Cities of Anaheim and Riverside are not under the jurisdiction of the CPUC.

(5) SCE is submitting information with respect to the San Onofre co-owners, SDG&E, Anaheim, and Riverside, on their behalf, and they are responsible for the completeness and accuracy of their respective information.

(6) The current site-specific decommissioning cost estimates for San Onofre Unit 1 and for San Onofre Units 2 and 3 assume that the DOE will commence transporting spent fuel assemblies in 2028. This assumption may be updated periodically due to the ongoing uncertainties regarding the availability of a permanent repository for spent fuel.

EXHIBIT 21

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Al Bates
Manager, Regulatory Affairs & Oversight

10 CFR 50.82
10 CFR 72.30

March 14, 2019

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

Subject: **Docket Nos. 50-206, 50-361, 50-362, and 72-41**
10 CFR 50.82(a)(8)(v-vii) and 10 CFR 72.30(c)
Decommissioning Funding Status Report 2018
San Onofre Nuclear Generating Station Units 1, 2, and 3
and Independent Spent Fuel Storage Installation

Dear Sir or Madam:

As required by 10 CFR 50.82(a)(8)(v), 10 CFR 50.82(a)(8)(vii), and 10 CFR 72.30(c), this letter provides the status of the decommissioning funding for San Onofre Nuclear Generating Station (San Onofre) Units 1, 2, and 3 and the San Onofre Independent Spent Fuel Storage Installation (ISFSI) as of December 31, 2018.

Based on the requirements in 10 CFR 50.82(a)(8)(v) and 10 CFR 50.82(a)(8)(vii), this information is reported on an annual basis for SONGS Units 1, 2, and 3 because the units were permanently shut down and site-specific decommissioning cost estimates (DCEs) have been submitted for each of these units. In addition, based on the requirements in 10 CFR 72.30(c), information demonstrating the adequacy of funding for the San Onofre ISFSI is reported at intervals not to exceed three years, and is included. The required information for Southern California Edison, San Diego Gas & Electric, the City of Anaheim, and the City of Riverside is provided in the Enclosure.

There are no commitments contained in this letter or its enclosure.

If you have any questions regarding this matter, please contact me at (949) 368-6945.

Sincerely,

ADD1
NMSS01
NMSS26
NRR
NMSS

Enclosure: San Onofre Nuclear Generating Station Units 1, 2, and 3 and ISFSI Decommissioning Funding Status Report for Calendar Year 2018

cc: S. Morris, Regional Administrator, NRC Region IV
M. G. Vaaler, NRC Project Manager, San Onofre Units 1, 2, and 3

Enclosure

San Onofre Nuclear Generating Station Units 1, 2, and 3 and Independent Spent Fuel Storage Installation (ISFSI) Decommissioning Funding Status Report for Calendar Year 2018

San Onofre Nuclear Generating Station Units 1, 2, and 3
and Independent Spent Fuel Storage Installation (ISFSI)
Decommissioning Funding Status Report
For Calendar Year 2018

San Onofre Unit 1 was a pressurized water reactor (PWR) rated at 1347 MWt. San Onofre Units 2 and 3 were pressurized water reactors (PWR) rated at 3438 MWt. Provided below is the information required by 10 CFR 50.82(a)(8)(v) and (vii) for San Onofre Units 1, 2, and 3; and the information required by 10 CFR 72.30(b) for the San Onofre ISFSI. This information is reported every year for San Onofre Units 1, 2, and 3 because they are permanently shut down and site-specific decommissioning cost estimates (DCEs) have been submitted for them.

The San Onofre ISFSI is located on the partially decommissioned site of San Onofre Unit 1, and is operated under a 10 CFR 72 General License issued to the holders of a 10 CFR 50 license.

The SONGS Unit 1 co-owners are reported as follows:

Southern California Edison (SCE)	80.00 %
San Diego Gas & Electric (SDG&E)	20.00 %
	100.00 %

The San Onofre Units 2 and 3 co-owners are reported as follows:

Southern California Edison (SCE)	78.21 %
San Diego Gas & Electric (SDG&E)	20.00 %
City of Anaheim (Anaheim)	0.00 %
City of Riverside (Riverside)	1.79 %

The decommissioning liability is shared between the current owners and former owner, Anaheim, as set forth below for each unit:

Owner	Unit 1 Decommissioning Liability	Unit 2 Decommissioning Liability	Unit 3 Decommissioning Liability
SCE	80.00%	75.7363%	75.7475%
SDG&E	20.00%	20.0000%	20.0000%
Anaheim	0.00%	2.4737%	2.4625%
Riverside	0.00%	1.7900%	1.7900%

All dollar amounts are in 100% share, 2018 dollars.

1) The estimated costs to decommission San Onofre Units 1, 2, and 3, and the San Onofre ISFSI, including all decommissioning and spent fuel storage costs estimated to be required pursuant to 10 CFR 50.75(b) and (c); 10 CFR 50.54(bb); and 10 CFR 72.30(b) are shown below:

The site-specific estimates for decommissioning include the following radiological decommissioning costs associated with terminating the site license pursuant to 10 CFR 50.75(b); non-radiological site restoration costs; spent fuel storage costs pursuant to 10 CFR 50.54(bb); and ISFSI decommissioning costs pursuant to 10 CFR 72.30(b):

	San Onofre Unit 1[1]
Estimate of License Termination Costs	$ 78.8 million
Less: Lic. Term. Costs during 2018	$ 1.5 million
"To Go" License Termination Costs	$ 77.3 million
Estimate of Fuel Storage Costs	$ 47.2 million
Less: Fuel Storage Costs during 2018	$ 2.3 million
"To Go" Fuel Storage Costs	$ 44.9 million
Estimate of ISFSI Decommissioning Costs	$ 5.4 million
Estimate of Site Restoration Costs	$ 94.7 million
Less: Site Restor. Costs during 2018	$ 0.4 million
"To Go" Site Restoration Costs	$ 94.3 million
Total Unit 1 "To Go" Costs as of 1/1/2019	$ 221.9 million

	San Onofre Unit 2[2]
Estimate of License Termination Costs	$1,045.0 million
Less: Lic. Term. Costs through 12/31/2018	$ 345.7 million
"To Go" License Termination Costs	$ 699.3 million
Estimate of Fuel Storage Costs	$ 705.7 million
Less: Fuel Storage Costs through 12/31/2018	$ 314.8 million
"To Go" Fuel Storage Costs	$ 390.9 million
Estimate of ISFSI Decommissioning Costs	$ 19.4 million
Estimate of Site Restoration Costs	$ 541.7 million
Less: Site Restor. Costs through 12/31/2018	$ 99.9 million
"To Go" Site Restoration Costs	$ 441.8 million
Total Unit 2 "To Go" Costs as of 1/1/2019	$1,551.4 million

	San Onofre Unit 3[2]
Estimate of License Termination Costs	$1,035.2 million
Less: Lic. Term. Costs through 12/31/2018	$ 346.4 million
"To Go" License Termination Costs	$ 688.8 million
Estimate of Fuel Storage Costs	$ 743.8 million
Less: Fuel Storage Costs through 12/31/2018	$ 312.0 million
"To Go" Fuel Storage Costs	$ 431.8 million
Estimate of ISFSI Decommissioning Costs	$ 19.4 million
Estimate of Site Restoration Costs	$ 765.7 million
Less: Site Restor. Costs through 12/31/2018	$ 114.7 million
"To Go" Site Restoration Costs	$ 651.0 million
Total Unit 3 "To Go" Costs as of 1/1/2019	$1,791.0 million

The site-specific decommissioning cost estimates for San Onofre Units 1, 2, and 3 and the San Onofre ISFSI include: (1) the cost to perform all decommissioning activities; (2) the cost of meeting the 10 CFR 20.1402 radiological criteria for unrestricted site use; and (3) adequate contingency factors for all costs.

2) Each San Onofre co-owner has established one or more external sinking trust fund accounts as provided in 10 CFR 50.75(e)(1)(ii) for their respective shares of the San Onofre Units 1, 2, and 3 decommissioning obligation, which also includes the San Onofre ISFSI. The Decommissioning Trust Fund amounts remaining at the end of calendar year 2018 (net of pending Trust Fund withdrawals and estimated capital gains taxes) are:[3][4][5]

Co-Owner	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
SCE	$ 289.4 million	$ 1,085.6 million	$ 1,267.5 million
SDG&E [5]	$ 149.3 million	$ 333.9 million	$ 387.5 million
Anaheim [5]	N/A	$ 51.4 million	$ 51.4 million
Riverside [5]	N/A	$ 26.9 million	$ 29.8 million
TOTAL	$ 438.7 million	$ 1,497.8 million	$ 1,736.2 million

3) Each San Onofre co-owner deposits its decommissioning fund contributions into their respective external sinking fund accounts as provided in 10 CFR 50.75(e)(1)(ii). The annual amounts projected to be collected in 2018 are:

Co-Owner	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
SCE	$ 0.0 million	$ 0.0 million	$ 0.0 million
SDG&E [5]	$ 0.0 million	$ 0.0 million	$ 0.0 million
Anaheim [5]	N/A	$ 0.0 million	$ 0.0 million
Riverside [5]	N/A	$ 0.0 million	$ 0.0 million
TOTAL	$ 0.0 million	$ 0.0 million	$ 0.0 million

4) The amounts spent on San Onofre Units 1, 2, and 3 decommissioning work performed during 2018 are summarized below:

Cost Category	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
License Term.	$ 0.1 million	$ 32.0 million	$ 35.4 million
Spent Fuel Storage	$ 1.8 million	$ 48.4 million	$ 50.2 million
ISFSI Decom.	$ 0.0 million	$ 0.0 million	$ 0.0 million
Site Restoration	$ 0.2 million	$ 6.7 million	$ 9.6 million
TOTAL	$ 2.1 million	$ 87.1 million	$ 95.2 million

5) The composite escalation rate and after tax investment rates of return for San Onofre Units 1, 2, and 3 Decommissioning are summarized below:

Composite Rate	San Onofre Unit 1	San Onofre Unit 2	San Onofre Unit 3
Rate of Return	2.95%	3.04%	3.04%
Escalation	2.69%	2.92%	2.92%
Real Earnings Rate	0.26%	0.12%	0.12%

The composite investment rates of return less the composite escalation rates yield composite real earnings rates less than the 2% real rate of return allowed under 10 CFR 50.75(e)(1)(ii).

6) None of the co-owners of San Onofre Units 1, 2, and 3 or the San Onofre ISFSI is relying on any contracts for the purposes of providing decommissioning funding pursuant to 10 CFR 50.75(e)(1)(v). There have been no modifications to the method of providing financial assurance.

7) The amounts of decommissioning funds available as of December 31, 2018 for San Onofre Units 1, 2, and 3 License Termination, Site Restoration, Spent Fuel Management, and ISFSI Decommissioning costs are shown in the tables below:[4]

San Onofre Unit 1	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2018 Net Trust Balance
License Termination Costs	$ 77.3 million	34.8%	$ 152.8 million
Spent Fuel Management Costs	$ 44.9 million	20.2%	$ 88.8 million
ISFSI Decommissioning Costs	$ 5.4 million	2.4%	$ 10.7 million
Site Restoration Costs	$ 94.3 million	42.5%	$ 186.4 million
TOTAL	$ 221.9 million	100.0%[7]	$ 438.7 million

San Onofre Unit 2	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2018 Net Trust Balance
License Termination Costs	$ 699.3 million	45.1%	$ 675.5 million
Spent Fuel Management Costs	$ 390.9 million	25.2%	$ 377.4 million
ISFSI Decommissioning Costs	$ 19.4 million	1.2%	$ 18.0 million
Site Restoration Costs	$ 441.8 million	28.5%	$ 426.9 million
TOTAL	$ 1,551.4 million	100.0%	$ 1,497.8 million

San Onofre Unit 3	Estimated "To Go" Decommissioning Cost	Cost Ratios	12/31/2018 Net Trust Balance
License Termination Costs	$ 688.8 million	38.5%	$ 668.4 million
Spent Fuel Management Costs	$ 431.8 million	24.1%	$ 418.4 million
ISFSI Decommissioning Costs	$ 19.4 million	1.1%	$ 19.1 million
Site Restoration Costs	$ 651.0 million	36.3%	$ 630.3 million
TOTAL	$ 1,791.0 million	100.0%	$ 1,736.2 million

8) Key assumptions pertaining to spent fuel storage and ISFSI decommissioning:

San Onofre Unit 1:

- Permanently retired on November 30, 1992
- 395 fuel assemblies in 17 canisters are located in the ISFSI
- 1 canister of Greater Than Class C (GTCC) waste is located in the ISFSI
- The U.S. Department of Energy (DOE) will commence transporting spent fuel assemblies in 2028[6]
- DOE will remove last SONGS Unit 1 fuel from the ISFSI by 2034

San Onofre Unit 2:

- Permanently ceased operations on June 7, 2013
- 1,000 fuel assemblies in 33 canisters are currently located in the ISFSI
- Transfer of the remaining 726 fuel assemblies from the spent fuel pool to the SONGS ISFSI is scheduled to be completed during 2019
- Greater Than Class C (GTCC) waste will be placed in the SONGS ISFSI per schedule to be developed by Decommissioning General Contractor
- DOE will commence transporting spent fuel assemblies in 2028[6]
- DOE will remove last SONGS Units 2 & 3 fuel from the ISFSI by 2049

San Onofre Unit 3:

- Permanently ceased operations on June 7, 2013
- 865 fuel assemblies in 29 canisters are currently located in the SONGS ISFSI
- Transfer of the remaining 869 fuel assemblies from the spent fuel pool to the SONGS ISFSI is scheduled to be completed during 2019
- Greater Than Class C (GTCC) waste will be placed in the SONGS ISFSI per schedule to be developed by Decommissioning General Contractor
- DOE will commence transporting spent fuel assemblies in 2028(6)
- DOE will remove last SONGS Units 2 & 3 fuel from the ISFSI by 2049

San Onofre ISFSI:

- The San Onofre ISFSI will be decommissioned and the remaining plant and ISFSI site will be decontaminated to meet 10 CFR 20.1402 site release criteria for unrestricted use as required to terminate the Part 50 General License by 2051.

Notes:

(1) The new site-specific decommissioning cost estimate for San Onofre Unit 1 that was submitted to the California Public Utilities Commission (CPUC) on March 15, 2018, includes the radiological costs associated with terminating the site license, site restoration costs, and fuel storage costs.

(2) The new site-specific decommissioning cost estimate for San Onofre Units 2 and 3 that was submitted to the CPUC on March 15, 2018 includes the radiological costs associated with terminating the site license, site restoration costs, and fuel storage costs.

(3) During the period between June 7, 2013 and December 31, 2018, SCE incurred costs of $760.4 million for San Onofre Unit 2 and $773.1 million for San Onofre Unit 3 (100% share, 2018$). In 2018, SDG&E and the City of Riverside did not withdraw funds for all or part of these costs from their Decommissioning Trusts. Therefore, their Net Balances are the differences between the December 31, 2018 Decommissioning Trust Balances and the 2013-2018 incurred or accrued costs.

(4) Pursuant to 10 CFR 72.30(e)(5), power reactor licensees are authorized to use the financial assurance methods provided for in 10 CFR 50.75(e). All four San Onofre co-owners recover the cost of decommissioning pursuant to cost-of-service rate regulation and, therefore, are eligible to provide assurance using the external sinking fund method provided for in 10 CFR 50.75(e)(1)(ii). To the extent the decommissioning costs are fully funded and annual deposits are no longer required, the Co-Participants provide assurance using the prepayment method provided for in 10 CFR 50.75(e)(1)(i).

SCE and SDG&E are also required to accumulate sufficient funds to decommission the SONGS facility under the California Nuclear Facilities Decommissioning Act, CA Public Utilities Code Section 8321, et seq. The CPUC has construed the SONGS decommissioning obligation to include: (1) radiological decommissioning as required to terminate the NRC licenses, (2) spent fuel storage (including ISFSI decommissioning), and (3) site restoration as required to terminate the SONGS site lease contracts granted by the U.S. Department of the Navy and the California State Lands Commission.

Under CA Public Utilities Code Section 8326(a)(2), SCE and SDG&E are required to update their site-specific nuclear facility decommissioning cost estimates periodically to reflect changes in decommissioning regulation, technology, and economics, for the purpose of adjusting contribution levels to their decommissioning trust.

Under CA Public Utilities Code Sections 8326(b), 8327, 8328, and 8329, the CPUC periodically reviews SCE and SDG&E's site-specific decommissioning cost estimates for the purpose of considering changes in electrical rates to ensure that sufficient funds will be available for payment of all decommissioning costs. The Cities of Anaheim and Riverside are not under the jurisdiction of the CPUC.

(5) SCE is submitting information with respect to the San Onofre co-owners, SDG&E, Anaheim, and Riverside, on their behalf, and they are responsible for the completeness and accuracy of their respective information.

(6) The current site-specific decommissioning cost estimates for San Onofre Unit 1 and for San Onofre Units 2 and 3 assume that the DOE will commence transporting spent fuel assemblies in 2028. This assumption may be updated periodically due to the ongoing uncertainties regarding the availability of a permanent repository for spent fuel.

(7) Some numbers may not add precisely due to rounding. Any such errors are immaterial to the substantive information presented in this report.

EXHIBIT 22

NRC NEWS
Office of Public Affairs, Region IV
Arlington, TX. 76011-4511
www.nrc.gov

No: IV-19-012 May 21, 2019
Contact: Victor Dricks, 817-200-1128

NRC Has Determined Fuel Loading Can Be Safely Resumed at San Onofre Nuclear Generating Station

The Nuclear Regulatory Commission has determined that fuel loading can be safely resumed at the San Onofre Nuclear Generating Station. The San Clemente, Calif., plant is owned by Southern California Edison and permanently shut down in 2013.

Fuel loading operations were suspended following an Aug. 3, 2018, incident involving a loaded spent fuel storage canister that was misaligned and became stuck on a flange while being lowered into a storage vault. Information about the incident and the NRC's response is available on the NRC website.

The NRC made its determination following extensive review of technical data submitted by Edison regarding the possible effects of scratching on spent fuel canisters during fuel loading operations.

The NRC will hold a virtual public meeting/webinar from 2-3 p.m. Central Time (12-1 p.m. Pacific Time) on June 3. Members of the public will have an opportunity to submit written comments and questions via the webinar user interface following a presentation by NRC officials. NRC staff will provide participation guidance during the webinar.

Interested members of the public should register for the webinar on the NRC website, at which time a confirmation e-mail will be sent with details for joining the webinar via computer or mobile device. There is an option to listen via a phone bridge; however participants must first register for the webinar to obtain the phone bridge number.

EXHIBIT 23

BARNES & THORNBURG LLP

655 West Broadway, Suite 900
San Diego, CA 92101-8484
(619) 321-5000
Fax (310) 284-3894
www.btlaw.com

Eric J. Beste
619.321.5015
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September 6, 2019

Via Email

Edward J. Casey
James R. Evans, Jr.
Alston & Bird, LLP
333 South Hope Street, 16th floor
Los Angeles, CA 90071

Michael Zweiback
Zweiback Fiset & Coleman LLP
523 W. 6th Street, Suite 450
Los Angeles, CA 90014

Re: ***Public Watchdogs v. Southern California Edison Co., et al.,***
Case No. 19CV1635-JLS (MSB) (S.D. Cal.)

Dear Counsel:

As outlined in Judge Sammartino's Order from today, you have until September 20, 2019, to brief the legal objections you raised to our Amended Motion for Preliminary Injunction and Temporary Restraining Order. But based upon your client's public statements, it appears that additional canisters will be interred between now and the time Judge Sammartino has an opportunity to adjudicate this dispute. Further complicating the matter is the fact that the technology does not presently exist to remove canisters that have already been buried.

Previously, your clients voluntarily agreed to suspend the removal, transport, and burial of spent nuclear fuel for almost a year. Given that you share our concern for the health and safety of the public and environment, we are asking your clients to again suspend that process for the very brief time it will take Judge Sammartino to resolve the pending Motion. If your legal arguments are correct, and our client cannot bring this case in federal district court at this time, the matter will be decided in your favor in short order. If, however, Judge Sammartino grants some or all of our requested relief—even temporarily—we will have been prejudiced by the current briefing schedule, and your clients will have the challenge of complying with a court order that requires them to undo something that can't be undone.

We recognize that this request is unusual. But we trust you appreciate the gravity of the situation, and the need to preserve Judge Sammartino's ability to adjudicate this dispute on the merits while the possibility of relief still exists. Please let us know by Monday, September 9, if you will agree to this modest proposal.

Very truly yours,

Eric J. Beste

cc (via email): Valerie Torres
Assistant U.S. Attorney
United States Attorney's Office
for the Southern District of California
880 Front Street, Room 6293
San Diego, CA 92101

EXHIBIT 24

ALSTON & BIRD

333 South Hope Street, 16th Floor
Los Angeles, CA 90071-1410
213-576-1000 | Fax: 213-576-1100

Edward J. Casey | Direct Dial: 213-576-1005 | Email: ed.casey@alston.com

September 9, 2019

VIA EMAIL AND U.S. MAIL

Eric J. Beste, Esq.
Barnes & Thornburg LLP
655 West Broadway
Suite 900
San Diego, CA 92101-8484

Re: *Public Watchdogs v. Southern California Edison Company, et al.*
USDC Case No. 3:19-cv-01635-JM (MSB)

Dear Mr. Beste:

On behalf of Southern California Edison, San Diego Gas & Electric, and Sempra Energy (collectively the "SONGS Parties"), I am sending this letter to respond to your letter sent at 6 p.m. on Friday, September 6, 2019. In that letter you, as counsel for plaintiff Public Watchdogs ("Plaintiff"), requested that the SONGS Parties suspend the transfer of the spent nuclear fuel ("SNF") to the Independent Spent Fuel Storage Installation ("ISFSI") at the SONGS facility. However, Plaintiff's request is premised on a mischaracterization of key facts concerning the Nuclear Regulatory Commission's ("NRC") licensing process, and the SONGS Parties' spent fuel transfer and storage operations. The NRC completed a detailed review and analysis confirming the safety of the Holtec canister system and spent fuel transfer procedures, and has determined that the SONGS Parties may safely resume spent fuel transfer operations at SONGS.

Having received all necessary regulatory approvals from the NRC (the agency with exclusive jurisdiction over radiological matters) for the transfer of the SNF to Holtec canisters and storage of those canisters in the ISFSI, the SONGS Parties plan to safely continue the transfer operations so that they can timely move forward with decommissioning on behalf of their customers, and ultimately finding a permanent off-site location for SNF. Therefore, the SONGS Parties respectfully decline Plaintiff's request for a suspension of those operations. Further, having been provided with relevant information

in this letter, we expect that Plaintiff will satisfy its legal obligation to inform the District Court of these facts if it seeks to file any additional pleading with the Court prior to its reply brief on September 27, 2019.

Very truly yours,

Edward J. Casey

EJC/ysr

cc: Michael Zweiback, Esq.
(Via Email)
Valerie Torres, Asst. U.S. Attorney
(Via Email)

EXHIBIT 25

Office of the Inspector General
Report of Administrative Inquiry

March 23, 2010

William R. McCollum, Jr., LP 6A-C
Ralph E. Rodgers, WT 6A-K

(b) (7)(C)
(b) (7)(C)
HOLTEC INTERNATIONAL
555 LINCOLN DRIVE WEST
MARLTON, NEW JERSEY 08053
OIG FILE NO. 12E-102

This report was prepared at the request of Ralph E. Rodgers, Deputy General Counsel, Office of the General Counsel, Tennessee Valley Authority (TVA), to summarize investigative and audit efforts concerning the actions of (b) (7)(C). These efforts were initiated following the receipt of a complaint that (b) (7)(C) had engaged in funneling money to a TVA employee, John L. (Jack) Symonds, to secure TVA nuclear contracts for HI. This report provides information related to how those payments were made to the TVA employee, (b) (7)(C) involvement with those payments and the pattern of behavior exhibited by (b) (7)(C) when attempting to acquire nuclear contracts. The report also reflects audit findings of overbilling by HI for equipment costs and the rationale provided by HI and TVA for the price difference at two of TVA's nuclear plants. The findings in this report were based on the statements of (b)(7)(D), several witnesses, the statements of Mr. Symonds, former Brown Ferry Nuclear Plant (BFN) Technical Contract Manager, and documents included as attachments.

On August 3, 2007, Mr. Symonds pled guilty in U.S. federal court to making false financial statements to TVA by not disclosing receiving more than $54,000 from Krohn Enterprises LLC, a company he co-owned with his spouse. Mr. Symonds was paid by HI through another company called U. S. Tool & Die (UST&D). Mr. Symonds knew HI had contracted with TVA in November 2001 to design and construct a dry cask storage system for spent nuclear fuel rods at BFN, and had contracted with UST&D to fabricate some of the construction materials for the TVA BFN dry cask storage system. The money received by Mr. Symonds was used to pay personal expenses of Mr. Symonds and his spouse.

OVERVIEW

During June 2000, TVA needed above-ground storage containers to store spent nuclear fuel at Sequoyah Nuclear Plant (SQN). TVA entered into a contract with HI, for design and construction services, storage systems, and the necessary ancillary equipment for the storage containers. During November 2001, the contract was supplemented to authorize HI to perform the same services at BFN. TVA employee Mr. Symonds was involved in the negotiations for the BFN contract as the BFN Technical Contract Manager, while being courted by HI with promises of money and employment. Mr. Symonds was later paid over $50,000 for his assistance in obtaining the TVA contract for HI.

FINDINGS

While TVA was assessing re-racking spent nuclear fuel storage at BFN, the plant initiated a study to determine if BFN should convert to a dry cask storage system instead of re-racking its spent nuclear fuel. Mr. Symonds began advocating strongly for HI to perform the work at BFN that HI had performed at SQN. During this time, (b) (7)(C) agreed to pay Mr. Symonds $50,000. (b) (7)(C) suggested that Mr. Symonds create a company and took Mr. Symonds to HI's (b) (7)(C), who provided Mr. Symonds with a contact which would help Mr. Symonds establish an Limited Liability Company (LLC) in Delaware.

From July 29 to August 2, 2001, Mr. Symonds and his wife went to Philadelphia, Pennsylvania, on a birthday trip. The itinerary for the trip was arranged by HI and the round-trip airline reservation for Mr. Symonds and his wife was made and paid for by HI. From Philadelphia, Mr. Symonds and his wife traveled to Atlantic City, New Jersey, and stayed at the Taj Mahal, the Trump-owned hotel, paid for by HI. Mr. Symonds and his wife had dinner with (b) (7)(C) that night. On July 31, 2001, they returned to Philadelphia where HI had made reservations for the Symonds at the Rittenhouse Hotel. (b) (7)(C) arranged for a dinner party for the Symonds at a fine French restaurant, Le Bec-Fin, and HI paid $2,137.20 for the meal. Attending were Mr. Symonds and his wife, (b) (7)(C) and his wife, and three HI executives and their escorts. (b) (7)(C) placed Mr. Symonds at the head of the table.

Later in August, 2001, (b) (7)(C) and Mr. Symonds attended a meeting at Fitzpatrick Power Plant, Oswego, New York, consisting of about 30 people representing various utilities to discuss lessons learned. Mr. Symonds was reimbursed a portion of the cost for this trip by TVA, and travel expenses were also charged to UST&D of which (b) (7)(C) was the majority owner. A Confidential Source recalled that (b) (7)(C) and (b) (7)(C) created a company, FABSCO Inc., and that company controlled UST&D (see Attachment 1). While Mr. Symonds was at the meeting, a TVA employee telephoned Mr. Symonds to tell him the TVA Board decided to proceed with the dry

cask storage project for BFN. During a dinner that night, (b) (7)(C) announced with fanfare to everyone present the decision to award the BFN work to HI, to the celebratory sound of clinking glasses. During the dinner, Mr. Symonds' wife told (b) (7)(C) her vocation was credentialing doctors, which included conducting physicians' background checks.

On September 13, 2001, Mr. Symonds had a breakfast meeting with (b) (7)(C) at the Marriott Hotel, Huntsville, Alabama. Previously, (b) (7)(C) had discussed employment for Mr. Symonds with HI. During this meeting, (b) (7)(C) expressed concern, to avoid appearance problems, that Mr. Symonds not come to work at HI directly from TVA. Mr. Symonds would manage a construction company that appeared to be a separate entity from HI. (b) (7)(C) offered Mr. Symonds a vice-president position at HI with a salary of $175,000 per year plus one percent of the business. (b) (7)(C) suggested January 1, 2002, as the target date for Mr. Symonds to report to work at HI. Mr. Symonds considered himself a part of HI from that point on, even though he continued to work for TVA. (b) (7)(C) told Mr. Symonds they could set up a way to pay Mr. Symonds $50,000 by setting up a business through Mr. Symonds' wife for background investigation services.

During November 2001, the HI dry cask contract for SQN was supplemented to authorize HI to perform the same services at BFN. Mr. Symonds had been involved in the negotiations for the BFN contract as the BFN Technical Contract Manager.

Also in November 2001, Mr. Symonds established Krohn Enterprises, an LLC in Delaware. On December 13, 2001, a post office box was created for Krohn Enterprises, in Huntsville, Alabama, and the name "Jack Symonds" was included as a person with access to the box. A bank account was also created in the name of Krohn Enterprises. Mr. Symonds came up with the name Krohn by using the first two letters of (b) (7)(C) first name, (b) (7) and the last three letters of his own name, (b)

Further, in November 2001, Mr. Symonds and his wife made a house-hunting trip to Philadelphia, Pennsylvania. The trip was later reimbursed by (b) (7)(C) through UST&D. During this trip, (b) (7)(C) moved Mr. Symonds' employment date from January to April 2002.

Shortly after the meeting in November, Mr. Symonds and (b) (7)(C) met at a restaurant in Cherry Hill, New Jersey. (b) (7)(C) said he did not know if they were going to bring Mr. Symonds in to HI as a vice president, and said Mr. Symonds might be worth more to (b) (7)(C) by remaining at BFN during the Unit 1 restart. (b) (7)(C) then said he would pay Mr. Symonds an additional $100,000.

Subsequently, (b) (7)(C) instructed UST&D to make a payment of $50,000 to an agency that would be billing UST&D for background checks. No investigative services were rendered to UST&D, and none were provided by Krohn Enterprises. Krohn Enterprises submitted two invoices to UST&D (Attachment 2). The first invoice, dated January 15, 2002, totaled $29,212.77 and included the first "retainer" payment of $25,000 and $4,212.77 in travel expenses. The travel expenses invoiced to UST&D were for the travel expenses of Mr. Symonds' meetings with (b) (7)(C) and HI officials. The second invoice, dated February 5, 2002, was for a "retainer fee," payment of $25,000. UST&D paid Krohn Enterprises a total of $54,212.77. A review was conducted of documents obtained by the Office of the Inspector General (OIG) regarding travel by Mr. Symonds and a copy of the review is attached (Attachment 3).

In approximately January 2002, Mr. Symonds learned from TVA employee (b) (7)(C) , who replaced Mr. Symonds as the Technical Contract Manager for the HI contract, that (b) (7)(C) had been offered a job by (b) (7)(C) Mr. Symonds did not miss the fact that he was now being ignored by (b) (7)(C) while (b) (7)(C) was pitching (b) (7)(C) to work for him. Mr. Symonds prepared a letter (Attachment 4) and sent it to (b) (7)(C) as a last chance for a position with HI, although it was clear to Mr. Symonds that his job with HI was dead.

STATEMENTS BY KRISHNA SINGH

On October 12, 2006, Mr. Symonds consented to telephoning (b) (7)(C) for the purpose of recording the conversation. Mr. Symonds told (b) (7)(C) the OIG was aware of the money paid to Mr. Symonds by UST&D and was coming to interview Mr. Symonds. Mr. Symonds requested advice from (b) (7)(C) on how to handle the situation. (b) (7)(C) response was as follows:

> *Well, you know UST&D had hired your wife to do security checks. She got paid for that, right? That was the retainer paid to do the work. She did do retainer work. Why are they auditing your account? There's no, there's nothing that uh, I mean it was a clean transaction, she was in the business of checking out, you know we had some, to my knowledge, UST&D had some problems with thefts and stuff, otherwise it was checks. She paid for, you know they paid for it. But you didn't do any direct business with UST&D, did you? They won't call me because I have nothing to do with it, you know. But to the extent that I pointed to a potential source for UST&D to get the help, they ask me I'll tell them. You know, I'll tell them the straight scoop. Jack you ought to make sure that you tell them that you really have no, the funds you don't know anything about the fact, other than the fact that your wife was in the business of doing consulting services and it was payment retainer for that work, and it's a company that you don't do any business with, and you have not.*

A copy of the entire transcription is attached (Attachment 5).

A few minutes after the recording above was made, (b) (7)(C) was interviewed in his office by OIG Special Agents. During that interview (b) (7)(C) stated essentially the following.

- Sometime between 1999 and 2001, UST&D was having problems with employee thefts. He wasn't sure if it was parts being stolen or other materials, but there was a problem. (b) (7)(C) advised that he mentioned to someone that Mr. Symonds did security checks. He wasn't sure if it was Mr. Symonds, his partner or someone associated with Mr. Symonds that helped companies catch employees stealing. (b) (7)(C) may have mentioned the theft problems to Mr. Symonds and suggested Mr. Symonds call the plant manager or he may have mentioned it to plant personnel to contact Mr. Symonds, he just couldn't remember. (b) (7)(C) thought he may have put Mr. Symonds in touch with several other people. (b) (7)(C) said he could not give the specifics about how he knew Mr. Symonds was involved with catching employees stealing at factories. (b) (7)(C) did not know if UST&D used Mr. Symonds or not.

- (b) (7)(C) recalled Mr. Symonds visited HI on a couple of occasions when Mr. Symonds was on a project they were doing at BFN. If Mr. Symonds came to HI, he (b) (7)(C) would have seen him. He never requested that HI employees entertain Mr. Symonds. However, he did know that Mr. Symonds was friendly with one of HI's engineers who no longer worked for HI. (b) (7)(C) (b) (7)(C) was asked if he provided any entertainment to Mr. Symonds and said he remembered having dinner with Mr. Symonds on one occasion. He does not remember who paid for the meal but he normally offered to pay for any meal he had with someone and they normally obliged. Sometimes clients would send checks back to him for the cost of their meals. He did not recall the specifics about the meal with Mr. Symonds.

- (b) (7)(C) stated that he would not have offered any money to Mr. Symonds or Krohn Enterprises for any reason. He did not direct anyone to pay any money to Mr. Symonds or Krohn Enterprises for any reason. He did not think that Mr. Symonds would solicit money from him. He said he has a particular air about him, and no one would ask a cent from him. (b) (7)(C) said that he was a very ethical person in business dealings. (b) (7)(C) stated he could not say if someone at HI or UST&D paid Mr. Symonds, but he has never been told anything or that anyone paid Krohn Enterprises anything. (b) (7)(C) opined that Mr. Symonds was not in a position to award contracts for TVA.

OTHER BAD ACTS BY (b) (7)(C)

(b) (7)(D), Exelon Corporation provided documentation relating to an internal investigation concerning an engineer in a position to potentially influence a contract award to HI and whose wife had a business with which HI began doing business under (b) (7)(C) direction. That investigation was instituted upon the receipt of information that HI, a contractor involved in a $20,000,000 project with ComEd, an Exelon company, for dry cask storage products, had switched travel agencies and began using an agency in Northbrook, Illinois, called Cove Travel. That travel agency was allegedly owned by (b) (7)(C), a Senior Engineer at ComEd Corporate Services, who was involved in administering the project with HI. According to a ComEd Supervising Engineer, in mid-July 1997, while on an audit trip to Japan, a HI Quality Assurance Manager, stated (b) (7)(C) had sent a letter to all HI employees instructing all travel arrangements be made through a travel agency in Northbrook. This letter was followed up six months later by (b) (7)(C) diverting all travel arrangements to (b) (7)(C)). During the internal investigation (b) (7)(C) was interviewed concerning the matter and stated he had known (b) (7)(C) since late 1989 or early 1990. (b) (7)(C) was sure that (b) (7)(C) made the initial contact with him relative to Cove Travel. She then submitted a proposal which he turned over to one of the two HI personnel who handled travel arrangements for the firm. He advised that (b) (7)(C) had never put pressure on him to use Cove Travel and had never told him he would increase/decrease ComEds business with HI dependent upon the use of Cove Travel. Were this to happen, (b) (7)(C) would "kick him out," stating in his mind, for one thing, (b) (7)(C) had "zero" authority to place business and had no "clout."

(b) (7)(C) **WRITES TO INSPECTOR GENERAL AND CHIEF NUCLEAR OFFICER**

(b) (7)(C) sent a letter addressed to the TVA Inspector General, Richard W. Moore, dated November 17, 2006 (Attachment 6), during the timeframe the criminal investigations were ongoing concerning HI, (b) (7)(C) and Mr. Symonds. In that letter (b) (7)(C) stated, “Holtec International categorically asserts that the company has not provided any funds to Mr. Saimonds [sic] in any shape or form, indirectly or directly.”

(b) (7)(C) also e-mailed a letter to Karl Singer, then Chief Nuclear Officer and Executive Vice President, dated November 9, 2006 (Attachment 7). In that letter, (b) (7)(C) stated, in part, “… we do not know anything about the gentleman’s (Symonds’) interactions with UST&D.”

CONTRACT REVIEW

The OIG conducted a review of the TVA contract with HI for the purchase of dry cask storage systems for spent nuclear fuel at SQN and BFN. The purpose of the review was to assess the reasonableness of the prices TVA paid HI for certain high-dollar equipment items at BFN in comparison with the prices paid for the equipment at SQN. Specifically, the OIG reviewed the prices TVA paid HI for the four largest dollar-value cask system components: the MPC (multipurpose canister for spent fuel), HI-STORM 100 (long-term storage overpack for the MPC), HI-TRAC 125D (in-plant transfer overpack for the MPC), and the vertical crawler. TVA had paid $7,198,763 for the equipment at SQN, versus $9,186,120 at BFN, a difference of $1,987,357.

Information obtained in the review (Attachment 8) found HI may have made false statements regarding the equipment prices proposed to TVA, and it appeared TVA relied on that information to approve prices quoted for the BFN equipment. Additionally, the review found that HI had overbilled TVA at least $276,000 for the BFN vertical crawler because it did not comply with the contract's cost-plus pricing provision. The price HI quoted for the BFN crawler misrepresented its compliance with the contract.

It appeared TVA relied on the information provided by HI to justify paying the higher BFN prices rather than attempting to negotiate lower pricing for BFN. Although it is unknown if TVA could have successfully negotiated lower prices for BFN, key economic indicators and reduction in material prices between the time period when HI proposed the SQN and BFN prices indicate TVA had an opportunity to negotiate better prices. For example, the price of steel had fallen about seven percent during the period between the SQN proposal and the BFN proposal.

In summary, the OIG review found evidence that the higher prices TVA agreed to pay for the BFN MPC, the HI-STORM 100 and the HI-TRAC 125D were unreasonable. It appears HI may have misled TVA regarding its pricing and TVA did not attempt to negotiate better prices at BFN.

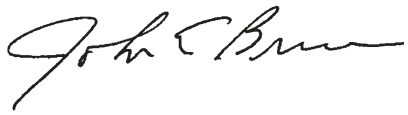
RECOMMENDATIONS

We recommend TVA place HI on the Supply Chain Clearance List based on the actions of (b) (7)(C) [redacted]. In addition, if you decide to take other documented action on the basis of this report, we would appreciate your sending a copy of the relevant information to this office for our file.

We would appreciate being informed within 15 days of your determination of what action is appropriate on the basis of our report. Our investigative files will be made available for review upon request.

This report has been designated “TVA Restricted” in accordance with TVA Business Practice 29, Information Security. Accordingly, it should not be disclosed further without the prior approval of the Inspector General or his designee. In addition, no redacted version of this report should be distributed without notification to the Inspector General of the redactions that have been made.

Our investigation of this matter is closed.



John E. Brennan
Assistant Inspector General
(Investigations)
ET 4C-K

(b) (6)

cc: Terrell M. Burkhart, WT 3A-K
Maureen H. Dunn, WT 6A-K
Peyton T. Hairston, Jr., WT 7B-K
Tom D. Kilgore, WT 7B-K
Kenneth E. Tilley, WT 3A-K
OIG File No. 12E-102

Attachment 1
Page 1 of 11

PENNSYLVANIA DEPARTMENT OF STATE
CORPORATION BUREAU

Articles of Incorporation-For Profit
(15 Pa.C.S.)

Entity Number

- [X] Business-stock (§ 1306)
- [ ] Business-nonstock (§ 2102)
- [ ] Business-statutory close (§ 2303)
- [ ] Cooperative (§ 7102)
- [ ] Management (§ 2703)
- [ ] Professional (§ 2903)
- [ ] Insurance (§ 3101)

Name: M. BURR KEIM COMPANY
Address: 2021 Arch Street
City: Philadelphia, PA 19103

Document will be returned to the name and address you enter to the left.

Fee: $100

Filed in the Department of State on JUL 25 2002

Secretary of the Commonwealth

In compliance with the requirements of the applicable provisions (relating to corporations and unincorporated associations), the undersigned, desiring to incorporate a corporation for profit, hereby states that:

1. The name of the corporation *(corporate designator required, i.e., "corporation", "incorporated", "limited" "company" or any abbreviation. "Professional corporation" or "P.C.")*:

FABSCO, Inc.

2. The (a) address of this corporation's current registered office in this Commonwealth *(post office box, alone, is not acceptable)* or (b) name of its commercial registered office provider and the county of venue is:

(a) Number and Street	City	State	Zip	County
c/o White and Williams LLP 1800 One Liberty Place	Philadelphia	PA	19103	Philadelphia

Attention: G. P. Biehn, Esq.
(b) Name of Commercial Registered Office Provider — County

c/o:

3. The corporation is incorporated under the provisions of the Business Corporation Law of 1988.

4. The aggregate number of shares authorized: 10,000 shares common

Attachment 1
Page 2 of 11

2002066- 890

DSCB:15-1306,2102/2303/2702/2903/3101/7102A-2

5. The name and address, including number and street, if any, of each incorporator *(all incorporators must sign below)*:

Name	Address
Susan J. Kadin	White and Williams LLP
	1800 One Liberty Place
	Philadelphia, PA 19103

6. The specified effective date, if any: Upon filing
month/day/year hour, if any

7. Additional provisions of the articles, if any, attach on 8½ by 11 sheet.

8. ~~*Statutory close corporation only.* Neither the corporation nor any shareholder shall enter into offering of any of its shares of any class that would constitute a public offering within the meaning of the Securities Act of 1933 (15 U.S.C. 77a et seq.)~~

9. ~~*Cooperative corporations only. Complete and strike out inapplicable term:*~~

~~The common bond of membership among the members/shareholders is:~~

IN TESTIMONY WHEREOF, the incorporator(s) has/have signed these Articles of Incorporation to be signed by a duly authorized officer thereof this

25th day of July 2002

Signature
Susan J. Kadin, Incorporator

Signature

200206 6- 801

ARTICLES OF INCORPORATION

FABSCO, INC.

Additional Provisions

7(a). Shareholders shall not have cumulative voting rights in the election of directors.

7(b). The term of the corporation is perpetual.

Doc#: 105395 v5

FROM WHITE & WILLIAMS 200207 1- 971

PENNSYLVANIA DEPARTMENT OF STATE
CORPORATION BUREAU

Articles/Certificate of Merger
(15 Pa.C.S.)

Entity Number
811235

[X] Domestic Business Corporation (§ 1926)
[ ] Domestic Nonprofit Corporation (§ 5926)
[ ] Limited Partnership (§ 8547)

Name
Address CT CORP-COUNTER
City State Zip Code

Document will be returned to the name and address you enter to the left.

Fee: $108 plus $28 additional for each Party in addition to two

Filed in the Department of State on AUG 16 2002
C. Michael Secretz
Secretary of the Commonwealth

In compliance with the requirements of the applicable provisions (relating to articles of merger or consolidation), the undersigned, desiring to effect a merger, hereby state that:

1. The name of the corporation/limited partnership surviving the merger is:
L. S. Tool & Die, Inc.

2. Check and complete one of the following:

[X] The surviving corporation/limited partnership is a domestic business/nonprofit corporation/limited partnership and the (a) address of its current registered office in this Commonwealth or (b) name of its commercial registered office provider and the county of venue is (the Department is hereby authorized to correct the following information to conform to the records of the Department):

(a) Number and Street | City | State | Zip | County
Keystone Commons, 200 Braddock Ave | Turtle Creek | PA | 15145 | Allegheny

(b) Name of Commercial Registered Office Provider | County

[ ] The surviving corporation/limited partnership is a qualified foreign business/nonprofit corporation/limited partnership incorporated/formed under the laws of _____ and the (a) address of its current registered office in this Commonwealth or (b) name of its commercial registered office provider and the county of venue is (the Department is hereby authorized to correct the following information to conform to the records of the Department):

(a) Number and Street | City | State | Zip | County

(b) Name of Commercial Registered Office Provider | County

[ ] The surviving corporation/limited partnership is a qualified foreign business/nonprofit corporation/limited partnership incorporated/formed under the laws of _____ and the address of its principal office under the laws of such domestic jurisdiction is:

Number and Street | City | State | Zip

DLCB 15-1826 3935/6047-2

Attachment 1
Page 5 of 11

FROM WHITE & WILLIAMS LLP 2002071- 972

3 The name and the address of the registered office in this Commonwealth or name of its commercial registered office provider and the county of venue of each other domestic business/nonprofit corporation/limited partnership and qualified foreign business/nonprofit corporation/limited partnership which is a party to the plan of merger are as follows

Name	Registered Office Address	Commercial Registered Office Provider	County
FABSCO, INC	1500 ONE LIBERTY PLACE, PHILADELPHIA, PA 19103		PHILADELPHIA

4 *Check and if appropriate complete one of the following*

☒ The plan of merger shall be effective upon filing these Articles/Certificate of Merger in the Department of State

☐ The plan of merger shall be effective on _____ at _____
Date Hour

5 The manner in which the plan of merger was adopted by each domestic corporation/limited partnership is as follows

Name	Manner of Adoption
FABSCO, Inc	Board of Directors pursuant to PA BCL 1924(b)(1)(ii) & 1924(b)(3)

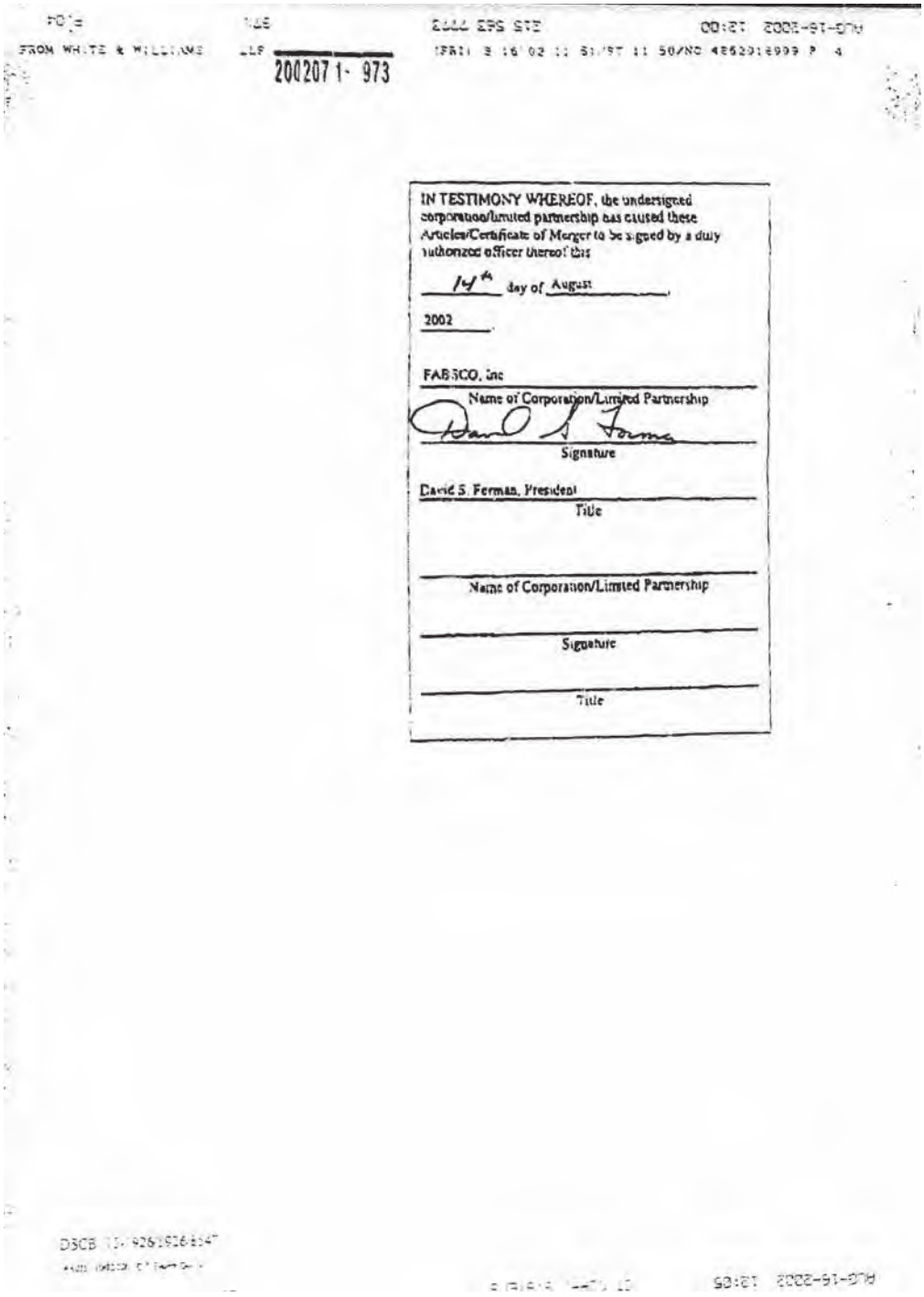
6 *Strike out this paragraph if no foreign corporation/limited partnership is a party to the merger.* The plan was authorized, adopted or approved, as the case may be, by the foreign business/nonprofit corporation/limited partnership (or each of the foreign business/nonprofit corporations/limited partnerships) party to the plan in accordance with the laws of the jurisdiction in which it is incorporated/organized.

7 *Check and if appropriate complete one of the following*

☒ The plan of merger is set forth in full in Exhibit A attached hereto and made a part hereof.

☐ Pursuant to 15 Pa.C.S. § 1907 (§ 1947(c) relating to omission of certain provisions from filed plans) the provisions, if any, of the plan of merger that amend or constitute the operative provisions of the Articles of Incorporation/Certificate of Limited Partnership of the surviving corporation/limited partnership as in effect subsequent to the effective date of the plan are set forth in full in Exhibit A attached hereto and made a party hereof. The full text of the plan of merger is on file at the principal place of business of the surviving corporation/limited partnership, the address of which is

Number and street	City	State	Zip	County



FROM WHITE & WILLIAMS LLP 2002071-973

IN TESTIMONY WHEREOF, the undersigned corporation/limited partnership has caused these Articles/Certificate of Merger to be signed by a duly authorized officer thereof this

14th day of August,

2002.

FABSCO, Inc
Name of Corporation/Limited Partnership

Signature

David S. Ferman, President
Title

Name of Corporation/Limited Partnership

Signature

Title

Exhibit A

Plan of Merger

This Plan of Merger ("Plan") between FABSCO, Inc., a Pennsylvania corporation ("Parent"), and U S Tool & Die, Inc., a Pennsylvania corporation ("Subsidiary") shall be adopted by Parent in the manner and become effective as of the time provided below.

1. Background. Parent is record and beneficial owner of 82.47% of the issued and outstanding capital stock of Subsidiary ("Subsidiary Common Stock"). The remaining shares of the Subsidiary Common Stock are owned and held of record by those shareholders listed in the Subsidiary's corporate records as of the Plan Adoption Date (as such term is defined in Section 2 of this Plan). The Board of Directors of Parent has determined that is desirable and in the best interests of Parent and Subsidiary that Parent be merged with and into the Subsidiary on the terms and conditions set forth in this Plan and in accordance with the applicable provisions of the Pennsylvania Business Corporation Law of 1988, as amended (the "PA BCL").

2. Approval. This Plan shall become adopted ("Plan Adoption Date") upon its approval by the Board of Directors of the Parent in accordance with Sections 1922(c), 1924(b)(1)(ii), and 1924(b)(3) of the PA BCL.

3. Time and Effect of Merger.

(a) *Effective Time*. The Merger shall become effective at the close of business on the date upon which appropriate Articles of Merger (to which this Plan will be attached and incorporated therein) are filed with the Department of State of the Commonwealth of Pennsylvania ("Merger Effective Time").

(b) *Effects of Merger*. At the Merger Effective Time, Parent shall merge with and into Subsidiary, the separate existence of Parent shall cease, and Subsidiary shall be the surviving corporation (the "Surviving Corporation"), all in accordance with this Plan and the applicable provisions of the PA BCL (the "Merger"). At the Merger Effective Time and as a result of the Merger, the Surviving Corporation shall continue to exist as a domestic business corporation under the laws of the Commonwealth of Pennsylvania with all of the rights and obligations of such surviving domestic business corporation as are provided by Section 1929 and the other applicable provisions of the PA BCL. Without limiting the generality of the foregoing, as of the Merger Effective Time, all of the property (real, personal and mixed), rights, powers, privileges, immunities, licenses, permits and franchises (both of a

2002071-975

private and public nature), and restrictions, duties, and obligations of the Parent and Subsidiary shall be taken and be deemed to be transferred to and vested or continued to be vested, as the case may be, in the Surviving Corporation, without further act, agreement, approval or deed.

4. Articles of Incorporation; Bylaws. The Articles of Incorporation and Bylaws of the Subsidiary as in effect prior to the Merger Effective Time shall remain the same and continue unchanged as, respectively, the Articles of Incorporation and Bylaws of the Surviving Corporation on and after the Merger Effective Time until changed in accordance with their respective terms and the applicable provisions of the PA BCL.

5 Directors and Officers. The Officers of Subsidiary prior to the Merger Effective Time shall, as of the Merger Effective Time, be and remain, respectively, the Officers of the Surviving Corporation until their respective successors are duly elected and qualified under the Bylaws of the Surviving Corporation then in effect, or until their earlier death or until their resignation or removal in accordance with such Bylaws. As of the Effective Time, the Directors of the Surviving Corporation shall be David S. Forman, Robert L. Moscardini and Christopher P. Strock who will serve as Directors of the Surviving Corporation until their respective successors are duly elected and qualified under the Bylaws of the Surviving Corporation then in effect, or until their earlier death or resignation or removal in accordance with such Bylaws.

6. Conversion of Shares.

(a) *Conversion of Shares of Subsidiary* Subject to the provisions of Sections 7 and 8 of this Plan, except for Dissenting Shares (as such term is defined in Section 10 of this Plan), which at the Merger Effective Time shall be converted into the right to receive the consideration determined in accordance with Section 10 of this Plan and the applicable provisions of the PA BCL, each share of Subsidiary Common Stock shall, at the Merger Effective Time, without further action and by virtue of the Merger, be converted into the right to receive cash consideration in the amount of $ .75 for each share of Subsidiary Common Stock, payable in accordance with Sections 7 and 8 of this Plan, and shall no longer be outstanding and shall be deemed to be automatically canceled and cease to exist.

(b) *Conversion of Shares of Parent*. Subject to the provisions of Section 8 of this Plan, each share of capital stock of Parent ("Parent Shares") shall, at the Merger Effective Time, without further action and by virtue of the Merger, be converted into one (1) share of capital stock of the Surviving Corporation, and shall no longer be outstanding and shall be deemed to be automatically canceled and cease to exist.

7 Withholding Rights. The Surviving Corporation shall be entitled to deduct and withhold from the consideration otherwise payable under Section 6 or 10 of this Plan, as the case may be, such amounts, if any, as it is required to deduct, withhold, and remit with

200207 1- 976

respect to the making of such payment under any provision of federal, state or local tax law (a "Withholding"). Any such Withholding shall be treated for all purposes (including without limitation this Plan and the Merger) as having been paid to the Record Shareholder (as such term is defined in Section 8) in respect of which the Surviving Corporation made such Withholding and, notwithstanding anything contained to the contrary in this Plan, such Record Shareholder shall only be entitled to receive from the Surviving Corporation the consideration payable pursuant to this Plan and/or the Dissenters' Rights Provisions (as such term is defined in Section 10 of this Plan), less any Withholding, which shall be payable on such Record Shareholder's account to the applicable federal, state or local taxing authority in accordance with applicable federal, state or local tax law ("Net Merger Consideration").

8 Notice; Surrender and Payment; Rights in Subsidiary Common Stock; Etc.

(a) *Merger Notice*. As soon as practicable following the Merger Effective Time, the Surviving Corporation shall mail or cause to be mailed to each record holder or record owner, as the case may be (individually, a "Record Shareholder" and collectively the "Record Shareholders") of the shares of Subsidiary Common Stock on the Plan Adoption Date notices ("Merger Notice") advising them of and enclosing, as applicable: (i) the effectiveness of the Merger, (ii) a copy of this Plan; (iii) a form letter of transmittal and instructions regarding the surrender of their certificates formerly representing shares of Subsidiary Common Stock ("Subsidiary Certificates"), or in lieu thereof, such evidence of lost, stolen or destroyed certificate(s) and such surety bonds or other security as the Surviving Corporation may, in its discretion, require ("Required Documentation"), in exchange for the applicable Net Merger Consideration, and (iv) the notices, information and other materials required to be provided to the Record Shareholders under Section 1575 of the PA BCL.

(b) *Surrender of Subsidiary Certificates; Payment of Consideration*. After the Merger Effective Time, upon surrender of their Subsidiary Certificates, or in lieu thereof, the Required Documentation, to the Surviving Corporation with a properly completed and executed letter of transmittal (substantially in the form included in the Merger Notice) with respect to such certificates, a Record Shareholder will be entitled to receive the applicable Net Merger Consideration. Such consideration shall be delivered by the Surviving Corporation as promptly as practicable after such surrender. Except as otherwise expressly provided in Section 10 of this Plan, without the written consent of a Record Shareholder and such other documentation and other items as the Surviving Corporation in its discretion may require (a "Permitted Substitution"), no person other than a Record Shareholder shall be entitled to receive any consideration whatsoever from the Surviving Corporation as a result of the Merger. In the event of a Permitted Substitution, except in respect of the availability of Dissenters' Rights (as such term is defined in Section 10), which shall be determined in accordance with Section 10 of this Plan, such person shall be considered a Record Shareholder for purposes of this Plan and the Record Shareholder for which a Permitted Substitution was

-1-

made shall thereafter have no right to receive any consideration from the Surviving Corporation as a result of the Merger.

(c) *Rights in Subsidiary Common Stock Following Merger*. As of the Merger Effective Time, (i) the Record Shareholders, all other holders of Subsidiary Certificates, and all beneficial but not record owners of Subsidiary Common Stock prior to the Merger Effective Time, if any, shall cease to have rights with respect to such previously outstanding stock, provided, however that the Record Shareholders only shall have the right to either exchange his, her or its Subsidiary Certificates or Required Documentation, as the case may be, for the Net Merger Consideration to which such Record Shareholder may be entitled pursuant to Sections 6 and 7 of this Plan or elect their Dissenters' Rights in accordance with the Dissenters' Rights Provisions (as such terms are defined in Section 10 of this Plan), and (ii) the Subsidiary Certificates held by Record Shareholders shall be deemed to evidence only ownership of either such Net Merger Consideration or Dissenters' Rights in respect of such Subsidiary Common Stock, if so elected in accordance with the Dissenters' Rights Provisions. In no event shall the Surviving Corporation be obligated to deliver Net Merger Consideration set forth in Sections 6 and 7 or determined pursuant to Section 7 and the Dissenters' Rights Provisions to a Record Shareholder unless and until such Record Shareholder surrenders his, her or its Subsidiary Certificates or furnishes the Required Documentation, as the case may be.

(d) *Surrender of Parent Shares Certificates; Issuance of Surviving Corporation Stock*. Upon receipt by the Surviving Corporation of the certificates representing the Parent Shares or in lieu thereof Required Documentation, as the case may be, together with a properly completed and executed letter of transmittal (in the form acceptable to the Surviving Corporation) with respect to such certificates, the Surviving Corporation will issue to the Parent's shareholders certificates representing the same number of shares of capital stock of the Surviving Corporation as had been held by them in the Parent immediately prior to the Merger Effective Time.

9 Termination of Plan. This Plan may be terminated and the Merger abandoned by action of the Board of Directors of Parent at any time before the Merger Effective Time.

10 Dissenters' Rights. Each (i) Record Shareholder or (ii) subject to compliance with the provisions of Section 1573 of the PA BCL, beneficial owner of Subsidiary Common Stock that is not a Record Shareholder (either, a "Dissenter"), as the case may be, shall be entitled to exercise dissenters' rights ("Dissenters' Rights") with respect to his, her or its shares of Subsidiary Common Stock ("Dissenting Shares") as a result of the Merger, as provided in Sections 1930(a), and 1571 and the other applicable sections of the PA BCL ("Dissenters' Rights Provisions"). Notwithstanding the foregoing, a Dissenter shall forfeit his, her or its Dissenters' Rights, unless such Dissenter makes a demand pursuant to the provisions of Section 1575 of the PA BCL, at the time and place specified in the Merger Notice with respect to such shares (a "Perfected Dissenter"). A Perfected Dissenter will be entitled,

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Page 11 of 11

subject to compliance with Section 8 of this Plan, to the fair value (less any Withholdings) for his, her or its Dissenting Shares, which fair value will be determined in accordance with Sections 1578 and/or 1579 of the PA BCL, as applicable, and will have such other rights and be subject to such obligations as are accorded to or imposed upon him, her or it pursuant to the Dissenters' Rights Provisions; provided, however, that if a Perfected Dissenter shall subsequently deliver a written withdrawal of his, her or its demand for appraisal of such shares (with the written approval of the Surviving Corporation), then such person shall also forfeit his, her or its Dissenters' Rights. In the event that a Dissenter forfeits his, her or its Dissenters' Rights, then such shares shall thereupon be deemed to have been converted into and to have become exchangeable for, as of the Merger Effective Time, subject to the provisions of Section 8 of this Plan, the right to receive his, her or its Net Merger Consideration provided in Sections 6(a) and 7 of this Plan without any interest or other additional sums payable thereon.

11. Amendment. This Plan may be amended in any manner at any time before the Merger Effective Time by action of the Board of Directors of Parent, subject to compliance with Section 1922(b) of the PA BCL.

The Parent has adopted this Plan as of August 7, 2002.

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Attachment 2
Page 1 of 2

KROHN ENTERPRISES
PO BOX 5324
HUNTSVILLE, AL
35814-5324
(256) 655-5399

INVOICE

DATE: January 15, 2002
INVOICE # 0001
RE: P.O. 01-12145

Bill To:
US Tool & Die
200 Braddock Avenue
Turtle Creek, PA 15145

For:
Retainer (1/2)
Expenses to Date

DESCRIPTION			AMOUNT
Retainer (½ 1st payment)			25,000.00
Airline Tickets			2,473.50
Hotel			1113.83
Car Rental			413.28
Fuel			39.00
Meals			104.16
Tolls			21.00
Parking			48.00
		TOTAL	$29,212.77

Make all checks payable to **Krohn Enterprises**
Payable upon receipt.

KROHN ENTERPRISES
PO BOX 5324
HUNTSVILLE, AL
35814-5324
(256) 655-5399/5400

INVOIC

DATE: February 15, 2002
INVOICE # 0002
RE: P.O. 01-12145

Bill To:
US Tool & Die
200 Braddock Avenue
Turtle Creek, PA 15145

For:
Retainer (1/2)

DESCRIPTION			AMOUNT
Retainer (½ 2nd payment)			25,000.00
		TOTAL	$25,000.00

Make all checks payable to **Krohn Enterprises**
Payable upon receipt.

Jack Symonds Travel Analysis
Case 12E-100

The following investigation was conducted by Intelligence Analyst (b) (7)(C) on August 10, 2006, in Knoxville, TN.

Jul 29-Aug 2, 2001
During the period of 7/29/01 – 8/2/01, Symonds and (b) (7)(C) flew to Philadelphia, PA not on duty status. The hotel is suspected to have been paid for by Holtec. TVA was direct-billed for the rental car because Symonds used his government travel card for the rental. TVA was not reimbursed by Symonds. (Title 18, Sec 287).

July 29 – August 2, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Philadelphia, PA	Expense Category	TVA	US Tool & Die	Holtec
Hotel Locations: Atlantic City, NY Philadelphia, PA On Leave from TVA	Flight	-	-	Unknown
	Hotel	-	-	$1,176.70
	Rental Car	$244.75	-	Unknown
	Meals	-	-	Unknown
	Gas	-	-	Unknown
	Miscellaneous	-	-	Unknown
	Total	**$244.75**	**$0**	**$1,176.70**

Aug 20 - 26, 2001
During the period of 8/20/01 – 8/26/01, Symonds and (b) (7)(C) flew to Syracuse, NY. Symonds' status was on-duty and TVA paid his travel expenses. Subsequently, US Tool & Die also paid for some of his travel expenses through Krohn (Title 18, Sec 209 and 1001).

August 20 – 26, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Syracuse, NY	Expense Category	TVA	US Tool & Die	Holtec
Hotel Locations: Syracuse, NY New York, NY Not On Leave from TVA	Flight	$349.00	$349.00	-
	Hotel	$374.64	$374.64	-
	Rental Car	-	-	-
	Meals	$34.32	-	-
	Gas	-	-	-
	Miscellaneous	$186.20	-	-
	Total	**$944.16**	**$723.64**	**$0**

Jack Symonds Travel Analysis
Case 12E-100

Sep 6 - 7, 2001
During the period of 9/6/01 – 9/7/01, Symonds flew to Philadelphia, PA on duty status and TVA paid his travel expenses. Subsequently, US Tool & Die also paid for some of his travel expenses through Krohn Enterprises (Title 18, Sec 209).

September 6 – 7, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Philadelphia, PA	Expense Category	TVA	US Tool & Die	Holtec
Hotel Location: Mount Laurel, NJ Not On Leave from TVA	Flight	$232.50	-	-
	Hotel	$138.71	$138.85	-
	Rental Car	$84.55	$84.55	-
	Meals	$37.48	-	-
	Gas	-	-	-
	Miscellaneous	$74.58	-	-
	Total	$567.82	$223.40	$0

Sep 23 - 30, 2001
During the period of 9/23/01 – 9/30/01, Symonds and (b) (7)(C) flew to Allentown, PA, on leave status. TVA was direct-billed for Symonds' rental car because Symonds used his government travel card for the rental (Title 18, Sec 287).

September 23 – 30, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Allentown, PA	Expense Category	TVA	US Tool & Die	Holtec
Hotel Location: Unknown On Leave from TVA	Flight	-	$266.00	-
	Hotel	-	-	-
	Rental Car	$484.44	-	-
	Meals	-	-	-
	Gas	-	$21.80	-
	Miscellaneous	-	-	-
	Total	$484.44	$287.80	$0

Jack Symonds Travel Analysis
Case 12E-100

Oct 7 - 8, 2001
During the period of 10/7/01 – 10/8/01, Symonds flew to Philadelphia, PA during a holiday period. The cost of the flight was direct billed to TVA because Symonds used his government travel card to purchase the ticket, and US Tool & Die, through Krohn, also paid the cost (Title 18, Sec 287 and 1001).

October 7 – 8, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Philadelphia, PA	Expense Category	TVA	US Tool & Die	Holtec
Hotel Location: Mount Laurel, NJ Federal Holiday	Flight	$264.50	$264.50	-
	Hotel	-	$144.56	-
	Rental Car	-	$50.09	-
	Meals	-	-	-
	Gas	-	-	-
	Miscellaneous	-	-	-
	Total	**$264.50**	**$459.15**	**$0**

Nov 9-12, 2001
During the period of 11/9/01 – 11/12/01, Symonds and two friends flew to Baltimore, MD. Symonds rented a car and drove to NJ over a weekend/holiday. Symonds submitted a travel voucher to TVA for reimbursement of expenses, and he also was reimbursed for his airline ticket, hotel, and the rental car by US Tool & Die through Krohn (Title 18, Sec 209 and/or 287).

November 9 – 12, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Baltimore, MD	Expense Category	TVA	US Tool & Die	Holtec
Hotel Location: Mount Laurel, NJ Weekend/Federal Holiday	Flight	$177.50	$177.50	-
	Hotel	$314.82	$314.82	-
	Rental Car	$136.91	$136.91	-
	Meals	$62.04	$14.78	-
	Gas	-	$17.20	-
	Miscellaneous	$43.52	$27.00	-
	Total	**$734.79**	**$688.21**	**$0**

Jack Symonds Travel Analysis
Case 12E-100

Dec 6-7, 2001
During the period of 12/6/01 – 12/7/01, Symonds flew to Philadelphia, PA on duty status, rented a car and traveled to NJ. Symonds submitted a voucher to TVA for reimbursement of expenses and also was reimbursed by US Tool & Die through Krohn (Title 18, Sec 209 and 1001).

December 6 – 7, 2001		Company Paying Symonds' Travel Expenses		
Flight Location: Cherry Hill, NJ	Expense Category	TVA	US Tool & Die	Holtec
Hotel Location: Mount Laurel, NJ	Flight	$546.50	$546.50	-
	Hotel	$140.96	$140.96	-
	Rental Car	$102.13	$102.13	-
	Meals	$21.80	$21.74	-
Not On Leave from TVA	Gas	-	-	-
	Miscellaneous	$26.52	-	-
	Total	**$837.91**	**$811.33**	**$0**

Attachment 4
Page 1 of 2

KROHN ENTERPRISES
PO BOX 5324
HUNTSVILLE, AL
35814-5324
(256) 655-5400

(b) (6)
Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

April 1, 2002

Dear (b) (6)

It is becoming more and more difficult for you and I to engage in business conversations, although, through no fault of our own. I am also finding that I too am experiencing some of the paranoid feelings that you have previously expressed concern about. I have determined that the only way to truly communicate with you without fear of some kind of electronic eavesdropping or wiretapping or some other kind of industrial spying technique is to simply revert to a simpler time when writing a letter was the most effective way of communicating. I think that by exercising this medium we can eliminate the anxiety of worrying about what some other people might say or do about the perceptions.

Anyway, I wanted to let you know that the $50K we discussed back in September that was to be paid for activities through the end of the year 2001 has been satisfied. Now let's talk about the $100K that you said that you would pay me in 2002 to stay with TVA. I had originally sent you a proposal that we break that up into quarters which would be $25K in April, $25K in August, $25K in October and $25K in December. You did not respond to that proposal except to say that you wanted me to perform the original deal with Bob. Now that the original deal is satisfied and we are ¼ of the way through 2002, I think we should address how we are going to bill for the remaining $100K.

Krohn Inc. is alive and well and could very well prove to be the proper conduit for this transaction. (b) (6) is still the CEO and all business transactions are done through her. If you want, she can send you an RFQ on Krohn Inc. letterhead explaining the billing for services rendered. You think about it and let me know how you want to handle the evolution.

I think that now that the ice has been broken with TVA on a couple of subjects, i.e., Engineering analysis activities with (b) (6) and Feedwater Heater issues with (b) (6) you should probably offer an unsolicited proposal to perform these kinds of activities. You should address the correspondence to (b) (6) and copy (b) (6)

TVA RESTRICTED INFORMATION

(b) (6) The only thing is, they might say "come on down and give us a presentation of what you think you can offer". We should be out of the outage by the 10th of April. The bad thing is we are going to do a mid-cycle outage on U2 for 2 identified fuel leakers the last week in April. It will only last a week (we hope). Then the board meets on May 16th to determine the fate of U1. So, if you lay this all out, it looks to me like your best chance at an audience with the decision makers between now and then would be the week of April 15th or the week of May 6th. Plan accordingly.

How is the construction company business search going? Have you told (b) (6) (b) (6) not to talk to me? (I thought you may have told them to pretend I didn't exist for a while until some time had passed). I keep trying to get a hold of them and I am not getting any response.

Let's stay in touch, so that we can eliminate any misunderstandings or any miscommunications that we promised each other we would avoid at all cost.

Talk to you later my friend,

Attachment 5
Page 1 of 12

(b) (7)(D)

[redacted]

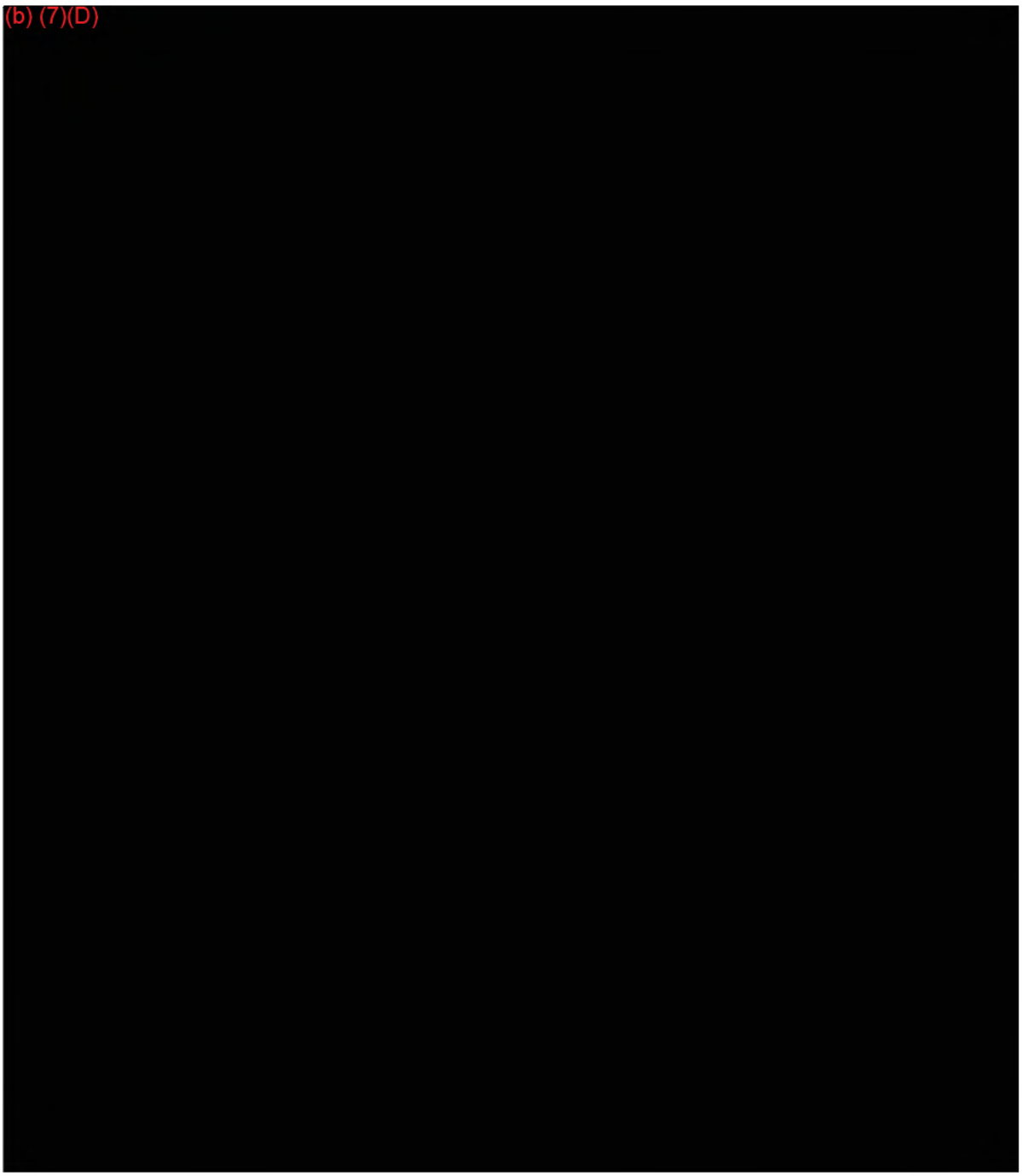
(b) (7)(D)

[redacted]

Atachment 5
Page 3 of 12

(b) (7)(D)

[redacted]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Attachment 5
Page 5 of 12

(b) (7)(D)

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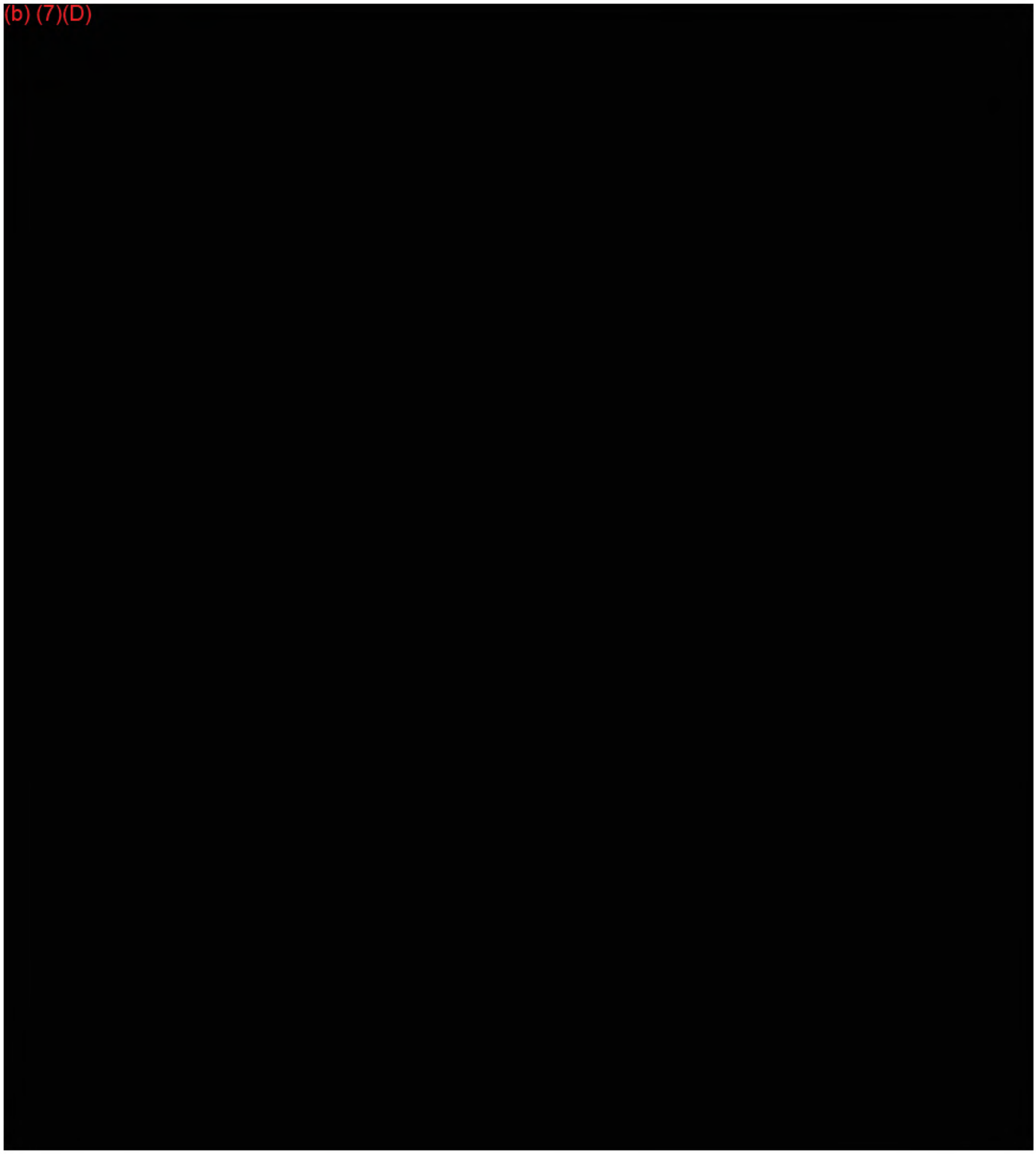
Attachment 5
Page 6 of 12



Attachment 5
Page 7 of 12

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Attachment 5
Page 8 of 12

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Attachment 5
Page 9 of 12

(b) (7)(D)

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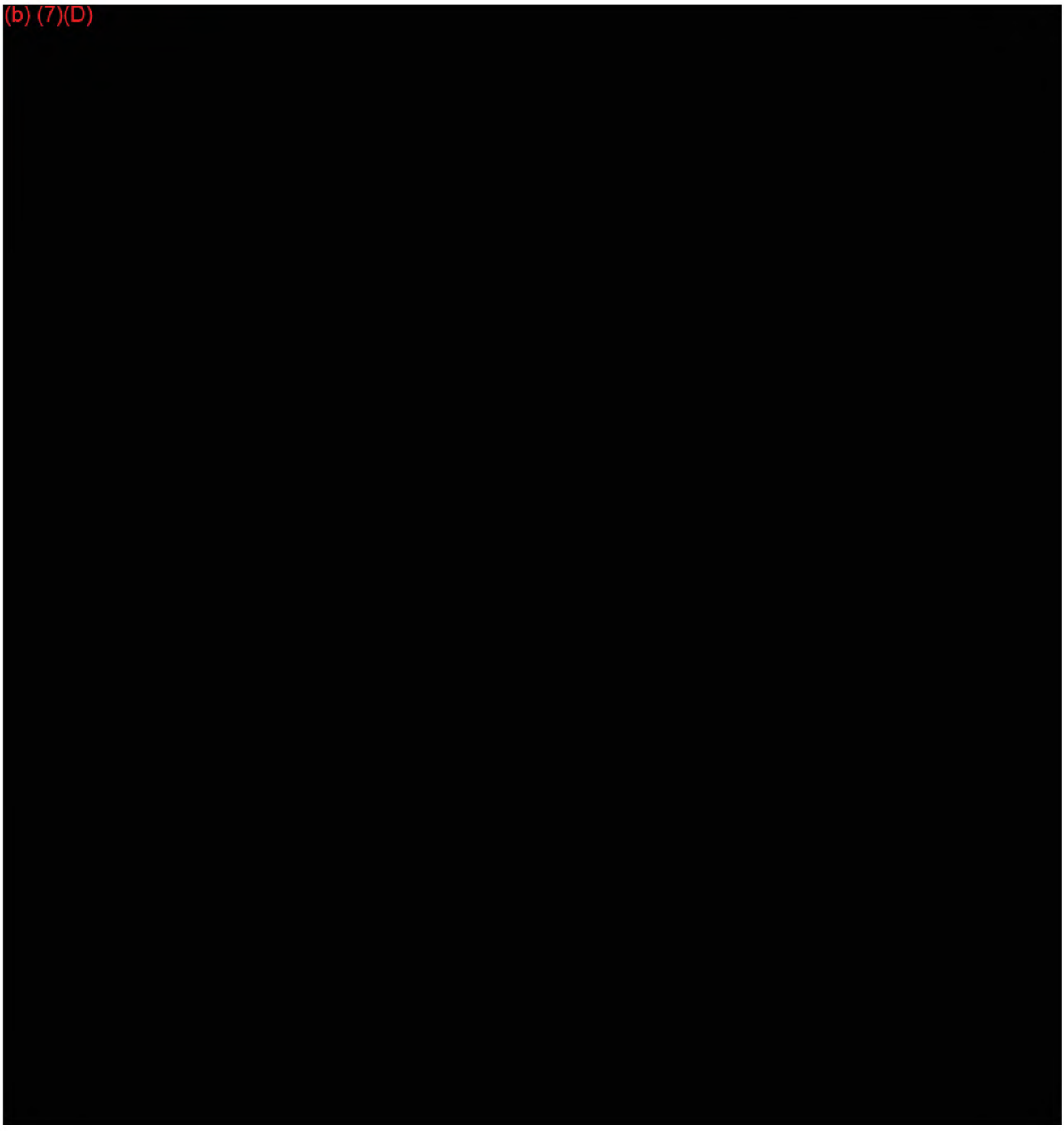
(b) (7)(D)



Attachment 5
Page 11 of 12

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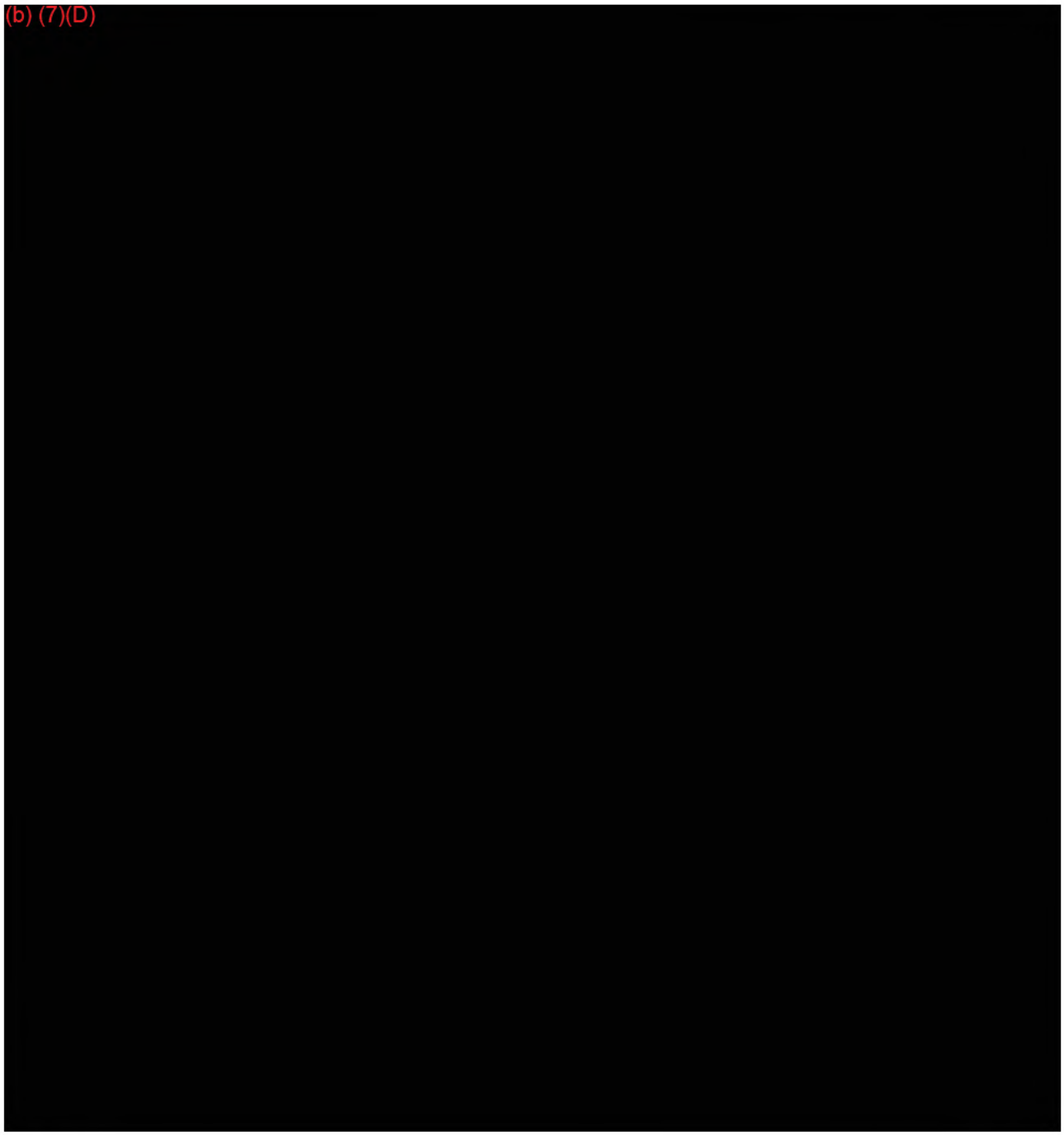

Atttachment 5
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Attachment 6
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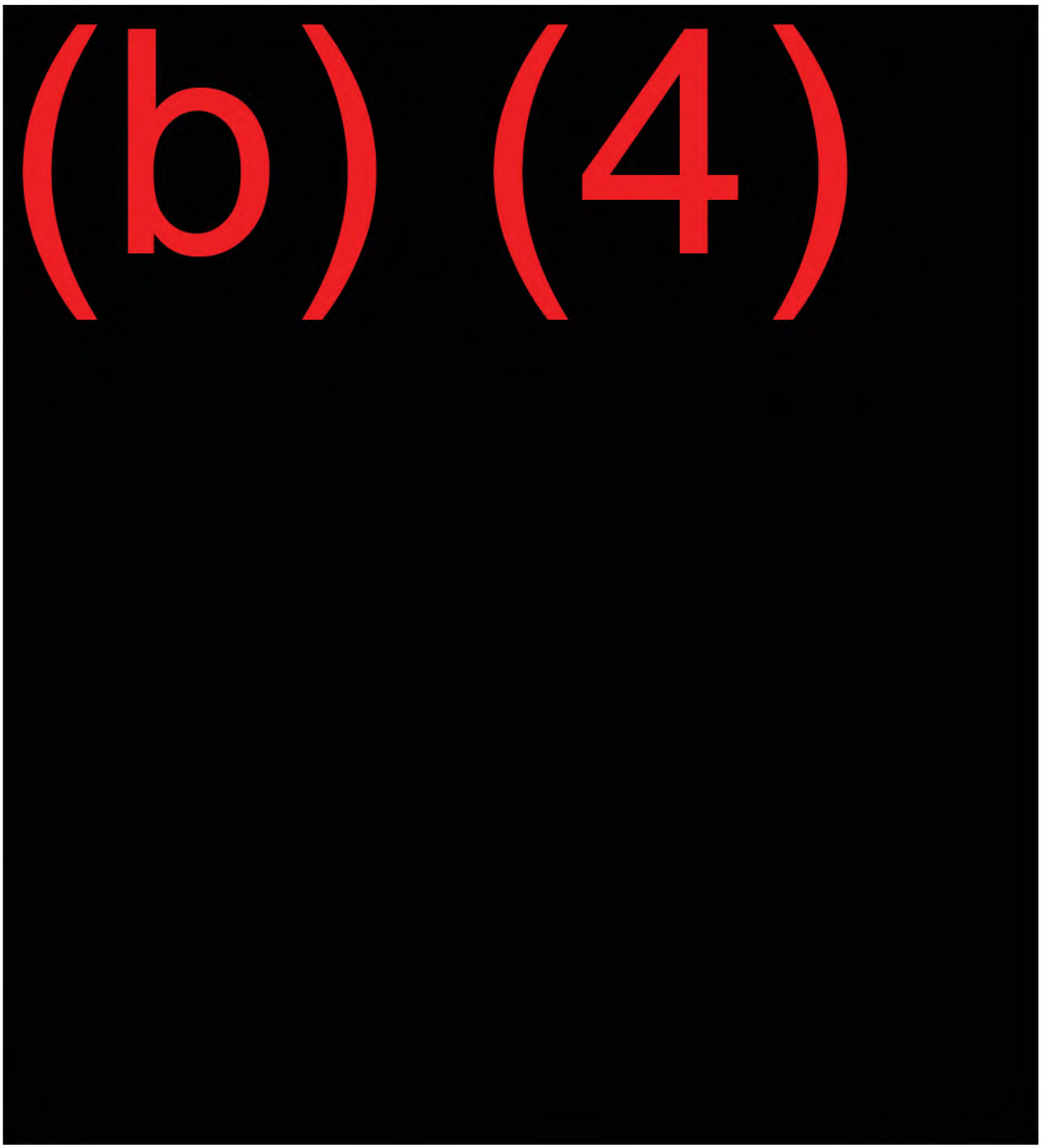
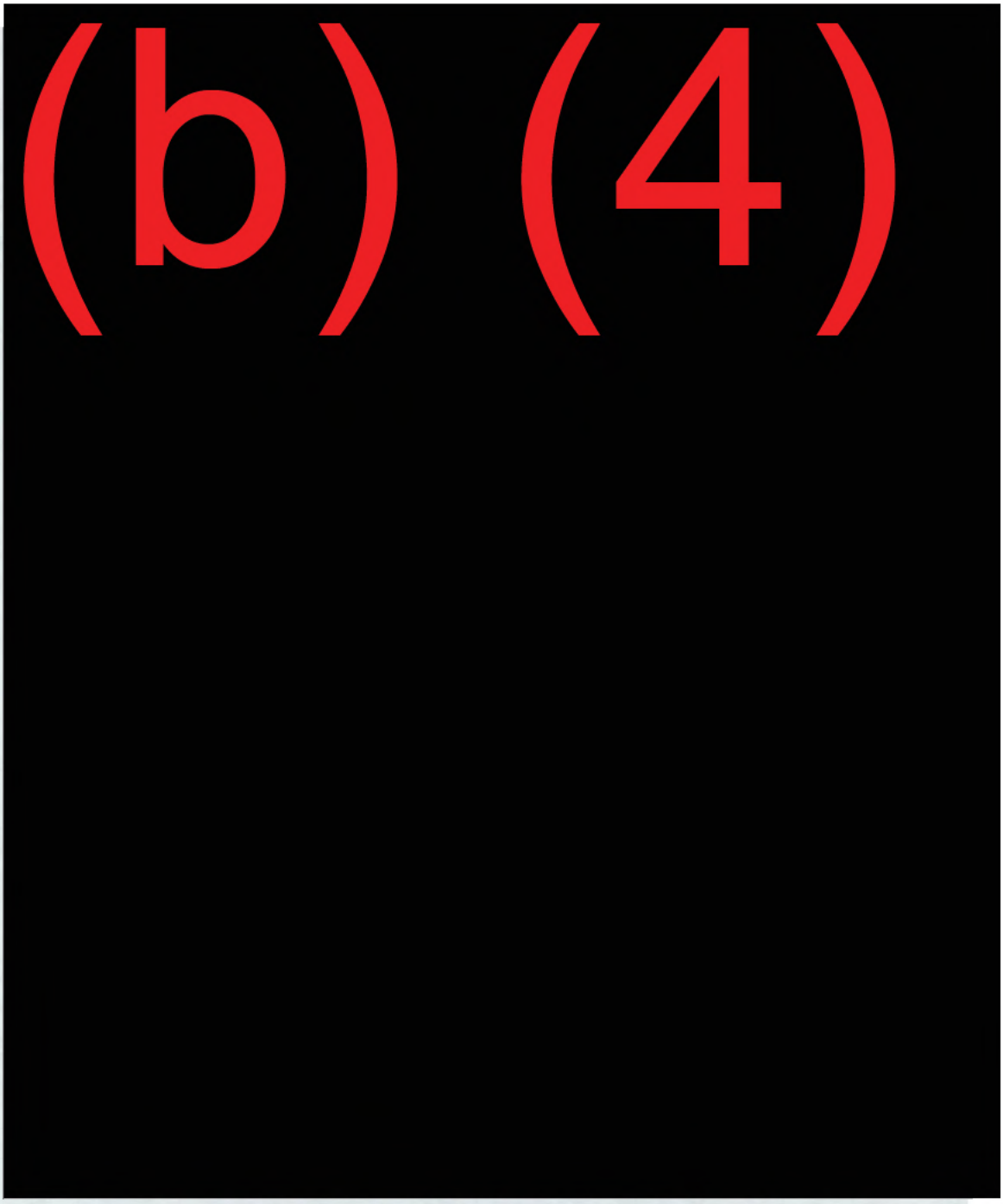
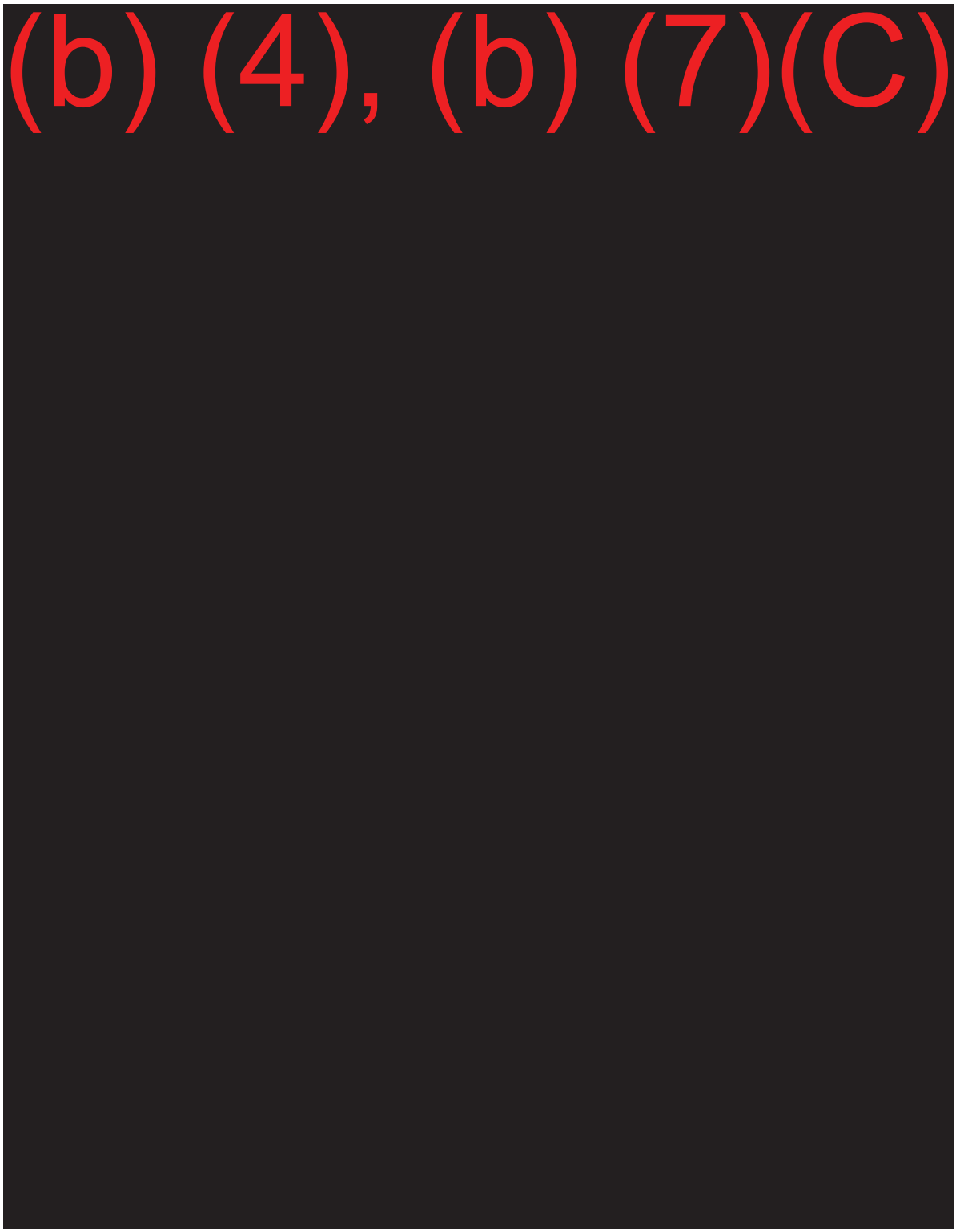
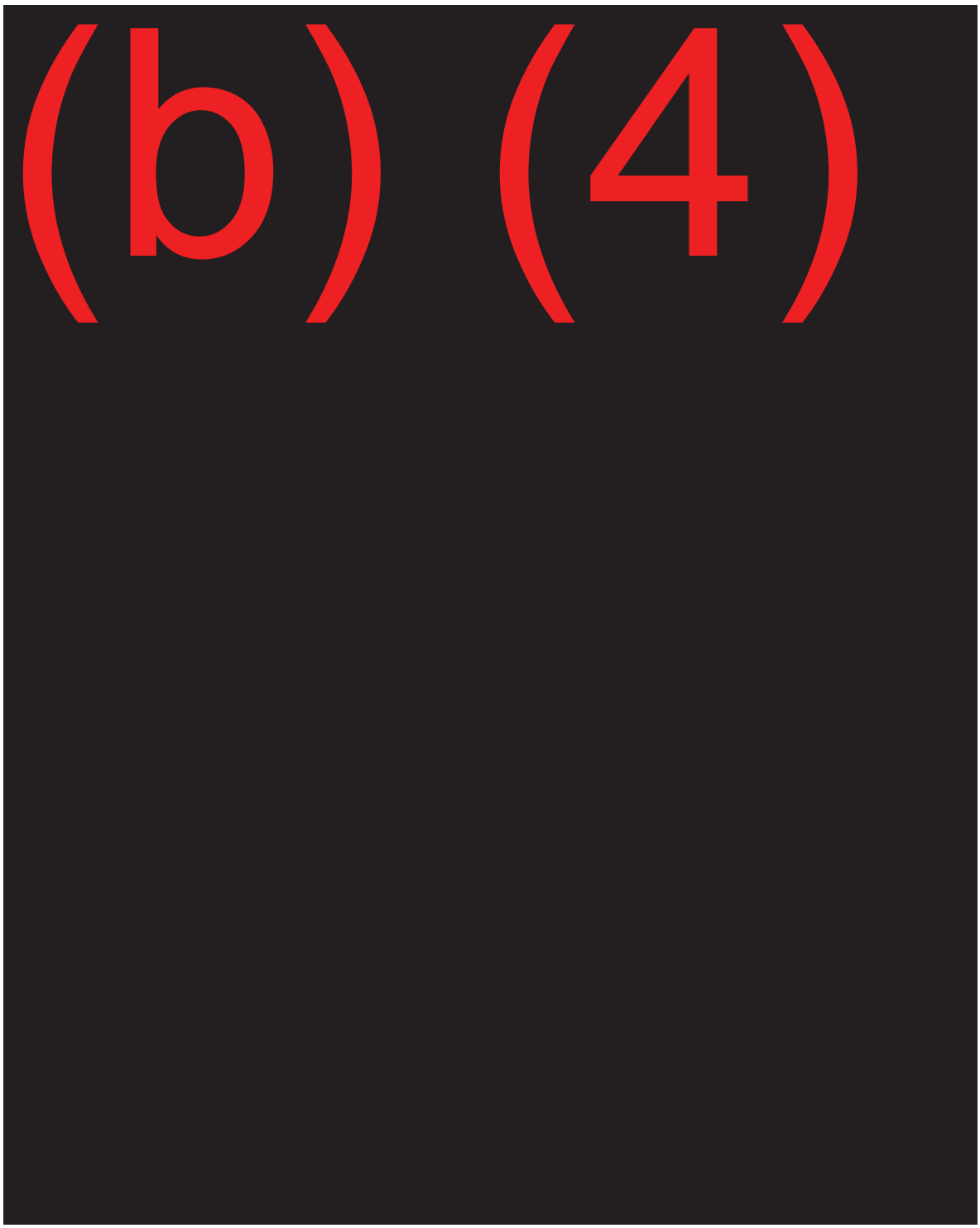


Attachment 6
Pag 2 of 2



Attachment 7
Page 1 of 3

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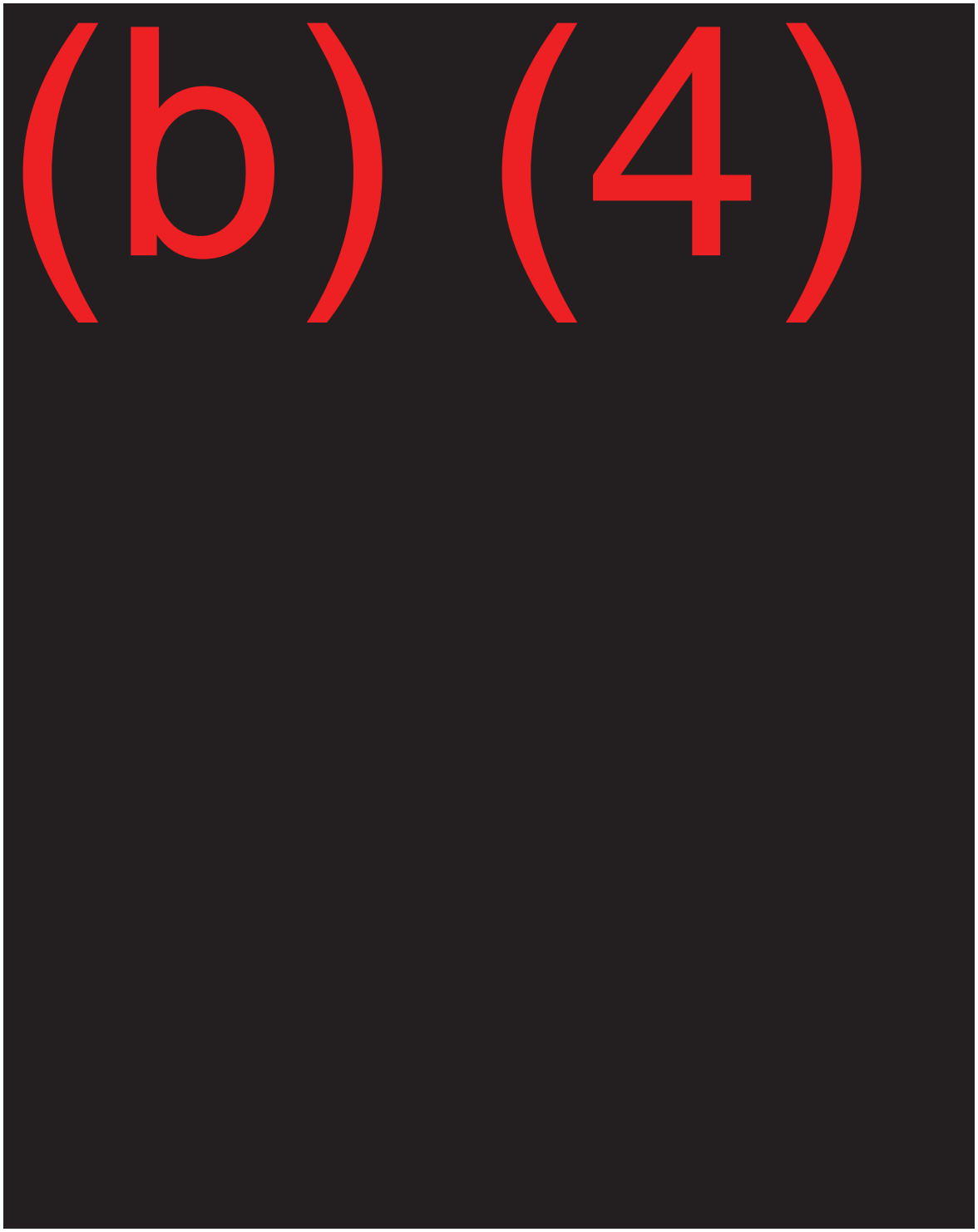
Atttachment 7
Page 3 of 3



July 30, 2007

Charles A. Kandt, ET 4C-K

SPECIAL PROJECT 2007-11160 – HOLTEC INTERNATIONAL CONTRACT NO. 99999906 – REASONABLENESS OF PRICES TVA PAID FOR CERTAIN DRY CASK STORAGE SYSTEMS COMPONENTS AT BROWNS FERRY NUCLEAR PLANT

As requested by OIG Investigative Operations, we initiated an audit of Contract No. 99999906 that TVA has with Holtec International (Holtec) for the purchase of dry cask storage systems for spent nuclear fuel at Sequoyah Nuclear Plant (SQN) and Browns Ferry Nuclear Plant (BFN). The purpose of our review was to assess the reasonableness of the prices TVA paid Holtec for certain high dollar equipment items at BFN in comparison with the prices paid for the equipment at SQN. Specifically, as summarized in the following table, we reviewed the prices TVA paid Holtec for the four largest dollar-value cask system components: (1) the MPC (multipurpose canister for spent fuel); (2) HI-STORM 100 (long-term storage overpack for the MPC); (3) HI-TRAC 125D (in-plant transfer overpack for the MPC); and (4) the vertical crawler.

Summary of Price Differences for Major Components of Dry Cask Storage Systems

Description	SQN Price	BFN Price	Difference
MPC	(b) (4)		
HI-STORM 100			
HI-TRAC 125D			
Vertical Crawler			
Total			

Table 1

As discussed in detail below, information obtained in our audit found Holtec may have made false statements regarding the equipment prices proposed to TVA, and it appeared TVA relied on that information to approve prices quoted for the BFN equipment. Additionally, we found that Holtec had overbilled TVA at least $276,000 for the BFN vertical crawler because it did not comply with the contract's cost-plus pricing provision. In our opinion, the price Holtec quoted for the BFN crawler misrepresented its compliance with the contract.

CONTRACT BACKGROUND

On June 30, 2000, TVA entered into Contract No. 99999906 with Holtec to provide equipment and engineering services for a dry cask system to store SQN spent nuclear fuel.[1] On November 8, 2001, the contract was supplemented to include a similar dry cask system for BFN. As of June 20, 2007, the contract had been supplemented 37 times, and TVA had paid Holtec $31.2 million against the contract payment ceiling of $54 million. The contract term is currently set to expire on June 30, 2008.

[1] The original Contract No. P00NNQ-258310 was changed to No. 99999906 in July 2001 for conversion to the PassPort supply chain software.

The contract included fixed prices for most of the components of the cask system and for defined scopes of engineering tasks to address safety aspects of the cask system unique to the two plant sites. The contract also included cost-plus pricing for optional items including (1) construction of a storage pad for the casks at the plant site and (2) a vertical crawler heavy lifting device to move the casks from the plant to the on-site storage pad.

The OIG is investigating certain issues regarding the pricing TVA agreed to under the contract with Holtec. To support the investigation, an audit (Audit 2007-028C) of the contract was initiated to assess the reasonableness of the prices TVA paid Holtec for the four highest dollar cask system components as summarized in Table 1. To perform our review, we:

- Reviewed the contract and related supplements, correspondence, e-mails, and payment records obtained from TVA's files.
- Visited the SQN and BFN sites and interviewed the dry cask spent nuclear fuel project managers and other key personnel to obtain an understanding about the products purchased.
- Obtained copies of TVA's documentation of products received; Holtec's documentation packages for the MPC, HI-STORM 100, and HI-TRAC 125D units as required by the Nuclear Regulatory Commission for these safety-related items; and Holtec's specification document for each crawler, to more clearly define the products purchased.
- Visited Holtec's offices and reviewed cost information to obtain an understanding about Holtec's costs for the products delivered.
- Visited Lift System's (manufacturer of the vertical crawlers) offices and reviewed documentation of sales and related cost data for vertical crawlers sold to Holtec.

AUDIT FINDINGS AND CONCLUSIONS

Information obtained in our audit found Holtec may have made false statements regarding the equipment prices proposed to TVA, and it appeared TVA relied on that information to approve prices quoted for the BFN equipment. Additionally, we found that Holtec had overbilled TVA at least $276,000 for the BFN vertical crawler because it did not comply with the contract's cost-plus pricing provision. In our opinion, the price Holtec quoted for the BFN crawler misrepresented its compliance with the contract.

MPC, HI-STORM 100, and HI-TRAC 125D

Holtec's proposal (dated September 12, 2001) to add the BFN scope of work included significant price increases for the MPC, HI-STORM 100, and HI-TRAC 125D components in comparison to the prices TVA had agreed to pay for similar equipment at SQN. Our review of TVA and Holtec files found Holtec may have made false statements to TVA when it explained why the prices it had quoted for certain BFN components were higher than the SQN prices. Specifically, in a draft letter submitted to TVA, Holtec informed that:

- The HI-STORM 100 for BFN was a significantly improved model in comparison to the model proposed for use at SQN in that (1) it had a reduced height for transport through

the plant's external door, and (2) it reduced radiation exposure by about one rem per cask.

- The (lower) SQN price for the HI-TRAC 125D was the result of an arithmetic error during quoting.

Each of these statements appears to be false or at least misleading because:

(1) BFN's external door has an additional 4 feet of vertical clearance in comparison to SQN's, thus negating the need for a reduction in height for the BFN HI-STORM 100,

(2) We found no evidence that the proposed BFN HI-STORM 100 model would have had a significant reduction in radiation dose, and

(3) Holtec initially proposed a price for the SQN HI-TRAC 125D that was the same price subsequently proposed for BFN. The final SQN price resulted from a discount offered by Holtec late in the bidding process. Holtec's claim that the lower SQN price was the result of an arithmetic error rather than a discount may have created the illusion that its prices were not negotiable. (Note – Holtec's final letter transmitting a comparison of the prices did not include the statements from the draft about the HI-STORM 100. However, the letter continued to mislead the TVA negotiation team regarding SQN's low price for the HI-TRAC 125D, referring to it as "an estimating department error.")

It appeared TVA relied on the information provided by Holtec to justify paying the higher BFN prices rather than attempting to negotiate lower pricing for BFN. Although it is unknown if TVA could have successfully negotiated lower prices for BFN, key economic indicators and reductions in material prices between the time period when Holtec proposed the SQN and BFN prices indicate TVA had an opportunity to negotiate better prices. For example, the price of steel had fallen about 7 percent during the period between the SQN proposal and the BFN proposal.

In summary, we found no evidence that the higher prices TVA agreed to pay for the BFN MPC, HI-STORM 100, and HI-TRAC 125D were reasonable. Instead, it appeared (1) Holtec may have misled TVA regarding its pricing, and/or (2) TVA did not attempt to negotiate better prices at BFN.

Vertical Crawler

Contract No. 99999906 provided that the pricing for (b) (4) (b) (4) Although the price TVA paid for the SQN crawler was in accordance with the cost-plus provision, the price for the BFN crawler was not. As discussed below, TVA's price for the BFN vertical crawler should have been at (b) (4) ess than the amount quoted by Holtec. Additionally, since Holtec's price quote for BFN was (b) (4) in our opinion the quoted price was a misrepresentation by Holtec that it was complying with the contract's pricing provision.

Holtec's Cost for Vertical Crawler Supplied to BFN – The vertical crawlers provided for SQN and BFN were manufactured and sold to Holtec by Lift Systems. Although the SQN crawler

had been ordered by Holtec specifically for the SQN project, the crawler that was sent to BFN had originally been ordered by Holtec for a project it had with Hope Creek Nuclear Plant (Hope Creek). When TVA requested Holtec to provide a crawler for BFN, to meet TVA's time requirements Holtec apparently requested Lift Systems to (1) send the crawler that had been manufactured for Hope Creek to BFN and (2) manufacture another crawler for Hope Creek.

We reviewed documentation of the prices Holtec paid Lift Systems for each of the crawlers and found Holtec had paid Lift Systems (b) (4) (b) (4) (b) (4) Based on the prices Holtec paid for the two vertical crawlers, the most that should have been billable to TVA would have been (b) (4)[2]

Potential Misrepresentation by Holtec – (b) (4) (b) (4) (b) (4) the quoted price misrepresented Holtec's compliance with the contract's cost-plus provision. Additionally, Holtec may have made false statements by informing TVA the price for the BFN crawler was higher than the price of the SQN crawler because the BFN crawler (1) had enhancements that the SQN crawler did not have and (2) included expediting fees. We found the enhancements on the BFN crawler were minor and would not have materially affected Holtec's cost. Additionally, we found no evidence that Holtec incurred any expediting fees other than the higher price it paid Lift Systems for the replacement crawler for Hope Creek.

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Based on discussions we have had with (b) (7)(C) we understand OIG Investigations does not want Audit Operations to issue an audit report to TVA or Holtec at this time since the investigation is ongoing. Accordingly, we are providing the information in this memorandum for use in your ongoing investigation. If you need additional information, please contact (b) (7)(C) (b) (7)(C)

Ben R. Wagner
Deputy Inspector General
ET 3C-K

JHB:JP
cc: Jack E. Brennan, ET 4C-K
(b) (7)(C)
Richard W. Moore, ET 4C-K
OIG File No. 2007-11160

[2] TVA could make an argument (b) (4) However, a legal opinion would be needed as to whether TVA could prevail at paying this lower cost since Holtec apparently had to pay a higher cost to replace the Hope Creek crawler.

EXHIBIT 26

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Governor's Task Force on EDA Tax Incentives

Established Pursuant to Executive Order No. 52 (Murphy)

First Published Report

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June 17, 2019

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I. EXECUTIVE SUMMARY

The Task Force on the Economic Development Authority's Tax Incentives (the "Task Force") is an advisory body and, pursuant to its mandate, submits this first report (the "First Report") to advise the Governor of its initial findings and recommendations.

In January 2018, Governor Philip D. Murphy directed the Office of the State Comptroller to conduct a comprehensive performance audit of the Grow New Jersey Assistance Act ("Grow NJ") and Economic Redevelopment and Growth ("ERG") tax-incentive programs (each a "Program" and together, the "Programs"), and predecessor programs, from 2010 forward, to "inform the public about the EDA's operations" and "assist lawmakers in their deliberations as to whether these programs should be reauthorized when they expire on July 1, 2019." On January 9, 2019, New Jersey State Comptroller Philip J. Degnan (the "Comptroller") issued his audit report[1] of the State's tax-incentive programs. The Comptroller's audit report revealed, among other things, that the New Jersey Economic Development Authority (the "EDA") had failed to comply with the applicable statutes and regulations and to implement key internal controls for monitoring the performance of tax-incentive beneficiaries.

In response to the Comptroller's audit report, Governor Murphy issued Executive Order No. 52, which established this Task Force with the following objectives:

1. Conduct an in-depth examination of the deficiencies in the design, implementation, and oversight of Grow NJ and the ERG tax-incentive programs, including those identified in the Comptroller's audit report, to inform consideration regarding the planning, development and execution of any future structure of these or similar tax-incentive programs; and

2. Hold public hearings and request testimony from individuals who can provide insight into the design, implementation, and oversight of these programs.

The Task Force has been authorized to call upon any department, office, division or agency of the State to supply it with data and any other information or assistance available to such agency as the Task Force deems necessary to execute its duties. Each State agency also has been required to timely cooperate with the Task Force. In addition, Governor Murphy appointed Professor Ronald Chen, as the Chairman of the Task Force, to "perform all of the functions of a duly authorized representative of the Governor" pursuant to N.J. Stat. § 52:15-7, including the ability to "subpoena

[1] A Performance Audit of Selected State Tax Incentive Programs, Jan. 9, 2019.

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and enforce the attendance of witnesses."[2] The Task Force has generally sought, in the first instance, to obtain information through witnesses' voluntary cooperation, but has also relied upon Professor Chen's subpoena power where necessary.

As described in more detail below, to fulfill its mandate, the Task Force has collected and reviewed thousands of documents—obtained from the EDA and other agencies, from companies awarded benefits under the Programs, and from other parties—and conducted 28 interviews to date. These interviews have included former and current EDA personnel and other government employees, as well as other parties with knowledge of or information about the design and administration of the Programs.[3] The Task Force has also interviewed several policy experts to provide insight on the structure and features of New Jersey's tax-incentive programs.

Although the Task Force's mandate encompasses both the Grow NJ and ERG programs, its investigation to date has focused primarily on Grow NJ. The Task Force's investigation is ongoing, and it intends to address ERG, as well as other aspects of Grow NJ, in later reports.

Given its mandate of examining the "design, implementation, and oversight" of the tax incentive programs, the Task Force began its analysis by dividing its efforts into two separate but related areas. In the first, it focused on the Programs' legislative underpinnings, examining factors relating to the design of the Programs, including whether special interests played a role in the statutory provisions. In the second, the Task Force focused on the EDA's implementation of the statutes and on its administration of the Programs. This included focus on examining the EDA's review and diligence over program applications to determine whether the EDA was employing meaningful scrutiny of those applications.

Although there is necessarily crossover among the issues encountered in these separate investigative areas, this investigative structure has enabled the Task Force to most efficiently and comprehensively examine the Programs. The description of our findings below follows this general investigative structure. The Task Force's findings are based upon the information available to the Task Force as of this date and are subject to further revision as the Task Force's investigation proceeds and additional information becomes available. In sum, the Task Force has found as follows:

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[2] *See* March 22, 2019 Letter from Governor Murphy to Professor Chen.
[3] We do not name EDA staff referenced herein, but we do name certain EDA senior managers.

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A. Special Interests, Which Prioritized Benefits to Private Parties Rather than the State, Had a Significant Impact on the Design of the Grow NJ Statutes and Regulations

With respect to the design of the statute, special interests—in the form of a law and lobbying firm and the clients on whose behalf it apparently operated—appear to have had a significant impact on the design of the Grow NJ statute as amended by the Economic Opportunity Act of 2013 (or "EOA 2013") and its implementing regulations. As a result of those special interests, EOA 2013 was—in several ways—structured to favor certain parties while disfavoring others in certain respects. For example, a statutory provision related to grocery stores in Camden appears to have been drafted to permit a particular grocery store to obtain tax incentives, while prohibiting a competitor grocery store from obtaining such benefits. Although neither grocery store ultimately opened in Camden, the drafts of this provision highlight the significant and, in the Task Force's view, inappropriate role special interests played in crafting the statute.

In addition, the Grow NJ program was dramatically expanded by EOA 2013 in numerous respects. Principal among these amendments were provisions that allowed projects in Camden—where many of the law firm's clients had business interests—to receive awards far in excess of what would have been possible in other parts of the State. Unlike the requirements applicable in other parts of the State that Grow NJ awards be anticipated to result in a net positive benefit to the State in terms of new tax revenue, these large awards for projects in Camden could be based on "phantom" taxes that would never actually accrue and thus might not result in a gain to the public fisc.

B. The EDA Did Not Have Adequate Procedures in Place to Ensure That It Discovered Relevant Information, Including Applicant Misstatements, That Would Have Led to Rejection of Some Applications or a Significant Reduction in the Amount of Certain Awards

With respect to the administration of the Programs, the EDA had only a few formal written policies and procedures to provide guidance to the EDA employees tasked with reviewing companies' applications for tax incentives. Even more troubling, the EDA lacked any formal training to ensure those same employees had a common understanding of Program requirements or clear rules for conducting due diligence on tax-incentive applications, which often involved awards of millions of dollars. This fundamental lack of controls led to important misunderstandings over threshold requirements for applications and inconsistency within the EDA in its evaluation and application of Program requirements—including confusion over even the basic level of scrutiny to be applied to applications, with some EDA employees viewing the vetting process as a "box

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checking" exercise, during which a company's factual assertions deserved deference, and other employees applying meaningful scrutiny.

Relatedly, the EDA did not have any protocol or written standards for conducting research in connection with companies' applications for Program benefits. As a result, at least with respect to the applications the Task Force has investigated in detail thus far, some EDA employees conducted independent research to verify aspects of applicants' factual assertions and others failed to do so, even when relevant information was readily available. For example:

- A simple internet search revealed that one company, Holtec International, had been debarred by the Tennessee Valley Authority, even though Holtec said it had never been debarred in its Grow NJ application. Although such a debarment would have been grounds for the EDA to deny Holtec's application for tax incentives, the Task Force found no evidence that the EDA discovered Holtec's debarment. Apparently unaware of the debarment, the EDA ultimately approved Holtec for a $260 million Grow NJ award.

- Another simple internet search revealed that three companies—Conner Strong & Buckelew Companies, LLC, The Michaels Organization, LLC, and NFI, L.P.—committed to move to Camden more than a year before submitting their applications for tax incentives, in which they claimed they were considering relocating to Pennsylvania as a potential alternative. Had the EDA's employees found this information,[4] the EDA may have found these applications materially misleading, and denied an award on that basis. At a minimum, armed with this information, the EDA should have calculated these awards based only on new jobs moving to Camden from outside the State, and the awards to these three entities combined would have been reduced by over $70 million.

[4] As we discuss below in Section V(C)(4)(b)(i) of this First Report, we found evidence that the then-President and Chief Operating Officer of the EDA, Tim Lizura, should have reasonably known by September 24, 2015—thirteen months before these three companies applied for tax incentives under the Grow NJ program—that these applicants had committed to the Camden project. This meant that their certifications in their applications that jobs were "at risk" of leaving New Jersey were, at best, dubious. We found no evidence that Mr. Lizura shared this information with either the Business Development Officer or Underwriter responsible for these applications. We continue to investigate this issue.

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To date, our investigation has uncovered no evidence that the EDA intentionally ignored this information, but the failure to have strict guidelines for such research made these lapses possible. Indeed, in another instance, the EDA failed to follow up on red flags (that is, concerns or cause to follow-up) in the actual application materials submitted by the applicant itself. The Cooper Health System acknowledged in its initial application materials that no jobs were at risk of leaving New Jersey and it was not considering any out-of-state locations. The EDA subsequently accepted, without any skepticism or further diligence, Cooper Health's later claim that it was considering an out-of-state relocation, and approved Cooper Health for nearly $40 million in tax incentives. The evidence shows otherwise. Had the EDA calculated Cooper Health's award based on its initial representation that no jobs were at risk of leaving the State, Cooper Health's award would have been approximately $7 million—more than $32 million lower than what it was awarded.

Although the Task Force's investigation is ongoing, below we make a number of recommendations for future legislation, as well as for the EDA's procedures in administering the Programs, based on its findings to date. By way of summary, those include:

- Designing any future legislation to ensure as much as possible that the public policy goals are applied neutrally, without favoring specific business interests;
- Assuring that persons or firms who represent tax-incentive applicants are properly registered as lobbyists under the New Jersey Legislative and Governmental Process Activities Disclosure Act;[5]
- Refraining from providing draft EDA regulations to people or firms that represent tax-incentive applicants outside the public notice-and-comment procedure under the New Jersey Administrative Procedure Act;[6]
- Taking steps to ensure that tax incentives are structured so that they result in a net gain to the State, or, if they do not, that fact is transparent;
- Ensuring that the language of any new legislation and implementing regulations more clearly sets forth the standards to be applied in determining eligibility for tax incentives;
- Strengthening the EDA's ability to withhold all or part of an award where a company has failed to meet its commitments, and ensuring that the EDA has sufficient data to fully evaluate a company's compliance with its incentive agreement;

[5] N.J. Stat. § 52:13C-18 et seq.
[6] N.J. Stat. § 52:14B-1 et seq.

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- Requiring the EDA to implement formal written policies and procedures governing all aspects of the Programs and their administration and to undertake to formally train its staff in how to review Program applications and monitor compliance;
- Requiring the EDA to use an experienced professional services firm to conduct a background check on each applicant and its affiliates and senior executives; and
- Strengthening the EDA's process for conducting diligence into an applicant's claim that it intends to locate out of state absent the award of tax incentives from New Jersey.

In addition to examining the design and administration of the Programs, the Task Force has established an accelerated recertification program, or "ARP," pursuant to which companies can voluntarily submit information to establish that they have been and remain in compliance with all Program requirements. We did this for two reasons: (1) we desired to streamline our work to focus on the most serious issues; and (2) if the EDA did an inadequate job vetting applications, but the applicant had business records to demonstrate its compliance with Program requirements, the EDA's oversight lapses for these applications would not have had a negative impact on the public fisc. Currently, 53 companies have pursued participation in the ARP.[7]

Finally, although our focus has been and shall remain on the EDA, our investigation necessarily involves a review of companies' tax-incentive applications to determine how the EDA administered the Grow NJ and ERG programs. As a corollary to our work, the Task Force has uncovered several instances where Program beneficiaries have—whether intentionally or not—failed to comply with Program requirements, either by submitting inaccurate information in their applications or by subsequently falling out of compliance. The Task Force has obtained some voluntary terminations of awards, and has referred others to the State Treasury or either law enforcement agencies, the EDA, or both, which may result in, among other things, steps to suspend or terminate these awards. The aggregate value of the awards that were either voluntarily terminated or may be subject to such suspension/termination actions exceeds $500 million.

II. INTRODUCTION TO THE PROGRAMS

New Jersey currently has two principal tax-incentive programs: Grow NJ and ERG. A brief summary of both programs follows.

[7] Of these companies, the Task Force has identified several companies that present threshold issues, which must be resolved before the company can proceed with the ARP. The Task Force is working with these companies to obtain additional information before it makes a final decision regarding their participation in the ARP.

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Grow NJ is generally intended to incentivize the creation of new jobs in the State or the retention of existing jobs that, absent the provision of tax incentives, would be eliminated or relocated outside New Jersey. To qualify for tax incentives under Grow NJ, a company must agree to make a minimum capital investment in a business facility—for example, the company may construct a new office building or rent new office space—at which the company agrees to create a minimum number of new jobs or retain a minimum number of existing jobs that, absent the tax incentives, would be eliminated or relocated out of state.[8] The Grow NJ program is intended to incentivize a company's capital investment and job creation or retention, together often referred to as a "project" by the company To qualify for the tax incentives, the company is usually required to demonstrate that, unless the incentives are provided (in the language of the statute, "but for" the incentives), the company's jobs would be eliminated or located outside New Jersey.[9]

ERG is generally intended to incentivize commercial and residential real estate development in qualifying locations in the State. To qualify for tax incentives under ERG, applicants are required to demonstrate a project financing gap—the costs that remain to be financed after accounting for all other sources of capital. [10]

The Task Force's investigation to date has focused on the Grow NJ program.

III. INVESTIGATIVE PROCESS

In this initial phase of its investigation, the Task Force sought to go beyond the scope of the Comptroller's audit as required by Executive Order No. 52. To that end, the Task Force sought to examine the design of the Programs and, further, to identify and investigate internal-control deficiencies in the EDA's administration and implementation of the Programs. To accomplish these aims, the Task Force established an investigative process for two separate, but related, work streams:

A. First Work Stream: The Design of the Tax-Incentive Programs

To carry out its examination of the design of the Programs, the Task Force needed to examine the history of the statutes relevant to the Programs. These statutes included:

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[8] *See* N.J. Stat. § 34:1B-244(a).
[9] *See* N.J. Stat. § 34:1B-244(d). The statute has different provisions that apply to projects in Camden and Atlantic City, which replace the "but for" test that is applicable in other parts of the State with an alternative "material factor" test. These provisions are discussed below.
[10] *See* N.J. Stat. §§ 52:27D-489e, 52:27D-489c ("project financing gap" definition).

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- The New Jersey Economic Development Authority Act, which in 1974 created the EDA as a state governmental agency and defined its authority.[11]
- The New Jersey Economic Stimulus Act of 2009 (the "ERG Act"), which created the ERG program in 2009, to be administered by the EDA.[12]
- The Grow New Jersey Assistance Act (the "Grow NJ Act"), which created the Grow NJ program in 2012, also to be administered by the EDA.[13]
- The New Jersey Economic Opportunity Act of 2013 ("EOA 2013"), which significantly revamped and expanded both the Grow NJ and ERG programs in 2013.[14]
- Multiple subsequent statutory amendments that revised the Grow NJ and ERG programs in relatively more minor ways between 2013 and the present.

Since the Governor's investigatory power is limited to the Executive Branch,[15] the Task Force did not affirmatively investigate the Legislature itself or its passage of these statutes, beyond what is available in the public domain. However, the statutes collectively create and define the Programs and, in addition, set out the parameters of the EDA's lawful discretion in its administration of them. As such, it is both within the Task Force's mandate—and necessary to the Task Force's mission—to analyze all pertinent aspects of the controlling statutory design, as embodied in the relevant statutes.

The Task Force began its analysis of the statutory design and history with publicly available documents, including the current versions of the statutes themselves and proposed and enacted bills and legislative statements.[16] The Task Force also reviewed and analyzed certain non-public evidence bearing upon the statutory design. During the investigation, the Task Force obtained draft

[11] P.L. 1974, c. 80 (current version codified at N.J. Stat. § 34:1B-1 et seq.).
[12] P.L. 2009, c. 90 (current version codified at N.J. Stat. § 52:27D-489e et seq.).
[13] P.L. 2011, c. 149 (current version codified at N.J. Stat. § 34:1B-242 et seq.).
[14] P.L. 2013, c. 161.
[15] N.J. Const., art. V, § 4, ¶ 5 ("The Governor may cause an investigation to be made of the conduct in office of any officer or employee who receives his compensation from the State of New Jersey, except a member, officer or employee of the Legislature or an officer elected by the Senate and General Assembly in joint meeting, or a judicial officer.").
[16] These draft versions of the bill are attached as Exhibits 1 and 2. The current statutes, as well as proposed and enacted bills legislative statements, are available on the Legislature's website. *See* N.J. Legislature, https://www.njleg.state.nj.us.

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versions of the EOA 2013 bill dated June 21, 2013.[17] The draft reflected revisions made in "track changes" mode and included metadata showing the author of each respective revision. The Task Force also acquired and analyzed a substantial number of documents from governmental sources, including the EDA. In many cases, these documents provided further evidence concerning relevant context surrounding the statutory design and the parties who impacted it.[18] The Task Force also spoke to witnesses who provided context concerning the special interests that affected the statutory design in various respects.

Through review and analysis of these public and non-public materials, the Task Force acquired significant information concerning the design of the Programs and the limitations on the EDA's discretion in its administration of them. The Task Force received evidence demonstrating that the EDA opposed some of these statutory provisions and in certain instances advocated for alternative provisions. However, because they were enacted into law, the EDA was required to faithfully administer them, irrespective of whether they were justifiable as sound policy.

The Task Force also analyzed the design and history of the EDA's implementing regulations for the Programs. Like other governmental agencies tasked with the administration of government programs, the EDA is authorized by New Jersey law to promulgate regulations that interpret the statutes implemented by the agency, including the Grow NJ and ERG Acts. While agency regulations must be faithful to the laws they implement, they may provide additional rules beyond those expressly set out by the statutes—in this way, agency regulations serve to effectively "fill in the gaps" in the statutes. The New Jersey Administrative Procedure Act (the "APA") sets out certain procedures that New Jersey agencies, including the EDA, must follow when promulgating regulations.[19] The APA requires a so-called "notice-and-comment" process in which agencies, before issuing final regulations with the force of law, must first provide the public with notice of the regulations they are considering and receive and consider comments from interested members

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[17] One of these draft versions was in the EDA's files. In addition, the Task Force learned that a law firm likely had additional versions of the draft legislation. Although this firm initially promised full cooperation with the Task Force, it subsequently declined to produce these versions without a subpoena.

[18] This investigation revealed that certain persons appeared to have engaged in unregistered lobbying in New Jersey, in apparent violation of the New Jersey Legislative and Governmental Process Activities Disclosure Act, N.J. Stat. § 52:13C-18 et seq. The Task Force referred this matter to appropriate law enforcement authorities, as previously disclosed.

[19] *See* N.J. Stat. § 52:14B-1 et seq.

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of the public. The Task Force has investigated the EDA's processes in this respect, primarily through analysis of documents and information provided by the EDA.

B. Second Work Stream: EDA's Administration of the Tax-Incentive Programs

To carry out its examination of the EDA's administration and implementation of the Programs, the Task Force established an Investigative Process to methodically identify, collect, review, and analyze pertinent information and data. The Task Force began by conducting a linear investigation of the Grow NJ and ERG application processes, from pre-application discussions through approval to annual certification and credit of the tax incentive awards. We examined these processes both by looking at the EDA's internal processes and files and by gathering information about, and from, the companies that were awarded incentives under the Programs.[20] At the onset of our investigation, we met with Friedman Kaplan Seiler and Adelman LLP ("Friedman Kaplan"), counsel for the EDA to get an overview of the EDA's processes and procedures. We then deepened our understanding of the processes and applicants—and various issues with them—through interviews of relevant personnel (both from within the EDA and outside the EDA) and review of relevant documents. As discussed below, the initial scope naturally expanded as the Task Force acquired, reviewed, and analyzed relevant evidence bearing on the EDA's processes and individual companies.

1. Background Meetings

The Task Force requested to meet with the EDA, State Treasury, and the State Comptroller's Office immediately after its inception to better understand the interplay of various State agencies involved in the process. At the initial meeting referenced above, Friedman Kaplan provided a high-level overview of the application process from pre-application through certification of a tax-incentive grant. Friedman Kaplan has continued to work cooperatively with the Task Force to produce documents and information and to review and assess the internal processes and controls within the EDA as they relate to the tax-incentive programs.

The Task Force also met with members of the Treasury Department's Division of Taxation (the "Treasury"). The Treasury provided an overview of its role in the administration and implementation of the Programs. Beyond a general overview, Treasury explained the

[20] Although we have begun our investigation of the certification and credit-award processes, our investigation thus far has largely been focused on the earlier stages of the approval process.

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documentation, memoranda, and certifications it reviews and approves before awarding a tax credit to a Program applicant.

The Task Force interviewed State Comptroller Philip Degnan and members of his audit team with the goal of obtaining a better understanding of the Comptroller's findings regarding the EDA's processes and procedures. Comptroller Degnan and his team provided an overview of their audit and findings and have continued to work collaboratively with the Task Force to provide information and offer consultation with respect to the Comptroller's audit.

The Task Force requested ongoing cooperation with the EDA and the State Comptroller's Office and for both entities to ensure that they were preserving relevant documents. The EDA, Treasury, and Comptroller's office have provided the Task Force with numerous documents in response to our requests. The bulk of the documents the Task Force has obtained have come from the EDA. Thus far, the Task Force has obtained over 1,069,789 pages of materials from the EDA and is continuing to conduct a strategic review of these materials.

2. Definition of Scope and Document Preservation and Collection

The Task Force worked collaboratively with the EDA to compile a list of all companies that have been certified to receive a Program award and did in fact receive a tax credit. Based on these parameters, there were 106 projects in the Task Force's initial scope. The Task Force subsequently expanded the scope of its investigation to include certain additional companies that had been approved for a tax-incentive award but that had not yet received tax credits. Those companies are discussed in more detail below.

a) Document Preservation and Company Outreach

The Task Force sent document preservation directive letters to companies that were identified as within its initial scope. The preservation notice informed the companies that the Task Force may seek information and documents relevant to the Programs and that the companies should take affirmative steps to ensure that all relevant documents would be preserved. To date, the Task Force has sent preservation letters to 116 companies.[21] In addition, the Task Force sent preservation notices to additional entities identified as related to Program applications and legislative design. In order to understand the EDA's review process for Program applications, the Task Force sought to identify what business records and documents existed, which would bear on company applications and certifications, even if the EDA chose not to request such documentation. The EDA has broad

[21] This includes companies that did not fall within the Task Force's initial scope but were later added to the investigative work stream based on leads obtained during the investigation.

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authority to request additional information from applicants,[22] but did not use this express authority in every case.

The Task Force reached out to each company to confirm (a) that the company had received the preservation directive; and (b) that the company was taking requisite steps to comply with the directive. The Task Force made contact with a majority of the companies. However, there is still a small number of companies that have not been reached due to inaccurate contact information, dissolution of the company, or failure of the company to respond.

b) Refinement of Scope

In order to methodically review the EDA's oversight of Program applications, as discussed below in detail, the Task Force created an "accelerated recertification program" ("ARP"). In the ARP, the Task Force is providing companies an opportunity to demonstrate that they (a) are in compliance with the Programs and (b) applied for tax incentives in good faith. For companies that successfully recertify through the ARP, the Task Force has agreed not to request further documents or information.

The Task Force segregated processes for companies enrolled in the ARP from the remaining companies (the "Non-ARP Group"). As of the date of this report, there are 63 companies in the Non-ARP Group. For these companies, the Task Force is conducting a thorough investigation of the EDA's oversight of these applicants. We also interviewed a number of witnesses, who provided information concerning relevant misconduct by individuals associated with Program applicants.

The Task Force initially focused on Program applications where a "red flag" had been raised through our initial document review and interviews. In this regard, a draft of EOA 2013 edited by Parker McCay, a law and lobbying firm that represented several clients whose interests, as discussed below, were impacted by EOA 2013 played an important role in our focus. Because those drafts were edited by a private law and lobbying firm, which seemed to be adding special provisions to the bill to benefit particular clients, the Task Force viewed this as a serious "red flag" for those clients who certified that their jobs were "at risk" of leaving the State. The Task Force was skeptical that a client, on the one hand, would consult with their lawyer about—what amounted to—special legislation for their benefit but, on the other hand, was seriously considering a move

[22] *See* N.J. Admin. Code §§ 19:31-18:5 (Grow NJ) and 19:31-4.4 (ERG) (setting forth application submission requirements and providing that the EDA may request "any other necessary and relevant information as determined by the [EDA] for a specific application").

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out of the State knowing it could receive very significant awards through the inclusion of those provisions.

c) Company and Third-Party Production of Documents

The Task Force has also obtained relevant documents from companies in the Non-ARP Group, from consultants and lawyers retained by companies in connection with their Program applications, and from additional parties with relevant information. The Task Force sought voluntary cooperation from all companies, individuals, and related entities, but when necessary, the Task Force recommended that Professor Chen issue subpoenas to obtain relevant documents.

3. Witness Interviews

In addition to the initial interviews described above, the Task Force has conducted numerous interviews of individuals relevant to is mandate. The Task Force has interviewed 12 current EDA employees. The employees interested were involved in the application pre-approval process at the officer, manager, and director levels as well as individuals in Human Resources, Operations and tax credit transfer positions. The Task Force has interviewed 2 former EDA employees who held senior leadership positions, Tim Lizura, the former President and Chief Operating Officer, and Maureen Hassett,[23] a former Senior Vice President of Finance and Development.

The Task Force also reached out to non-EDA individuals and potential witnesses identified as having information relevant to the Programs or to award recipients. Thus far, the Task Force has interviewed 14 non-EDA witnesses.

IV. LEGISLATIVE FOCUS: THE DESIGN AND IMPLEMENTATION OF THE TAX-INCENTIVE PROGRAMS

A. Initial Findings

As further discussed below, the draft versions of the EOA 2013 bill dated June 21, 2013, reviewed in conjunction with publicly available versions of the bill and other documents and information in the Task Force's possession, indicated that certain special interests played a key role in numerous provisions that were ultimately enacted into New Jersey law, and which, when administered by the EDA, would provide significant benefits to those special interests. Certain aspects of the Grow NJ program's design are difficult to justify from a rational policy perspective and can be understood only as the result of a process in which certain favored private parties were

[23] Ms. Hassett is currently working with the Treasury Department, but is still employed by the EDA.

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permitted to shape the legislation to their benefit—and further, in some cases, to disfavor potential competitors.

The Task Force has found that the same special interests who successfully impacted the legislative design of the Programs were also afforded privileged status with respect to the Programs' implementing regulations. The EDA provided these special interests with early information about the regulations the agency was considering, prior to the notice provided to other members of the public, and permitted them to provide private feedback—which, in some instances, the EDA accepted and incorporated into the regulations. Moreover, the influence exerted by these special interests over this process was not disclosed to the public.

Thus, the Task Force's investigation to date has found that special interests succeeded in molding both the Programs' legislation and implementing regulations in their favor. The result is that New Jersey's tax-incentive programs have not been "neutral" in their design but have rather been structured in respects both large and small to favor the business interests of favored parties, sometimes in ways of debatable merit from a public policy standpoint. This is troubling for many reasons, including that the New Jersey Constitution contains certain prohibitions on "special legislation."[24] These constitutional prohibitions, the New Jersey Supreme Court has explained, were intended to combat "the propensities of legislatures to indulge in favoritism."[25] Given the findings discussed below, there may be reasonable questions as to whether New Jersey's current tax-incentive laws are compatible with constitutional requirements.

Some will certainly note that the problematic examples described below center on projects located in the City of Camden. The Task Force should not be misunderstood as disagreeing in any way about the desirability—indeed the necessity—of the State finding ways to encourage substantial reinvestment and growth in Camden, and in helping it meet the substantial challenges that it faces. Reinvestment in Camden has rightly been a priority for governors from both major political parties for decades. But as laudable as that *end* is, it does not necessarily justify, without any question or limitation, every conceivable *means* to accomplish it. "Shoehorning" the priority of *capital investment* in Camden in the Grow NJ program, the priority of which is the equally desirable but very different goal of *job growth*, has led to confusion in eligibility criteria, mismatched metrics of accountability, and lack of enforcement of the program requirements by the very agency that is responsible for monitoring it. Allocation of scarce public resources must inevitably involve some inquiry into the relationship, and resulting efficiency, between ends and

[24] N.J. Const., art. IV, § VII, ¶¶ 7-9.
[25] *Vreeland v. Byrne*, 72 N.J. 292, 298 (1977).

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means, and the absence of that logical nexus has been painfully evident in the course of the Task Force's work.

1. Influence by Special Interests in Grow NJ's Legislative Design

The Grow NJ program was created in 2012 by the Grow NJ Act.[26] Compared to the version of Grow NJ that exists today, the original iteration of the program was relatively modest. Individually, the maximum awards available to program beneficiaries were far smaller than the maximum awards now possible under the current version of Grow NJ. Collectively, the original Grow NJ program provided a programmatic cap of up to $200 million in tax credits that the EDA could approve.[27] The current version of Grow NJ, by contrast, has no such programmatic cap, which has allowed tax incentive approvals to balloon to the point that billions are now outstanding. Indeed, under the current version of Grow NJ, multiple companies have been individually approved for awards in excess of $200 million in tax incentives, meaning that each of these companies by itself exceeded the maximum programmatic cap under the original iteration of the Grow NJ program.

The original version of Grow NJ existed for less than two years before it was significantly revamped and expanded by EOA 2013. The initial EOA 2013 bill was introduced in the New Jersey General Assembly on January 14, 2013 as Assembly Bill Number 3680. The Assembly passed the bill on May 20, 2013, and sent it to the Senate.

The Task Force has received evidence and information demonstrating that, during this period when EOA 2013 was before the Senate, certain special interests became involved in the drafting process—namely, the Parker McCay P.A. law and lobbying firm based in Mount Laurel, Hamilton, and Atlantic City, which drafted large swaths of the bill in various respects that appear to have been intended to benefit the firm's clients. Based on evidence and information in possession of the Task Force, Philip A. Norcross, Parker McCay's Managing Shareholder and Chief Executive Officer, and Kevin D. Sheehan, another partner of the firm, both worked on the drafting of the bill. Among other apparent intended beneficiaries of Parker McCay's drafting work was the Conner Strong & Buckelew insurance brokerage firm, headed by its Executive Chairman, George E. Norcross, III—the brother of Philip A. Norcross. Several years after EOA 2013 was enacted, on March 24, 2017, Conner Strong & Buckelew was approved for an $86 million award to relocate its

[26] P.L. 2011, c. 149.
[27] The EDA was also statutorily permitted to raise the programmatic cap if it would determine that doing so was "reasonable, justifiable, and appropriate."

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offices to Camden. An award of that size would have likely been impossible if not for statutory amendments that Parker McCay played a pivotal role in incorporating into the legislative design.

The Task Force has received two Microsoft Word draft versions of the bill, both dated June 21, 2013—one draft dated several hours earlier than the other one—with revisions in "track changes" mode. The metadata in these documents appear to attribute many, but not all, of the revisions in the bill to Mr. Sheehan of Parker McCay.[28] In addition to this metadata, other documents and information in the Task Force's possession further corroborate that Mr. Sheehan, with the potential influence of Mr. Norcross, drafted these changes to the bill.

On June 24, 2013, the Senate Budget and Appropriations Committee favorably reported its amended version of the bill, which incorporated many of the bill revisions that were drafted in whole or in part by Parker McCay and reflected in the June 21, 2013 working drafts. As a result of these changes, the bill dramatically expanded in both length—the version of the bill favorably reported by the Senate committee was double the length of the bill that had been passed by the Assembly—and substantive scope. Numerous provisions were added to the bill expanding the availability of tax incentives under the Grow NJ program.

On June 27, 2013, the Senate passed its version of the EOA 2013 bill, incorporating many of Mr. Sheehan's revisions, and returned the bill to the Assembly. That same day, the Assembly concurred in the amended bill, with additional amendments, and returned it to the Senate. The Senate passed the amended bill on August 19, 2013, sending it to the Governor. Governor Chris Christie conditionally vetoed the bill on September 9, 2013, recommending limited revisions. The Assembly and the Senate both concurred in Governor Christie's recommended revisions and returned the bill to him. The EOA 2013 was finally enacted into law on September 18, 2013. The provisions of the bill drafted in whole or in part by Parker McCay largely survived this iterative process and were included in the final bill enacted into law.

Several of the most important or otherwise notable aspects of Grow NJ's amendments under the EOA 2013 are discussed below. These amendments, each of which Parker McCay appears to have had some role in drafting, are illustrative of some of the ways Grow NJ's statutory design following the enactment of the EOA 2013 was structured to favor chosen special interests in ways both large and small, sometimes arguably to the detriment of the public interest. It is important to

[28] These draft versions of the bill are attached as Exhibits 1 and 2. The authorship information in the metadata is not visible in these exhibits.

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note that the EOA 2013's changes to the Grow NJ program were innumerable and complex, and most will not be discussed in this First Report.

a) Tax Incentives for Grocery Stores in Camden

Grow NJ, both in its original and current iterations, has generally precluded tax incentives for retail businesses.[29] The EOA 2013 included several provisions, however, drafted in part by Parker McCay, which expressly authorized the EDA, as an exception from the otherwise applicable exclusion for retail projects, to award tax incentives to companies that would build grocery stores in Camden. The policy basis to incentivize development of grocery stores in Camden is readily apparent, because Camden has for decades been described as a "food desert" in which there are insufficient grocery stores to serve the city's residents.[30]

However, notwithstanding the indisputable need to increase food access in Camden, the EOA 2013 did not allow tax incentives for all or even most potential grocery stores that could be built in the city. Instead, the EOA 2013 amended the Grow NJ statute to allow tax incentives for a "full-service supermarket or grocery store" *only* if it would be "at least 50 percent" of a larger retail development "of at least 150,000 square feet."[31] Therefore, the grocery store itself must be at least 75,000 square feet at a minimum to qualify for tax incentives. For reference, the average American grocery store size around this time was reported to be approximately 46,000 square feet—far below the minimum threshold size required to qualify for tax incentives under Grow NJ as amended by the EOA 2013.[32] If the goal was to alleviate the lack of local food access for Camden residents, an ostensible policy justification for limiting the incentives to supersized grocery stores, while

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[29] *See* N.J. Stat. § 34:1B-243 (generally excluding "business[es] that [are] . . . engaged in final point of sale retail" from the definition of the "qualified business facilit[ies]" that are eligible for tax incentives).

[30] *See* Hr'g Tr. (May 2, 2019) at 202:24-203:6 (testimony that Camden was considered a food desert in which the city's residents lacked convenient access to a grocery store).

[31] *See* N.J. Stat. § 34:1B-243 ("qualified business facility" definition).

[32] *See* Brad Tuttle, *Your Grocery Store May Soon Be Cut in Half*, MONEY, June 2, 2014, http://money.com/money/136330/why-your-grocery-store-may-soon-be-cut-in-half; Brad Tuttle, *Fewer Choices, More Savings: The New Way to Buy Groceries*, TIME, Jan. 25, 2011, http://business.time.com/2011/01/25/fewer-choices-more-savings-the-new-way-to-buy-groceries.

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excluding such incentives for grocery stores of average or even large sizes that would also provide Camden residents with increased food access, is not obvious.[33]

The Task Force's investigation to date has found that the cause of this statutory limitation appears to have not likely been considerations of the public interest, but rather the private business interests of one of Parker McCay's clients. In March of 2013, before the EOA 2013 was enacted, the owners of several grocery stores in New Jersey and a development firm announced that they had partnered in a joint venture to open a ShopRite grocery store in Camden, which would anchor a larger retail shopping center.[34] Mr. Sheehan and Mr. Norcross of Parker McCay represented the retail project, which, when completed, was planned to be over 150,000 square feet, with at least 50 percent occupied by the grocery store. Meanwhile, around this same time, another developer had separate plans to build a different retail development in Camden that would also be anchored by a grocery store. This competitor retail development was planned to be smaller, such that it would not qualify for tax-incentive subsidies under the EOA 2013 amendment, while the retail development that Parker McCay represented would.

It should be noted that both projects ultimately failed, and neither grocery store was built. The Task Force has received evidence demonstrating that the project Parker McCay represented initiated efforts to receive tax incentives from the EDA, but the project collapsed before any award was approved.[35] The competitor project, which was necessarily disqualified for tax incentives as a result of this EOA 2013 amendment, also failed.

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[33] EDA's former President and Chief Operating Officer Tim Lizura testified at the Task Force's May 2, 2019 public hearing that "[y]ou can make an argument" for tax incentives for grocery stores of any size in Camden, but with respect to this limitation, "it didn't offend us that that was the provision that was there." Hr'g Tr. (May 2, 2019) at 236:16-238:9.

[34] *See Mayor Redd, The Goldenberg Group, and Ravitz Family ShopRites Announce Major Retail Project in Camden*, CITY OF CAMDEN, March 19, 2013, https://www.ci.camden.nj.us/releases/mayor-redd-the-goldenberg-group-and-ravitz-family-shoprites-announce-major-retail-project-in-camden.

[35] *See* Allison Steele, *Long-promised Camden supermarket isn't coming*, PHILA. INQUIRER, Aug. 9, 2016, https://www.inquirer.com/philly/news/new_jersey/20160810_Long-promised_Camden_supermarket_isn_ t_coming.html ("Plans to build a ShopRite supermarket on the Admiral Wilson Boulevard in Camden, a project that officials had said would create permanent jobs and provide improved access to fresh, affordable food, have fallen apart, according to sources with knowledge of the situation. Instead, Actega North America Inc., a Delran-based company that makes coatings and sealants, on Tuesday was approved to receive $40 million in state tax incentives if it decides to

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b) The Alternative Approach to Award Calculation for Incentivized Camden Projects

As a general rule, the Grow NJ Act provides that the size of a tax incentive award is determined by a relatively straightforward formula that is tied to the number of new jobs created by the company in New Jersey and/or the number of existing jobs retained by the company in New Jersey that, absent the tax incentive award, would be relocated out of state or eliminated.[36] First, a "base" amount per job—ranging from between $500 to $5,000 annually—is determined based on certain statutorily defined factors (primarily the location of the project).[37] Second, any applicable statutorily defined "bonus" amounts are applied to increase the total award per job.[38] For example, jobs in a "targeted industry" (the EDA is statutorily authorized to determine which industries are "targeted") are eligible to receive an increase of $500 annually per job.[39] Under this statutory formula, the maximum possible award per job is $15,000 annually.[40]

However, provisions of the EOA 2013, drafted in part by Parker McCay, amended the Grow NJ statute to set out an additional, alternative approach to award calculation exclusively for incentivized projects located in Camden. Under these provisions, the award calculation for Camden projects is effectively decoupled from the number of jobs created or retained by the company, and is instead tied to—and, unless capped by an applicable statutory limitation, equal to—the size of the company's capital investment in the project.[41] These provisions have allowed companies that agreed to make large capital investments in projects located in Camden to qualify for awards far exceeding the amounts that would have otherwise been permitted.

For an illustration of the difference between the statutory formula approach under Grow NJ for award calculation and what is often referred to as the "Camden alternative" approach, consider a hypothetical project in which a company will invest $100 million to build a new office building in New Jersey at which the company plans to hire 250 new employees. Under the formula approach applicable to projects in most of the State, with a maximum annual per-job award of $15,000, as

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build a 130,000-square foot headquarters on the site. . . . No explanation has been provided for why the ShopRite project collapsed.").

[36] *See* N.J. Stat. § 34:1B-246(a)–(d).

[37] *See* N.J. Stat. § 34:1B-246(b).

[38] *See* N.J. Stat. § 34:1B-246(c).

[39] *See* N.J. Stat. §§ 34:1B-246(c), 34:1B-243 ("targeted industry" definition).

[40] *See* N.J. Stat. § 34:1B-246(d).

[41] *See* N.J. Stat. § 34:1B-246(d) (subsection beginning, "Notwithstanding anything to the contrary set forth herein and in the provisions of subsections a. through f. of this section . . .").

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discussed above, the largest possible award for the company would be $3.75 million each year ($15,000 x 250 jobs). Over the ten-year term for awards under Grow NJ, the maximum award would be $37.5 million ($3.75 million x 10 years). If the project were in Camden, however, and subject to the Camden alternative approach to award calculation, the company could receive an award of $100 million, equal to the size of the anticipated costs to build the new office building—over twice the size of the maximum award available in other parts of the State.

Numerous Parker McCay clients have benefited from the Camden alternative approach to award calculation. As noted previously, Parker McCay client, the Conner Strong & Buckelew insurance brokerage firm, was approved by the EDA on March 24, 2017 for an $86 million award to relocate 268 jobs from the company's existing offices to a new office tower to be built on the Camden waterfront. Pursuant to the Camden alternative provisions of EOA 2013, this award was based on the claimed anticipated costs of the office tower's construction. Under the formula approach to award calculation, the company could have potentially, in the best possible circumstances for it, qualified for a maximum award of $40.2 million ($15,000 x 268 jobs x 10 years).

The Task Force has not conducted an economic analysis of the approaches to award calculations under Grow NJ and therefore has made no finding concerning whether the increased size of Camden alternative awards is sensible as a matter of public policy. Indeed, given the enormous challenges facing Camden, one of New Jersey's poorest cities, an up-front decision by the State to appropriate substantial resources—through the normal procedures for allocating State resources—to invest in the capital infrastructure would have been completely understandable.

However, while there are certainly rational policy justifications for providing incentives for capital projects located in Camden, the Camden alternative approach in the EOA 2013, which do so in the context of an enhanced tax-incentive program ostensibly dedicated to job growth, has been criticized as excessive by a number of parties given the potentially large cost to the State, and even many of its defenders have said that it may need to be appropriately reconsidered in future legislation. For example, a July 2018 report (the "Rutgers Report") by Will Irving, Michael L. Lahr, and Ray Caprio of the Edward J. Bloustein School of Planning and Public Policy at Rutgers, the State University of New Jersey, which analyzed data concerning Grow NJ awards approved by the EDA to date, found that the average cost in tax incentives per job incentivized by the formula approach was $55,888, while the average cost per job under the Camden alternative approach was

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$340,000—over six times more.[42] The Rutgers Report recommended that the Camden alternative approach "be revised to tie awards more closely to the employment created by these firms."[43]

Additionally, it should be noted that the "capital investment" definition in the statute, which, as described above, effectively operates to define the expenditures for which companies are eligible to receive recompense via tax credits, is extremely broad. The statute defines "capital investment" with respect to projects in Camden to include, among other things, any and all "development, redevelopment, and relocation costs."[44] The result is that a broad range of expenditures in Camden by Grow NJ beneficiary companies may be effectively reimbursed via tax credits—notably, including expenditures for which the public interest in state subsidization is debatable. For example, the new office tower on the Camden waterfront for which Conner Strong & Buckelew was approved for an $86 million award included a rooftop helipad, the construction of which is within the scope of the statutory "capital investment" definition. Whether Grow NJ was intended to enable the State to subsidize helipads for corporate executives can reasonably be questioned.

c) Expansion of Capital Expenditures Eligible for Tax Credits

As discussed above, the "capital investment" definition in the Grow NJ statute effectively operates to define the expenditures for which companies with projects in Camden are eligible to receive recompense via tax credits. It appears that Kevin Sheehan of Parker McCay had a role in amending the statute's "capital investment" definition in two ways apparently intended to benefit the firm's clients.[45]

First, Mr. Sheehan appears to have amended the definition to include, as an eligible expenditure, "pier, wharf, [or] bulkhead . . . construction or repair."[46] This amendment was likely intended to benefit several Parker McCay clients, including Conner Strong & Buckelew, that, as discussed in Section V(C)(4)(b) of this First Report, had plans to construct a new office tower on a pier on the Delaware River waterfront of Camden. As a result of this amendment, these clients would be allowed to receive tax credits for any such construction or repairs on the pier.

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[42] Rutgers Report at i–ii. The Rutgers Report is available on the EDA's website, at https://www.njeda.com/pdfs/NJEDA-Final-Incentives-Report_Governor.aspx.
[43] Rutgers Report at iii.
[44] *See* N.J. Stat. § 34:1B-243 ("capital investment" definition).
[45] In addition, it is notable that the "capital investment" definition was expanded to include expenditures on "professional services." However, the metadata does not reflect that Kevin Sheehan made that amendment.
[46] *See* N.J. Stat. § 34:1B-243 ("capital investment" definition).

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Second, Mr. Sheehan appears to have also amended the "capital investment" definition to include "site acquisition" as an eligible expenditure if purchased within 24 months prior to the Grow NJ application, thereby allowing the firm's clients with planned projects in Camden to potentially receive tax credits for real estate that the company purchased before even applying to the EDA for the tax incentives.[47] This amendment has a clear tension with the overarching purpose of tax-incentive programs, which are intended to incentivize companies to make decisions that they have not already made and would not make absent the incentive. This provision, by contrast, affords tax credits for company decisions already made—that is, real estate already purchased. Precisely because of this tension, the EDA's former President and Chief Operating Officer Tim Lizura testified at the Task Force's May 2, 2019 public hearing that this provision "was always a challenge to administer" and he "never really understood the policy behind it."[48]

d) Phantom Taxes in the Net Benefit Test

Under the Grow NJ Act, every tax-incentive award must be anticipated to "yield a net positive benefit to the State."[49] In this context, the "benefit to the State" means tax revenues collectible by the State as a result of the fruition of the project for which the tax incentives were awarded—that is, tax revenue that the State would not collect in the absence of the tax incentives. For example, consider construction work in New Jersey that would not occur unless tax incentives are provided. If the incentives are awarded and the construction is commenced, any taxes collected by the State as a result of such incentivized construction, such as property taxes on the developed property and sales taxes on the building materials used in the construction, are "benefits to the State." Because of this so-called "net benefit" requirement under the Grow NJ Act, tax incentives under the Program are sometimes said to effectively "pay for themselves." That is, if the statute operates as intended, the State will collect tax revenue at least in the amount that the State "spends" on tax incentives, meaning that there is no loss to the public fisc.

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[47] Although the text of this provision has been revised by subsequent statutory amendments, Mr. Sheehan's amendment remains in substance in the current law. *See* N.J. Stat. § 34:1B-243 (defining "capital investment" in pertinent part: "In addition to the foregoing, in a Garden State Growth Zone [including Camden], the following qualify as capital investment: . . . site acquisition if made within 24 months of application to the [EDA]").

[48] Hr'g Tr. (May 2, 2019) at 228:11-230:19. As for why the provision would allow tax credits for site acquisition up to two years prior to the Grow NJ application but not earlier periods, Mr. Lizura said that he did not know of a policy reason for the distinction. *Id*. at 233:6-14.

[49] N.J. Stat. § 34:1B-244(a)(3).

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However, the EOA 2013's amendments to the Grow NJ program included certain provisions that significantly undermined the net benefit requirement for projects in Camden. Pursuant to these provisions, the net benefit calculation "may utilize" the value of certain taxes that would otherwise accrue but were exempted from payment by operation of other provisions of law.[50] In other words, the Grow NJ Act was amended to provide that the net benefit calculation for projects in Camden may include "phantom taxes" as ostensible "benefits to the State" even if the State will never collect those taxes. As a result of these provisions, the "net positive benefit to the State" that is purportedly required by the law may be rendered illusory.[51]

The bill drafts in Microsoft Word format in the Task Force's possession, both dated June 21, 2013, do not contain these provisions, which were apparently not yet incorporated into the bill as of this date.[52] Therefore, the Task Force does not have a document with metadata that indicates the author of these provisions. However, the Task Force is in possession of email correspondence between government officials who were involved in the EOA 2013's drafting that refers to "the 'phantom tax' notion for NBT that Phil and Kevin laid out in [the] original bill draft."[53] Because Parker McCay represented numerous clients with project plans in Camden, these provisions would have allowed these companies to potentially receive large Grow NJ awards—pursuant to the Camden alternative approach provisions discussed above—without the State receiving a corresponding net positive benefit.[54]

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[50] N.J. Stat. § 34:1B-244(a)(3)(b).

[51] At the Task Force's May 2, 2019 public hearing, the EDA's former President and Chief Operating Officer Tim Lizura was asked whether these provisions "allowed projects to get through even though they weren't paying for themselves." Mr. Lizura responded, "I would say that's a pretty accurate statement." Hr'g Tr. (May 2, 2019) at 257:9-15.

[52] We have been advised that a law firm has additional versions of drafts of EOA 2013 from this time period. The Task Force has attempted to obtain these drafts through voluntary cooperation from that firm. To date, we have not been successful.

[53] Exhibit 3. The EDA's Tim Lizura, who received this email, testified concerning the email's reference to "Phil": "I assume that's Phil Norcross." Hr'g Tr. (May 2, 2019) at 251:3-19.

[54] Mr. Lizura testified that he recalled the following companies with approved Grow NJ awards as having benefited from the phantom tax provisions: Holtec International, Philadelphia 76ers, L.P., American Water (American Water Works Company, Inc., American Water Works Service Company, Inc., and American Water Enterprises, Inc.), Subaru of America, Inc., Conner Strong & Buckelew Companies, LLC, The Michaels Organization, LLC, NFI, L.P. When asked whether Parker McCay represented all of those companies, Mr. Lizura responded, "I recall they represent[ed] some, some role in most of those." Hr'g Tr. (May 2, 2019) at 257:16-258:14.

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e) The Material Factor Test Applicable to Camden Projects

For incentivized projects in most parts of New Jersey, it is indisputable that, for a company to receive Grow NJ tax incentives for existing jobs in New Jersey, those jobs must be at risk of leaving the State or being eliminated. This is clearly set out in the statutory text, which requires companies to establish that "but for" the provision of tax incentives, the jobs would be relocated out of state or eliminated:

> "[T]he business's chief executive officer, or equivalent officer, shall submit a certification to the [EDA] indicating: (1) that any existing full-time jobs are at risk of leaving the State or being eliminated; (2) that any projected creation or retention, as applicable, of new full-time jobs would not occur but for the provision of tax credits under the program; and (3) that the business's chief executive officer, or equivalent officer, has reviewed the information submitted to the [EDA] and that the representations contained therein are accurate . . . ."[55]

As discussed above, the Task Force reviewed the June 21, 2013 EOA 2013 bill drafts.[56] The metadata in these documents appear to show that Kevin Sheehan of Parker McCay amended the above-quoted language to add a provision expressly stating that the risk of an out-of-state relocation "shall not be required with respect to projects in [Camden]." Mr. Sheehan proposed to amend the provision as follows:

> "[T]he business's chief executive officer, or equivalent officer, shall submit a certification to the [EDA] indicating that: (i) any existing full-time jobs are at risk of leaving the State or being eliminated; (ii) that any projected creation, or retention as applicable, of new full-time jobs would not occur but for the provision of tax credits under the program; and, (iii) that the business's chief executive officer, or equivalent officer, has reviewed the information submitted to the [EDA] and that the representations contained therein are accurate, **provided however, item (i) shall not be required with respect to projects in [Camden]**. . . ."[57]

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[55] N.J. Stat. § 34:1B-244(d).
[56] Exhibits 1 and 2.
[57] Additionally, in the current version of the statute, there is also language that makes this provision apply to projects in Atlantic City as well as to projects in Camden. The Atlantic City language was

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(Emphasis added).

On Friday, June 21, 2013, at 8:12 PM, an aide to then-Governor Chris Christie, Colin Newman, who was involved in EOA 2013's drafting, sent an email to several senior EDA officials—Tim Lizura, Maureen Hassett, and Michele Brown—attaching a working draft of the bill containing the above-quoted amendment by Mr. Sheehan of Parker McCay.[58] Mr. Newman noted in the email that the bill draft presented certain "issues" that needed to be discussed over the weekend.[59] On Sunday, June 23, 2013, at 10:31 PM, Mr. Newman sent an email to Mr. Lizura and Ms. Hassett, stating that they needed to prepare "compromise language" with respect to the above-quoted provision.[60] Mr. Newman proposed language that would have restored the requirement that, for projects in Camden, there be a risk of out-of-state relocation to receive tax incentives for retaining jobs.[61] Throughout the morning and afternoon of Monday, June 24, 2013, Mr. Newman, Mr. Lizura, and Ms. Hassett proceeded to iteratively draft additional versions of proposed compromise language, while appearing to complain that the other side of the negotiations continued to produce "unsatisfactory" counterproposals.[62]

By the afternoon of June 24, 2013, the negotiating parties appear to have agreed to compromise language that rejected the "shall-not-be-required" language that Mr. Sheehan had drafted and replaced it with a "material factor" test that was ultimately enacted into law, and is still embodied in the version of the statute in force now. That material factor test is as follows:

> "[T]he business's chief executive officer, or equivalent officer, shall submit a certification to the [EDA] indicating: (1) that any existing full-time jobs are at risk of leaving the State or being eliminated; (2) that any projected creation or retention, as applicable, of new full-time jobs would not occur but for the provision of tax credits under the program; and (3) that the business's chief executive officer, or equivalent officer, has reviewed the information submitted to the [EDA] and that the representations contained therein are accurate, provided however, that **in satisfaction of the provisions of paragraphs (1) and (2) of this subsection, the certification**

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added in 2014 statutory amendments. Because the current discussion concerns EOA 2013's amendments, which did not yet apply to Atlantic City, we omit that language here.

[58] Exhibit 4.
[59] Exhibit 4.
[60] Exhibit 5.
[61] Exhibit 5.
[62] *See* Exhibits 6, 7, and 8.

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> **with respect to a project in [Camden[63]] . . . shall indicate that the provision of tax credits under the program is a material factor in the business decision to make a capital investment and locate in [Camden]** . . . ."

(Emphasis added).[64]

Thus, the statute provides that, for projects in Camden to be eligible for tax incentives, the company must be facing a "business decision" concerning where to "locate." One option must be Camden, and the provision of tax incentives must be a "material factor" in the company's decision to locate there. However, the statutory text *does not specify one way or the other* whether the "business decision" concerning the company's location (a) must be between Camden versus an out-of-state location or (b) may be between Camden versus another New Jersey location. No court has yet had occasion to interpret this clause and resolve this statutory ambiguity concerning whether tax incentives are available for intra-state relocations to Camden when no potential out-of-state relocation is considered. From the Task Force's perspective, the former interpretation—that is, that tax incentives for projects relocating to Camden, like tax incentives for projects relocating elsewhere, are available only if the company is considering a potential out-of-state location—is likely the better interpretation. This is so for at least two reasons. First, the New Jersey Supreme Court has repeatedly taught that "the furtherance of legislative purpose is the key to the interpretation of any statute,"[65] and here, the Grow NJ statute expressly states that a purpose of the program is to "preserve jobs that currently exist in New Jersey but which are in danger of being relocated outside of the State."[66] The statute does *not* say that its purpose is to incentivize the relocation of jobs to Camden from elsewhere in New Jersey, even if those jobs are not at risk of

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[63] The statutory text that is replaced here with the bracketed "Camden" notation for ease of readability is the following: "a Garden State Growth Zone that qualifies under the 'Municipal Rehabilitation and Economic Recovery Act,' P.L.2002, c. 43 (C.52:27BBB-1 et al.)." Camden is the only municipality that fits that definition, as it is "the only municipality affected by the provisions of the [Municipal Rehabilitation and Economic Recovery Act]." Fiscal Impact Statement for Assembly Bill No. 4375 (Jan. 4, 2010), https://www.njleg.state.nj.us/2008/Bills/A4500/4375_S1.HTM.

[64] N.J. Stat. § 34:1B-244(d).

[65] *GE Solid State, Inc. v. Dir., Div. of Taxation*, 132 N.J. 298, 308 (1993). *See also, e.g.*, *In re Young*, 202 N.J. 50, 64 (2010) (explaining that statutory interpretation must be intended to "effectuate the fundamental purpose for which the legislation was enacted").

[66] N.J. Stat. § 34:1B-244(a).

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leaving the State. It would further the statute's express purpose, therefore, to construe the out-of-state requirement that is applicable to projects in the rest of the State to also apply to Camden.[67] Second, if the statute were to be interpreted as intended to incentivize the relocation of jobs to Camden from other parts of New Jersey, a question would arise as to whether the statute would be unconstitutional because it would favor Camden over other parts of the State and, as such, arguably be an impermissible "private, special or local law."[68] Statutory interpretations that avoid such serious constitutional questions are typically favored.[69] For these reasons,[70] if a New Jersey court

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[67] *Cf. Murray v. Plainfield Rescue Squad*, 210 N.J. 581, 592 (2012) ("We do not view the statutory words in isolation but in context with related provisions so as to give sense to the legislation as a whole.").

[68] *See* N.J. Const., art. IV, § VII, ¶ 7 ("No general law shall embrace any provision of a private, special or local character.") and ¶ 9(6) ("The Legislature shall not pass any private, special or local laws . . . [r]elating to taxation or exemption therefrom."); *Mooney v. Bd. of Chosen Freeholders of Atl. Cty.*, 122 N.J. Super. 151, 154 (Law. Div.), *aff'd*, 125 N.J. Super. 271 (App. Div. 1973) ("[L]ocal and special laws rest on a false or deficient classification in that . . . they create preference and establish inequalities; they apply to persons, things or places possessed of certain qualities or situations, and exclude from their effect other persons, things or places which are not dissimilar in these respects.'") (internal quotation marks and citation omitted). While the Legislature may in some cases adopt special laws if there is prior public notice (¶ 8), the prohibition in ¶ 9(6) against special laws "[r]elating to taxation or exemption therefrom" is absolute.

[69] *See, e.g.*, *Silverman v. Berkson*, 141 N.J. 412, 417 (1995) ("Unless compelled to do otherwise, courts seek to avoid a statutory interpretation that might give rise to serious constitutional questions.").

[70] Additionally, it is also notable that, whether the EDA is applying the "material factor" test that is applicable to Camden or the "but for" test that is applicable to the rest of the State, in both cases the statute directs the EDA to consider the same evidence concerning the company's potential relocation sites: "When considering an application involving intra-State job transfers, the [EDA] shall require the business to submit the following information as part of its application: a full economic analysis of all locations under consideration by the business; all lease agreements, ownership documents, or substantially similar documentation for the business's current in-State locations; and all lease agreements, ownership documents, or substantially similar documentation for **the potential out-of-State location alternatives**, to the extent they exist. Based on this information, and any other information deemed relevant by the [EDA], the [EDA] shall independently verify and confirm, by way of making a factual finding by separate vote of the [EDA]'s board, the business's assertion that the jobs are actually at risk of leaving the State, and as to the date or dates at which the [EDA] expects that those jobs would actually leave the State, or, with respect to projects located in [Camden] . . ., the business's assertion that the provision of tax

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were to construe this "material factor" provision, the Task Force believes the court would more likely than not conclude that an out-of-state location is required for projects in Camden.[71] Putting our view aside, whatever the Legislature intended, any representations Grow NJ applicants made to the EDA concerning their potential out-of-state relocation were required to be truthful, so falsely stating that jobs were at risk of leaving the State and, accordingly, that an out-of-state alternative was under consideration would be highly problematic.[72]

In any event, whether or not a risk of an out-of-state relocation is strictly required under the statute for projects in Camden, it is indisputable, based on provisions of the Grow NJ Act and EOA 2013 separate and apart from those discussed here, that whether or not such an out-of-state relocation is contemplated is a critical factor bearing upon the potential size of any award. This is because of Grow NJ's "net benefits" requirement, which mandates that every Grow NJ award be anticipated to result in a net benefit to the State in terms of new tax revenue.[73] For companies relocating existing jobs from somewhere within New Jersey to Camden, those jobs create no new "benefit" to the State, since the "benefits" test is state wide and those jobs would yield no new tax

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credits under the program is a material factor in the business's decision to make a capital investment and locate in [Camden] . . . before a business may be awarded any tax credits under this section." N.J. Stat. § 34:1B-244(d) (emphasis added). If a potential out-of-state alternative location were not required for projects in Camden, it is difficult to understand why the statute directs the EDA to consider evidence of the company's "potential out-of-state location alternatives" ("to the extent they exist") in the same manner as if EDA were considering a project outside Camden, where there is no question that an out-of-state location alternative is required.

[71] The "material factor" provision applicable to Camden, in the Task Force's view, is likely best understood as intended to reduce the required showing for the at-risk nature of the jobs: outside Camden, the CEO has to certify that but for the tax incentives jobs would leave the State (that is, the tax incentives are a determinative factor in the company's decision); by contrast, in Camden, the CEO has to certify that the tax incentives are a material factor in locating the jobs in Camden rather than in another state (that is, the tax incentives are an important factor in the company's decision but are not necessarily determinative).

[72] *See* N.J. Stat. § 34:1B-244(d) (requiring an applicant's CEO or other equivalent officer to certify that he or she "has reviewed the information submitted to the [EDA] and that the representations contained therein are accurate"). For criminal penalties under New Jersey law potentially applicable to misrepresentations in connection with Grow NJ applications, *see* N.J. Stat. §§ 41:3-1 (perjury), 2C:28-2 (false swearing), 2C:28-3 (unsworn falsification), 2C:21-3(b) (fraud relating to public records), 2C:20-4 (theft by deception), 2C:21-7(h) (deceptive business practices).

[73] *See* N.J. Stat. § 34:1B-244(a)(3) (requiring Grow NJ awards to "yield a net positive benefit to the State").

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revenue.[74] Put another way, New Jersey accrues tax revenue from those jobs whether or not they are relocated, since in either case they are in the State. Based on this principle, when in-state jobs are relocated to Camden and no potential out-of-state alternative is contemplated, the "benefit" calculation is minimal, and the potential tax incentive award must be reduced as a result.[75] Thus, if a company falsely certified that its jobs were "at risk" of leaving the State—when they were not at risk—such a representation would likely affect the size of the company's potential award, and, as such, would surely be material.[76]

We hasten to note that the above discussion relates to the Grow NJ statute itself—not to the EDA's administration of the law, which is covered later in this First Report. Here, the Task Force notes that with respect to the "material factor" provision of the statute, there is a notable ambiguity, which, as shown by the evidence above, may have been by design—as a compromise between, on the one hand, those parties who advocated for the statute to expressly provide that a risk of out-of-state relocation "shall not be required" for projects in Camden, and, on the other hand, those parties who advocated for the statute to require a showing that jobs were at risk of out-of-state relocation.[77]

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[74] This principle, which is inherent in the notion of a state-wide "benefits" test, is expressly set out in EDA's regulations for Grow NJ, which provide in pertinent part: "Retained employees in a project in [Camden] . . . shall not be included [in the benefits calculation] unless the business demonstrates that the award of tax credits will be a material factor to retain the employees **in the State** . . . ." N.J. Admin. Code § 19:31-18.7(c) (emphasis added).

[75] This issue is discussed further below, in Section V(C)(2)(b) of this First Report.

[76] As EDA's former President and Chief Operating Officer Tim Lizura explained at the Task Force's May 2, 2019 public hearing, "the net benefit test was a statewide test, and that would suggest, or would then require that the jobs would be at risk of leaving New Jersey in order to include [the] economic impact of those jobs under the net benefit test. If there was not a risk of leaving the state, we would include all the other drivers of the net benefit test except the economic activity from the employees, which is the largest driver of the economic output." Hr'g Tr. (May 2, 2019) at 262:8-18).

[77] In 2014, this provision of the Grow NJ Act was again amended to provide that Atlantic City would be treated in the same manner as Camden. Therefore, under the current version of the statute, companies may be eligible for Grow NJ benefits when the tax incentives are a "material factor" in the company's decision to locate in either Camden or Atlantic City. The statutory ambiguity discussed in this section with respect to Camden applies likewise with respect to Atlantic City.

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2. Influence by Special Interests in EDA's Implementing Regulations for Grow NJ

After EOA 2013 was enacted in September of 2013, it fell to the EDA to promulgate regulations to implement the law's amendments to the Grow NJ program. As described previously, New Jersey law required the EDA to use a "notice-and-comment" process in connection with its issuance of such regulations—that is, to provide public notice of the regulations it was considering and to receive and consider comments from interested members of the public in response to such proposals. However, the Task Force has received information and documents that appear to show that—before the EDA publicly announced any proposed regulations—Kevin Sheehan of Parker McCay privately lobbied the agency to adopt provisions favorable to the firm's clients. At least one of these requests was incorporated in the EDA's first publicly proposed regulations, which the agency announced on January 6, 2014.

Grow NJ, as previously noted, generally excludes retail businesses from eligibility for tax incentives.[78] Parker McCay represented The Cooper Health System—the parent of Cooper University Hospital in Camden—in connection with its Grow NJ application. If the hospital were to be deemed a retail business, it would be ineligible for tax incentives under the statute. (From a policy perspective this exclusion is sensible, since a retail business—especially a hospital dedicated to serving a local community—is unlikely to make a business decision to move out of state absent tax incentives.) On December 10, 2013, Mr. Sheehan sent an email to the EDA's then President and Chief Operating Officer Tim Lizura: "[I]n reviewing the qualified business facility definition in the [regulations] that we discussed, my suggestion would be to add a sentence at the end of the definition to say: a university research hospital shall not be considered final point of sale retail. Thanks."[79] The EDA incorporated the request into its initial January 6, 2014 regulatory proposal as well as its final regulations adopted on December 15, 2014, and the provision remains in effect in the regulations in force now.[80] The Cooper Health System—deemed eligible for tax incentives pursuant to this regulation—would later be approved by the EDA for an approximately $40 million award. Meanwhile, the EDA does not appear to have disclosed that, outside of the public notice-

[78] *See* N.J. Stat. § 34:1B-243 (generally excluding "business[es] that [are] . . . engaged in final point of sale retail" from the definition of the "qualified business facilit[ies]" that are eligible for tax incentives).
[79] Exhibit 9.
[80] *See* N.J. Admin. Code § 19:31-18.2 (in the "qualified business facility" definition, carving out "university research hospital[s]" from the scope of ineligible "business[es] . . . engaged in final point of sale retail business").

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and-comment period, its regulations had been amended in response to the request of a private party, apparently to assist a specific client.

3. Inadequate Statutory Requirements to Ensure Job Requirements Are Consistently Met

The current statutory requirements and EDA regulations governing reporting requirements and required annual jobs reports for companies to receive awards are inadequate to ensure that companies are consistently creating or retaining the required number of jobs and achieving the aims of Grow NJ. Based on the language of the regulations, a company need only submit an annual report, certified by the company's chief financial officer or equivalent, showing that it created or retained the required number of jobs for the last tax year before the credit amount is approved and issued. There is no additional certification requirement to ensure that these jobs are maintained to further the aims of economic growth and job creation. In essence, a company could create the number of jobs required in its agreement, certify, receive the first tenth of its overall credit, and then eliminate or fail to retain the required number of jobs immediately after receiving its credit while still retaining the award for the full year.

Indeed, in one instance, World Business Lenders, LLC ("WBL"), moved to New Jersey from another state in July 2016. WBL's award was contingent on its promise to bring a specific number of jobs into New Jersey, and its Incentive Agreement provided that it would remain in New Jersey for fifteen years. By October 2016, WBL had hired enough employees to meet the employment numbers set forth in its Incentive Agreement. WBL's submission to the EDA showed that it had satisfied the employment numbers set forth in its Incentive Agreement in October 2016. In the beginning of December 2016, the EDA certified to the Division of Taxation that the company was eligible for its overall tax credit certificate of approximately $16 million. At the beginning of January 2017, however, the company laid off a significant number of its employees, sending its job numbers well below the number required to continue to qualify for a tax-incentive grant. The EDA learned of the mass layoffs through news reports. The company subsequently submitted a report showing that it had met the required employment numbers for November and December 2016. Therefore, despite having seen indications that the company had terminated its employees after satisfying the requirements to receive its tax credit for 2016, the EDA asked the Division of Taxation to issue the company the first tenth of its overall credit, amounting to approximately $1.6 million. The company received this award even though it had been located in New Jersey for only six months, had submitted only three months of employment data, and had laid off a significant number of employees shortly after qualifying for the first year of its award.

The Task Force is still investigating this issue and has not reached any conclusion regarding the company's conduct or intent in connection with its application, and the company has maintained

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that it acted entirely in compliance with Grow NJ's requirements. Regardless, the Grow NJ regulations did not specifically require that the company prove that it maintained the agreed-upon number of jobs for a full twelve-months, did not require that it be located in New Jersey for a full year in order to receive a full year's award, and did not have a mechanism requiring that a company maintain a minimum number of jobs after the award was issued in order to retain its award. The company was not certified to receive the second tenth of its award in 2017 because it did not employ the required number of employees for that tax year.

V. EDA: THE ADMINISTRATION OF THE TAX-INCENTIVE PROGRAMS

In its examination of the EDA's implementation and administration of the Programs, the Task Force set out to: (1) further examine and assess the EDA's process and control failures, including in the EDA application-approval process, from pre-application through approval and certification; (2) evaluate the effectiveness of existing EDA policies and procedures relating to the roles and responsibilities of individual EDA officers, EDA staff training, and EDA officers' understanding of the purpose, implementation, requirements, and administration of the Grow NJ and ERG tax incentive programs; (3) assess the administration of the tax incentive programs and subsequent monitoring of grant recipients; and (4) determine whether or not external or internal pressures were brought to bear on the EDA in connection with its application approval, compliance, monitoring, and certification processes, as well as its rulemaking processes relating to the Programs.

A. Overview of the Application-Approval Process

In order to evaluate any problems relating to the Programs' design, implementation, or administration, the Task Force had to begin with an understanding of the relevant statutes and of the EDA's tax-incentive application and administration process, from application through the annual award of tax-incentive grants. As noted previously, the Task Force focused primarily on Grow NJ during the initial phase of its investigation. A high-level overview of the Grow NJ process is below:[81]

1. Pre-Approval Process: Application Review and Board Approval

Companies learn of EDA tax-incentive programs and make initial contact with the EDA through various channels. The EDA receives potential application referrals through a customer care telephone line, through the Business Action Center ("BAC"), which is housed within the New

[81] Although there is significant overlap between the Grow NJ and ERG processes, particularly in the pre-application through approval stages, the differences in the Grow NJ and ERG Program requirements result in divergent approaches to the administration of these Programs. We will provide an overview of the ERG process in a later report.

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Jersey Department of State, and through Choose New Jersey, a 501(c)(3) non-profit whose mandate is to act as the marketing arm of the State and attract out-of-state and international businesses to New Jersey. BAC personnel frequently work with EDA officers to attract and obtain program applicants, and the BAC has historically been the biggest driver of application lead referrals to the EDA. Separately, the EDA's Community Development Officers ("CDOs") and Business Development Officers ("BDOs")[82] are also charged with developing business relationships and recruiting potential applicants. Indeed, a BDO's year-end performance is evaluated, in part, on their outreach efforts as well as whether they have met yearly goals in the volume of applications submitted to the EDA. Potential applicants may also directly contact the EDA to obtain information about the Programs. In addition, applicants are often represented by consultants, lawyers, lobbyists, or real-estate agents, and those representatives may also reach out directly to EDA personnel prior to the submission of a tax-incentive application.

Before submitting a Program application, a potential applicant often has an initial meeting or conversation with EDA personnel—typically a BDO—in order to discuss the applicant's business, needs, and Program requirements. Potential applicants occasionally meet with members of the EDA's senior leadership team in addition to or in lieu of meeting with a BDO. Pre-application dialogue between Program applicants and the EDA is not required, but in practice, often precedes formal submission of a company application by weeks or months.

A company formally submits its application through the EDA's electronic application system. At that time, the company pays an application fee and a BDO is assigned to the application. Often, it is the same BDO that worked with the company pre-application. The BDO is responsible for conducting an initial review of the application and assisting the applicant—or "client"—in ensuring that the applicant has submitted all required documentation prior to transmittal of the application file to Underwriting. BDOs must consult their Program Manager and Managing Director for application reviews before the application is submitted to the Underwriting group.

During the underwriting phase, underwriters are responsible for conducting due diligence and vetting an application to ensure it sufficiently meets all Program requirements and to address any outstanding concerns. Although underwriters bear the primary responsibility for conducting due diligence and follow-up with applicants, they often include the assigned BDO in correspondence to the applicant as the face of the relationship. Among other factors, underwriters

[82] These roles and titles within the EDA are now consolidated and currently all Community Development Officers ("CDOs") are now referred to as Business Development Officers ("BDOs"). For the sake of consistency, the Task Force's First Report will refer to both CDOs and BDOs at various times as BDOs.

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assess the applicant's submitted cost benefit analysis[83] and conduct the required net benefits analysis.[84] Underwriters are also responsible for drafting project summary memoranda, which are presented during "Project Review Meetings." At those meetings, the assigned underwriter presents the application to EDA personnel and members of the New Jersey Attorney General's Office. The EDA staff discusses and raises any issues or concerns related to the application, which the assigned underwriter answers or addresses directly with the applicant as follow-up.

After the Project Review meeting, the underwriter presents the application to the Incentive Committee of the EDA Board, after which the Incentive Committee either does or does not recommend an application for approval by the Board. Although an application may proceed to Board review without a recommendation by the Incentive Committee, more often, the applicant will withdraw its application if the Incentive Committee does not recommend approval.

If the Incentive Committee recommends that the EDA Board approve an application, the application is presented during an EDA Board meeting for approval. EDA Board meetings are conducted on a regular basis and are open to the public. Prior to the Board Meeting, EDA personnel provides the EDA Board with memoranda detailing the project applications that are subject to review and approval at the upcoming meeting. If the Board votes on an application and it is approved, the Governor has ten days to veto the approval. Board-approved projects are required to pay a non-refundable fee of 0.5% of the approved award amount, capped between $50,000 to $500,000, prior to final approval.

Depending on the complexity of the application, the full review process may last a number of months. EDA employees said that, in the early period of Grow NJ's administration, they often processed applications in one or two months, but now, although they can process more complete applications in as little as two months, it could take several months to a year to process others.

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[83] The EDA requires Grow NJ applicants to submit "Cost Benefit Analysis" (or "CBA") forms with their applications. These forms compare the costs of the applicant's proposed New Jersey site and the applicant's alternative site. The purpose of the form is to demonstrate that the applicant's proposed New Jersey location is more expensive than the alternative location—and thus, tax incentives are required to offset the higher costs.

[84] As discussed in further detail herein, the EDA conducts a net benefit analysis ("NBA") to determine that every Grow NJ award is anticipated to "yield a net positive benefit to the State" of at least 110%, with the exception of Camden, where the requirement is 100%.

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2. Post-Approval Process: Closing Services, Monitoring, and Certification

After Board approval, the EDA executes an approval letter and the project moves to Closing Services, during which a conditions of approval officer monitors the project to ensure that any conditions imposed on the project have been met. The conditions of approval, outlined in the approval letter, may include, for example, site plan approval, site control, committed project financing, eligible minimum capital investments, and updated status reports. Once the conditions have been met, Closing Services prepares an Incentive Agreement in consultation with the New Jersey Attorney General's Office. Once the Incentive Agreement is executed, a closing date is set. After closing, the company may receive a tax award the following year, provided it can certify that the project has met all the conditions of the Incentive Agreement in the prior year.

Once the closing process is complete and an Incentive Agreement has been executed, the project is transferred to the Portfolio Management and Compliance[85] group for monitoring and annual certification. Projects have three years to certify that they have met all the conditions and requirements of the Program and Incentive Agreement, with the possibility of up to two six-month extensions of time. Once a project certifies to the EDA that it has met all conditions and requirements of the Program and Incentive Agreement, the EDA's Portfolio Management and Compliance group then certifies the same to the Department of Treasury. The Treasury Department then issues the tax-incentive award. Projects are required to certify their compliance on an annual basis to obtain their tax-incentive award, which is distributed evenly in increments of 1/10th of the total award, across a ten-year period.

If the Portfolio Management and Compliance Group determines that a project is non-compliant with its Incentive Agreement or the Program requirements, the tax incentive award is subject to potential forfeiture, recapture, or recoupment.

B. EDA-Related Litigation

In the early stages of the Task Force's investigation, the Task Force discovered a whistleblower complaint, *Veyis Sucsuz v. New Jersey Economic Development Authority, John J. Rosenfeld, Michele Brown, Fred Cole, Anne Cardello, and John Does 1-10*,[86] filed on May 11, 2015 in New Jersey Superior Court, Mercer County, by a former EDA underwriter, Veyis "David" Sucsuz. Mr. Sucsuz was employed at the EDA for over ten years until his termination in September 2014. He began at the EDA as a legal assistant in lending services and later became an underwriter,

[85] The Portfolio Management and Compliance Group was reorganized and renamed in late 2018 and previously existed as the Finance & Development – Post-Closing Financial Services Group.
[86] No. MER-L-001083-15 (Super Ct., Mercer Cty. filed May 11, 2015).

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responsible for the review and processing of Grow NJ and ERG incentive award applications, among other incentive programs.

In his complaint, Mr. Sucsuz alleged employment discrimination claims in addition to claims that he witnessed misconduct in connection with Grow NJ and ERG incentive program approvals, and that he was fired when he resisted directives from senior management to alter or promote applications that should have otherwise been rejected. Among other claims of misconduct by both applicant companies and individuals within the EDA, Mr. Sucsuz alleged, both in his complaint and under oath in deposition testimony, that certain applicants to the Grow NJ Program provided fabricated or "phantom" out-of-state locations.[87] Mr. Sucsuz alleged that in some instances, applicants fabricated an alternate out-of-state location to conceal a pre-existing intention to locate or expand in New Jersey. Mr. Sucsuz alleged that such applicants were nevertheless approved for Grow NJ tax incentive grants. Mr. Sucsuz further alleged that he was directed by his supervisor to alter or manipulate cost inputs for the cost benefit analysis or net benefit test in order to qualify applicants that would not have otherwise qualified with the cost inputs provided. He alleged that when he refused to alter the cost inputs, his supervisor would do it himself.

The case ultimately went to jury trial, which began on April 30, 2018 and lasted eight days. The jury announced its verdict on May 10, 2018. While Mr. Sucsuz did not ultimately prevail on his retaliation claim, the jury unanimously found that Mr. Sucsuz had a reasonable belief that the EDA violated a law, rule or regulation in the processing of application for loans, grants and tax incentives, and had proven by a preponderance of the evidence that he performed a "whistleblowing" activity as defined by the New Jersey Conscientious Employee Protection Act ("CEPA").

Despite testimony at the May 2, 2019 hearing by a Senior Vice President of Operations for the EDA that Mr. Sucsuz's allegations "identif[ied] potential fraud or misrepresentation in the application[s] submitted to the EDA for tax incentive programs" and also "focused on the EDA's review and approval of tax incentive awards,"[88] the EDA took no action to investigate any of Mr. Sucsuz's whistleblower allegations. While the Task Force has taken no position on the accuracy

[87] As discussed in Section V(C)(2)(b) of this First Report, for incentivized projects in most parts of New Jersey, it is indisputable that, for a company to receive Grow NJ tax incentives for existing jobs in New Jersey, those jobs must be at risk of leaving the state or being eliminated. Thus, where jobs are not at risk of elimination, applicants must demonstrate an alternate out-of-state location. In any event, any proposed alternate out-of-state locations must be legitimate and comparable.
[88] Hr'g Tr. (May 2, 2019) at 58:18-59:2.

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or truthfulness of Mr. Sucsuz's allegations, the Task Force has taken steps to investigate Mr. Sucsuz's various claims, which will be detailed in a later report.[89]

We also found that the EDA lacks the proper internal controls with respect to the processing and review of internal whistleblower complaints. During the second day of the Task Force's public hearing, we heard testimony from a Senior Vice President of Operations at the EDA, Fred Cole, who admitted to a failure within the EDA to investigate a former EDA underwriter's whistleblower complaints regarding various failures within the EDA with respect to tax incentive applications. At the May 2, 2019 public hearing, Mr. Cole acknowledged that the whistleblower allegations implicated conduct related to the EDA's tax-incentive programs, specifically that the allegations "identif[ied] potential fraud or misrepresentation in the application submitted to the EDA for tax incentive awards" and "also focused on the EDA's review and approval of tax incentive awards."[90] Yet, Mr. Cole testified that neither he nor anyone else at the EDA conducted an internal investigation into the allegations of fraud and misconduct. The Task Force takes no position on the accuracy or truthfulness of the whistleblower allegations. However, the EDA's processes failed when it took no steps to investigate the whistleblower claims which, as Mr. Cole admitted, could have had merit and, if true, could have carried significant financial ramifications.

In addition to the EDA's failure to conduct an internal investigation into the former EDA employee's whistleblower allegations, the EDA further failed to disclose this litigation to the Office of the Comptroller during its 2018 audit despite an affirmative obligation to disclose pending claims and litigation against the EDA. Indeed, the EDA's failure to disclose occurred despite the fact that members of its senior leadership team were deposed shortly before and during the beginning stages of the Comptroller's audit in late 2017 and early 2018 and despite the fact that the trial took place in April 2018 while the Comptroller's audit was ongoing. In fact, at the conclusion of the Comptroller's audit on January 3, 2019, Mr. Cole signed a management representation letter to the Comptroller's office, representing that, for the ten years prior and through the close of the Comptroller's audit, the EDA was not aware of any allegations of fraud or suspected fraud affecting

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[89] During its investigation, the Task Force made several attempts to contact Mr. Sucsuz for testimony but was ultimately unsuccessful. The Task Force first attempted to obtain Mr. Sucsuz's voluntary testimony by contacting him through his former counsel; however, when Mr. Sucsuz failed to return the Task Force's requests to meet, the Task Force requested the issuance of a subpoena from Professor Chen. After several attempts to serve Mr. Sucsuz, the Task Force ultimately effectuated proper service of two subpoenas for both deposition and public hearing testimony on Mr. Sucsuz. He nevertheless failed to appear at both the date set for his deposition and the May 2, 2019 public hearing of the Task Force.

[90] Hr'g Tr. (May 2, 2019) at 58:18-59:2.

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the EDA received in communications from employees or former employees and had disclosed all details concerning any pending claims, assessments and litigation against the EDA of which the EDA was aware and which would have a significant impact on financial operations.[91] EDA representatives are unable to offer an explanation for their failure to disclose the whistleblower litigation and a basis for its false representations to the Comptroller that it had, in fact, disclosed all relevant and pending claims and litigation.

C. Initial Findings

1. Lack of Written Policies and/or Procedures

The Task Force sought to review all of the EDA's written policies and procedures relating to the Programs. In seeking that information, the Task Force discovered that in the immediate years following the passage of EOA 2013, from approximately 2013 through 2017, the EDA had virtually no written policies or procedures regarding its process for reviewing and approving applications.[92] Although some practices and procedures have recently been memorialized in written memoranda to senior leadership and the Board, the EDA continues to lack a sufficient set of formal written policies and procedures to disseminate to personnel and ensure a consistent application review and approval processes.

Furthermore, to the extent policies have been memorialized by the EDA, we do not believe, based on the inconsistency of responses received from EDA employees when asked about such documents, that those policy documents have been consistently and comprehensively distributed amongst EDA personnel. For example, several BDOs were unaware of existing BDO checklists or flowcharts when shown during interviews. Indeed, most of the current EDA employees interviewed did not recall reviewing or receiving a training manual, memorandum, or set of written policies relating to the EDA tax incentive program approval process.

The EDA also lacks sufficient written policies detailing the roles and responsibilities of specific positions within the EDA. The Task Force received a "Grow NJ Processing Steps" chart, which was finalized in April 2015, identifying the EDA employee responsible for each step in the Grow NJ application process. However, several of the EDA employees that the Task Force interviewed had never seen this document. Moreover, the chart does not provide detail or guidance

[91] Exhibit 10.
[92] The EDA does have a few written policies, including on the net benefit test and the factors (including the possibility an out-of-state location) affecting that test.

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on how to execute each step outlined and therefore does not provide guidance as to the roles and responsibilities for personnel.

The Task Force observed that BDOs and underwriters rely primarily on basic "checklists" implemented in 2014, which set forth the documentation required for a complete application. These checklists, however, do not provide guidance on how EDA personnel are expected to review or analyze required documentation, which would be more helpful to the guide the process. Rather, they require only that the BDOs and underwriters confirm that the Program applicant submitted required documentation before the application was transmitted to the Underwriting group. As indicated, they do not offer guidance on what is considered adequate documentation. It appears, moreover, that at least some EDA employees believed the documents listed on the checklists were not all required to proceed with an application: a senior underwriter responsible for ERG applications described the ERG checklist, which identified "Items required prior to submission to underwriting" as including both required items and items that would be "nice to have." That same underwriter told us that, for example, the Chief Executive Officer ("CEO") Certification is a "nice to have" item from this checklist, despite the clear regulatory requirement for a CEO Certification under the ERG Act.[93]

2. Failure to Comprehensively Train EDA Staff

The effect of the EDA's lack of written policies and procedures was exacerbated by its failure to comprehensively train its staff while onboarding and during promotions and role transfers, or on an ongoing basis. The EDA did not comprehensively train its staff regarding: (1) the requirements and responsibilities of roles within the EDA; (2) the Programs' requirements; (3) amendments to the Programs' requirements; and (4) the EDA's implementation of the Programs' requirements. Indeed, each of the employees the Task Force interviewed confirmed that he or she did not receive any formal training when onboarded to the EDA; they also did not receive any formal training following a promotion or transfer to a new role. Rather, training was "on the job" and involved shadowing senior management and/or colleagues. In some cases, employees stated that they were provided with the relevant statutes and instructed to "familiarize themselves" with the provisions.

EDA employees also did not receive comprehensive training regarding the statutory requirements of the Programs and the Programs' subsequent amendments. Some senior EDA employees recalled that, after the EOA 2013 was passed, employees attended a training seminar or

[93] The regulations governing ERG expressly require, as part of the Program's application submission requirements, a "written certification by the chief executive officer, or equivalent officer for North American operations." N.J. Admin. Code § 19:31-4.4.

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seminars with the New Jersey Attorney General's Office that provided an overview of the Programs and guidelines. However, all the interviewees indicated that the EDA did not provide subsequent trainings when new statutory amendments were passed. Although some EDA personnel recalled that senior leadership briefed EDA personnel regarding statutory and regulatory amendments and changes to the EDA's tax-incentive Programs during Pipeline Meetings, others indicated that although they might have received a copy of a regulatory amendment and had an opportunity to ask questions, they did not recall receiving formal notice or follow-up training when regulatory changes took place. Indeed, two senior underwriters stated that, when statutory or regulatory requirements were amended, underwriters simply reviewed the amended language and learned how to enforce the new amendments "on the job."

Furthermore, EDA personnel were not adequately trained to review and analyze information and documentary evidence applicants were required to submit. For example, employees did not receive training on how to review and identify problems with lease agreements, letters of intent, or requests for proposals that are consistently submitted with project applications to support proposed project locations. EDA employees generally seemed completely unaware of the kinds of documents a business would generate if it were seriously considering a move of its facilities to another state, and some appeared to be reluctant to "ask too many questions."[94] We discuss some examples of the impact of those failures in Section V(C)(4) of this First Report below.

Finally, given the critical importance of screening applications for potential misconduct, some training in fraud detection is critical for program underwriters. Not only did the Task Force determine that the EDA provided no such training at any time, up to the present, many EDA employees we interviewed expressed the view that their vetting required them to take information at "face value."

[94] At the Task Force's May 2, 2019 public hearing, John Boyd, a principal at a corporate site selection firm in New Jersey, testified that for a relocation of several hundred office employees, companies typically conduct a serious analysis to select the ideal location. The process often includes meetings with employees from multiple departments (including accounting, legal, human resources, and communications), memoranda and reports, and multiple site visits. Mr. Boyd testified at the Task Force's hearing that he "agree[d]" that, to determine whether a company was sincere in its considerations of a potential relocation site, there should be "a lot of documentation of [the company's] deliberations" that "the company should be able to produce." *See* Hr'g Tr. (May 2, 2019) at 101:9-107:17.

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a) Inconsistent Understanding of Roles and Responsibilities

The EDA's failure to comprehensively train its staff has resulted in an inconsistent understanding of the roles and responsibilities of specific positions within the EDA. The Task Force observed that among the BDOs we interviewed, there was a broad range in the understanding of their responsibilities. All BDOs interviewed understood their role as business developers and advocates for the applicants or "clients." However, several BDOs expressed the belief that their review of applications did not require independent verification of information and required only "perusing the application" for "red flags" or "glaring errors" that would potentially disqualify an applicant. Their supervisors, on the other hand, expected their officers to also conduct preliminary due diligence on the submitted documentation and conduct independent diligence in the form of internet-based searches on the applicant, including the business, its senior leadership, and the applicant's exposure to legal risks. Unfortunately, because of a complete lack of policies concerning how to conduct internet and other public searches for such information and what to look for, the quality of such diligence varied from BDO to BDO, and application to application. Indeed, as noted above, we found important information through simple internet-based searches which BDOs missed completely, including potentially disqualifying information.[95] BDO supervisors expected BDOs to review application materials and address as many potential issues or questions in order to present a complete application to Underwriting. Although some BDOs believed their role was to both assist and scrutinize the applicant, all the BDOs understood that it was primarily the underwriter's responsibility to conduct due diligence, investigate, and verify information provided by the applicant.

Nearly all of the underwriters interviewed understood their responsibility to conduct due diligence and investigate and verify information applicants provided; however, at least one senior underwriter understood the role to be that of a "processor" who "checks off the boxes." The same underwriter believed that the underwriters needed to review applications to ensure the required documentation and materials had been submitted but did not need to assess whether applicants' representations were truthful. This approach is inconsistent with the underwriters' gatekeeping role: the underwriters are the primary means to ensuring that applications comply with the Programs' requirements.

[95] However, the Task Force did observe other instances where BDOs did perform sufficient due diligence and identified one company's failure to disclose on its application potentially relevant lawsuits. The EDA eventually resolved the initial non-disclosure with the company.

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b) Inconsistent Understanding of the Program Requirements Concerning Camden and Atlantic City

The EDA personnel interviewed thus far have, in some important areas, exhibited inconsistent, incomplete, or inaccurate understandings of certain Program requirements, specifically with respect to (a) the circumstances in which Grow NJ applicants are required to demonstrate a risk that their jobs may be relocated outside of New Jersey and (b) the effect such a relocation risk may have on the terms of any tax incentives award.

As discussed in Section IV(A)(1)(e) of this First Report, the Grow NJ Act expressly states that a "purpose of the [Grow NJ] program is . . . to preserve jobs that currently exist in New Jersey but which are in danger of being relocated outside of the State."[96] In most cases, Grow NJ applicants are indisputably required to demonstrate to the EDA, in order to qualify for tax incentives, that they are considering an out-of-state relocation. However, because of an ambiguity in the statute's text, it is arguable that tax incentives may be available (although only in a reduced amount, for reasons discussed below) for relocating existing New Jersey jobs to Camden or Atlantic City, even when no potential out-of-state relocation is contemplated.[97] The EDA has on one occasion approved tax incentives for a company that relocated from within New Jersey to Atlantic City even though that company was not contemplating a possible out-of-state relocation—thus, the company was approved for tax incentives even though its jobs were not "in danger of being relocated outside of the State."

Whether or not an out-of-state relocation is strictly required under the statute for projects in Camden or Atlantic City to receive tax incentives, it is indisputable, based on a separate provision of statute, that whether or not such an out-of-state relocation is contemplated is a critical factor bearing on, at a minimum, the potential size of any award. As discussed previously, the Grow NJ Act requires that every tax incentive award be anticipated to "yield a net positive benefit to the State."[98] In this context, the "benefit to the State" means tax revenues collectible by the State as a result of the fruition of the project for which the tax incentives were awarded—tax revenue, that is, that the State would not collect in the absence of the tax incentives. Under the statute, no tax incentive award under the Grow NJ program may be larger than the anticipated benefit to the State. If the anticipated benefit is smaller than the award that for which the applicant would otherwise be

[96] N.J. Stat. § 34:1B-244(a).
[97] As discussed previously, EOA 2013 introduced this provision with respect to Camden, and the statute was amended again in 2014 to have the provision apply to Atlantic City as well.
[98] N.J. Stat. § 34:1B-244(a)(3).

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eligible, then the award must be reduced. For example, if an applicant would otherwise be eligible for a $50 million award for a project in Camden, but the EDA anticipates that the project will yield only $10 million in resultant tax revenue to the State, then the applicant's award must be reduced to $10 million only rather than $50 million.

A company's certification that jobs are at risk of leaving the State—and thus that it is considering an out-of-state alternative—may have a critical and material effect on the net benefit test, particularly with respect to income taxes that accrue from employment. The net benefit test required by the Grow NJ Act is a statewide test that assesses benefits to the State as a whole—rather than to a particular locality within the State. When an applicant's jobs are already in New Jersey, any income taxes related to those jobs are factored into the net benefits calculation only if the jobs are at risk of being relocated out of state. There, the provision of tax incentives, which keeps the jobs in the State, provides a clear benefit to New Jersey. By contrast, if an applicant is not considering moving out of state, and a job will exist somewhere in New Jersey in any event, there can be no benefit to the State as a whole. Thus, the EDA's implementing regulations for Grow NJ provide that, for projects in Camden and Atlantic City, "[r]etained employees . . . shall not be included [in the net benefits calculation] unless the business demonstrates that the award of tax credits will be a material factor to retain the employees in the State . . . ."[99] This rule is also set forth in several EDA policy documents.

Some EDA employees demonstrated a limited understanding of these issues. At least two EDA employees believed that, as administered by the EDA, projects moving to Camden did have to show jobs were at risk of leaving the State.[100] Some were unclear about whether the possibility of an out-of-state relocation is strictly required as a matter of threshold eligibility (rather than a factor in award size) for projects in Camden or Atlantic City, and did not know whether the EDA had ever processed applications concerning projects in Camden or Atlantic City for which no potential out-of-state relocation was contemplated. Although the existence of a potential out-of-state relocation clearly has an effect on the net benefit test and, therefore, on the size of any potential

[99] N.J. Admin. Code § 19:31-18.7(c).
[100] *See* Hr'g Tr. (May 2, 2019) at 135:9-20 (testimony of David Lawyer, the EDA's managing director of underwriting since May 2017: "Q. And for companies that were, at the time of their application, they were already in New Jersey, does every Grow applicant need to show that the jobs were at risk, as the program was administered, does every applicant have to show that the jobs were at risk of moving out of the state? A. That is my understanding. Q. And that is true even where an application proposes to move jobs intrastate from a city outside of Camden to Camden? A. That is my understanding, yes.").

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award, at least one EDA employee misapprehended this rule. Given that the risk of jobs leaving the State is a core element of the Grow NJ program, it is important for all EDA employees responsible for processing Grow NJ programs to fully understand the pertinent issues, and EDA employees should have a firmer understanding of them.

3. Due Diligence Failures

The Task Force has found that the EDA's due diligence practices in connection with review of applications have generally been insufficient. Program applicants are required to make a number of representations in connection with their applications, both about the applicant itself and about the circumstances under which they are seeking tax incentives. Because these representations are critical to determining whether the applicant is eligible for the tax incentives requested, it is important to conduct sufficient due diligence to detect fraud, misrepresentations, or error.

Many EDA employees we interviewed did not believe independent verification of an application's accuracy or truthfulness was warranted because the EDA required an applicant's CEO to certify under penalty of perjury that the representations contained in the application were accurate and that the CEO had taken steps to ensure that the application materials were complete. However, if the answers provided by an applicant are taken at face value, without any effort to cross-corroborate or verify through public sources, applicants could easily present and certify false, misleading, or inaccurate information to the EDA without consequence.

Some EDA employees stated that they conducted internet searches regarding applicants and their senior personnel to identify potential red flags and issues, but it appears that those searches, when conducted at all, were insufficiently broad and failed to identify key information that should have raised red flags or at least warranted follow-up questions to applicants. For example, the Grow NJ application requires applicants to state whether the applicant has ever been debarred by any state or federal governmental department, agency, or instrumentality. Under the EDA's regulations, such a debarment could constitute grounds for the EDA to deny an application for tax incentives.[101] One company, Holtec International, represented in its application—certified by its CEO—that it had no prior history of debarment.[102] In fact, however, Holtec had previously been debarred by the Tennessee Valley Authority, a congressionally chartered corporation of the United States. The EDA then approved Holtec for a $260 million award under Grow NJ. Had the EDA conducted cursory internet research, it could have found that Holtec's answer was inaccurate. Yet EDA

[101] N.J. Admin. Code § 19:30-2.2(a)(1)(10).
[102] *See* Exhibits 11 and 12.

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personnel failed to independently uncover Holtec's misrepresentation when it approved Holtec's award, one of the largest tax incentive awards in New Jersey history.[103]

Although Holtec's undisclosed debarment was potentially disqualifying, other examples abound where readily available information—if the EDA had found it—would have at least merited follow-up questions to program applicants. However, even more concerning were examples found where EDA personnel did, in fact, conduct internet searches that yielded red flags, including relevant lawsuits involving the company, but EDA failed to investigate and conduct further due diligence that could have uncovered material misrepresentations. For example, NFI, L.P. ("NFI"), submitted its Grow NJ application on October 24, 2016. It asserted that in exchange for Grow NJ tax incentives, it would continue to employ 670 employees in New Jersey rather than move the jobs to Philadelphia. NFI submitted a chart of affiliates identifying the related companies, which included NFI Industries, Inc., National Freight, Inc., and NFI Interactive Logistics, LLC. As part of its application, NFI was required to answer a series of background questions related to legal matters. The application asked whether the "applicant, any officers or directors of Applicant, or any Affiliates (collectively, the 'Controlled Group') [had] been found guilty, liable or responsible in any Legal Proceeding for any of the following violations or conduct." NFI answered "No" for each listed question, which included offenses indicating a lack of business integrity or honesty, such as fraud, and violations of the governing hours or labor, minimum wage standards, and prevailing wage standards laws. While the EDA may have a timeframe that it considers relevant for legal proceedings, the actual application does not indicate that a company should limit disclosures to a period of five or ten years. Therefore, each company is presumed to have disclosed all legal proceedings relevant to the disclosure questions regardless of whether EDA would find it impactful on a company's eligibility.

The Task Force has reviewed the application and full company file of NFI and found that the EDA was aware of at least three lawsuits related to NFI.[104] In its Grow NJ transmittal form,

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[103] Last month, Holtec acknowledged that it did not disclose its prior debarment in its application and sought to amend its application. The EDA has since suspended Holtec's tax-incentive award, pending further investigation.

[104] First, an Equal Employment Opportunity Commission action in which NFI paid $45,000 to settle gender-discrimination allegations about unequal pay; second, a Department of Labor action in which NFI was ordered to pay 350 workers over $1 million in back wages for misclassifying them as exempt from overtime; and third, a Department of Labor action in which NFI was ordered to reinstate a trucker and pay him $276,870 after he alleged he was fired for refusing to make a trip that would have violated federal "hours of service" restrictions.

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which is an internal request for application review, an EDA BDO, listed four articles highlighting these three lawsuits under the section "Google Search of Applicants/Owners." Our review of correspondence indicates that on October 24, 2016, the EDA BDO sent an email to Mr. Sheehan of Parker McCay, who represented NFI, asking for an explanation and status of the three cases she found based on her internet search. On October 31, 2016, Mr. Sheehan responded with a brief explanation and stated that NFI disputed each claim but settled "to avoid protracted and costly litigation." The EDA BDO referred the issue and lawsuits to an EDA Senior Legislative Officer. In her correspondence, the EDA BDO highlighted for the EDA Legislative Officer that NFI answered "No" for the legal questions on their application. Based on a review of the correspondence, it appears that the EDA Legislative Officer directed the EDA BDO to request the settlement agreements from Mr. Sheehan and had further communications with Mr. Sheehan regarding details and his initial concerns regarding lawsuits involving NFI.

While the Task Force appreciates that the EDA BDO conducted initial diligence, it believes that further diligence would have unveiled a criminal conviction and guilty plea by affiliate Interactive Logistics, Inc. d/b/a NFI Interactive Logistics, Inc. and at least two additional legal proceedings.[105] The Task Force reviewed publicly available documents indicating that in November 2005, an NFI-related entity, Interactive Logistics, Inc. d/b/a NFI Interactive Logistics, Inc., pled guilty to three counts of wire fraud for defrauding Anheuser-Busch.[106] In addition, the Task Force reviewed publicly available documents related to lawsuits alleging violations of wage and hours laws. The Task Force finds this concerning on numerous grounds. It further highlights potential misrepresentations by NFI, and Sidney Brown, NFI's CEO who certified on its behalf, that all information contained within the company's Grow NJ application was true. Second, it is concerning that—after the EDA questioned Mr. Sheehan and NFI about the discovered lawsuits—neither he nor Brown was forthcoming about the criminal conviction or additional lawsuits, especially those of a nature required to be disclosed on the EDA application. Finally, from an EDA perspective, the Task Force believes that in-depth due diligence would have found the publicly available lawsuits. While the EDA Legislative Officer identified the need to review the settlement agreements in the lawsuits that were found, neither he nor the EDA BDO seemed appropriately concerned that at the crux of the matter, NFI's application contained potential misrepresentations

[105] *Interactive Logistics, Inc. v. Markel Insurance Co.,* No. 08-CV-1834 (D.N.J.); *Brime v. Eckenrode and Interactive Logistics, LLC*, No. 08-CV-0095 (E.D.V.A.) (previously captioned *Brime v. Eckenrode and Interactive Logistics, Inc. t/a National Freight, Inc.*).
[106] *United States v. Interactive Logistics, Inc.,* No. 05-CR-00872 (D.N.J.); *see* Exhibit 13.

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and a potentially fraudulent CEO certification. Even more, despite learning this, the EDA approved NFI's application for an approximately $80 million award.

4. Deficiencies in Assessing Applicants' Alternative Relocation Sites

The Task Force has investigated applicants' consideration of locations outside of New Jersey. Because a core goal of the Grow NJ program is "to preserve jobs that currently exist in New Jersey but which are in danger of being relocated outside of the State,"[107] Grow NJ applicants are required to provide information about the locations in New Jersey and other states to which they are considering relocating.[108] The Task Force's investigation to date has found clear deficiencies in the EDA's evaluation of applicant submissions about these alternative sites. In some instances, Grow NJ applicants have made representations about a potential out-of-state alternative site that should have raised serious red flags about whether the applicant genuinely intended to move out of state, but the EDA failed to take any action to investigate the issue.

The Task Force has examined the EDA's processing of several applications of Program awardees thus far, and that investigation is ongoing. The Task Force selected certain applications to prioritize for investigation if it received information about red flags in connection with a particular application or applicant—for example, if a whistleblower indicated that there were potential concerns with a company's application or compliance with Program requirements. In some instances, however, the Task Force did not initially intend to include certain companies in its priority review, but information arising during the Task Force's investigation alerted it to potential issues that should be further examined.

As noted previously, the draft versions of the EOA 2013 that included revisions from Parker McCay were, from the Task Force's perspective, a very significant red flag. The Task Force remains skeptical that a company whose lobbyist had placed special provisions for its benefit in the tax-incentive legislation would have a legitimate business plan to move jobs to a different state. Indeed, three of these companies—Conner Strong & Buckelew Companies, LLC ("CSB"), The Michaels Organization, LLC ("TMO"), and NFI—had publicly committed to moving to Camden on September 24, 2015—thirteen months prior to their Grow NJ applications, which would seem

[107] N.J. Stat. § 34:1B-244(a).
[108] N.J. Stat. § 34:1B-244(d) ("When considering an application involving intra-State job transfers, the authority shall require the business to submit the following information as part of its application: a full economic analysis of all locations under consideration by the business; all lease agreements, ownership documents, or substantially similar documentation for the business's current in-State locations; and all lease agreements, ownership documents, or substantially similar documentation for the potential out-of-State location alternatives, to the extent they exist.").

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to directly belie their claim that they were considering an out-of-state move. Yet, although the Parker McCay-edited version of the EOA 2013 had, we have determined, been shared with the EDA's then President and Chief Operating Officer, Tim Lizura, we saw no evidence that Mr. Lizura considered these applications with any skepticism or alerted the BDOs and underwriters reviewing the applications to apply any heightened scrutiny themselves. We thus worried that the process may have been compromised.[109] We therefore made our review of the EDA's oversight of some of these applications a key priority.

To compound our concerns, on March 11, 2019, the Executive Chairman of CSB and member of the Board of Trustees of The Cooper Health System ("Cooper Health"), George Norcross, III, published an Op-Ed on *NJ.com*. In the Op-Ed, Mr. Norcross stated, among other things, that the Programs' tax credits were intended to "convince firms to move to Camden," but "were **not intended** to entice firms that were leaving the state to remain." (Emphasis added).[110] Mr. Norcross's contention caught the Task Force's attention because, in point of fact, every application for an in-state company that proposed a move to Camden did, in fact, certify that jobs were "at risk" of leaving the State (except one that had planned to eliminate jobs if denied tax incentives), including applications from entities with affiliations to Mr. Norcross, including CSB and Cooper Health.[111] We also learned that TMO and NFI were affiliated with Mr. Norcross in that their applications were related to CSB's application. The Op-Ed thus raised a concern about whether any of these companies had not, in fact, been considering moving out of the State at the time they applied for tax incentives under Grow NJ. The Task Force decided to review the applications for those companies and—even on a cursory review—additional concerns arose, and the Task Force determined that an examination of the EDA's oversight of these applications was appropriate.

Thus, we reviewed the applications of Cooper Health, CSB, TMO, and NFI, to examine whether the EDA gave any meaningful scrutiny to their certifications that jobs were at risk of leaving New Jersey and whether they had viable out-of-state locations that were bona fide, suitable,

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[109] To date, we have found no direct evidence that Mr. Lizura's actions and inactions were motivated by any corrupt intent.

[110] George E. Norcross, III, *George Norcross: We need tax incentives to continue to rebuild Camden*, NJ.COM, March 11, 2019, http://s.nj.com/okKoUPg.

[111] Although Cooper Health's application indicated that jobs were not at risk of leaving the State, it subsequently informed the EDA during the course of EDA's processing of its application that—in fact—it was considering an out-of-state move to Philadelphia. These circumstances are described more fully below. The EDA did not require Cooper Health to submit a revised application, nor did it require a new certification from Cooper Health's CEO.

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and available.[112] After conducting this review, we found that the EDA's scrutiny of these four entities' applications was inadequate in several material respects and that, as a result, the EDA failed to discover significant problems with those applications. We describe below EDA's deficiencies in assessing these four applications.

a) The Cooper Health System

On November 7, 2014, Cooper Health applied to the EDA for tax incentives under the Grow NJ program. Just over a month later, the EDA approved Cooper Health for a tax-incentive award of $39,990,000, in exchange for Cooper Health's relocation of certain back-office operations from various existing sites in Cherry Hill and Mt. Laurel, New Jersey to Camden, New Jersey. During the EDA's processing of Cooper Health's Grow NJ application, Cooper Health represented to the EDA that it was considering relocating its operations to Philadelphia, Pennsylvania as an alternative to Camden. Based on this representation, an internal EDA memorandum recommended awarding the tax incentives to Cooper Health to "make New Jersey more competitive." However, there is significant evidence, described below, that Cooper Health's purported alternative location in Philadelphia was illusory, and the EDA failed to sufficiently investigate that possibility based on the information in its possession.

Cooper Health's tax credits were for its relocation of certain administrative functions to One Federal Street, Camden, New Jersey, in a building often referred to as the "L-3 Building." Internal Cooper Health documents indicate that Cooper Health favored the L-3 Building in Camden as a relocation site as early as March 2014, months before its November 2014 application for tax incentives: on March 28, 2014, Douglas Shirley, Cooper Health's CFO, sent an email to John Sheridan, Cooper Health's President and CEO: "I have the proposal . . . and it is very rich! From a cash flow and balance sheet [sic] the L-3 is the best deal by a long shot. No other option can touch it, so you need to be okay with this option before we go out with it."[113] In addition, an internal Cooper Health document dated April 1, 2014, entitled "Potential Cooper Office Options," contains a chart of three possibilities for Cooper Health's office, including the L-3 Building in Camden and two other potential locations—both also in Camden.[114] The chart does not list any potential Philadelphia location. The EDA did not request contemporary business records from Cooper Health concerning relocations it was considering, so it did not have the benefit of these documents.

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[112] The Task Force has examined several other applications for these same purposes but has not found other instances—at this stage—where serious concerns were apparent.
[113] Exhibit 14.
[114] Exhibit 15.

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When Cooper Health initially applied to the EDA for tax incentives on November 7, 2014, it did not claim that it was considering relocating out of state. The application asked: "Are any jobs listed in the application at risk of being located outside of New Jersey?" Cooper Health answered "No."[115]

On November 8, 2014, the day after Cooper Health's application was filed, Cooper Health's representative, Kevin Sheehan of the Parker McCay law and lobbying firm, sent an email to an EDA employee that processes Grow NJ applications, copying EDA's Tim Lizura, to "give . . . a heads up that Cooper Hospital filed its GrowNJ application." Mr. Sheehan added, "As you review the application, if you need anything, let me know."[116]

A few days later, on November 10, 2014, the EDA employee responded to Mr. Sheehan with a list of several items the EDA needed, including a completed "Cost Benefit Analysis" (or "CBA") form.[117] The EDA's CBA forms are used by Grow NJ applicants to list certain information about the potential relocation sites the applicant is considering, and to show the difference in costs between, on the one hand, the more expensive New Jersey location for which the applicant is seeking tax incentives, and, on the other hand, the less expensive alternative location that the applicant will ostensibly relocate to if denied tax incentives in New Jersey. Responding to the EDA employee's request for a CBA form, Cooper Health's Vice President of Real Estate and Facilities, Andrew Bush, copying Kevin Sheehan, submitted to EDA on November 11, 2014, a CBA form that compared the costs of the L-3 Building in Camden, for which Cooper Health sought tax incentives, to the costs of Cooper Health's existing facilities in Cherry Hill and Mt. Laurel, New Jersey—not to the costs of any out-of-state alternative site.[118] In other words, the CBA form was consistent with Cooper Health's representation on its application that no jobs were at risk of being relocated outside of New Jersey, since the CBA listed only in-state locations as under consideration.

Two days later, on November 13, 2014, the EDA employee sent an email to Parker McCay's Mr. Sheehan: "I need to talk to you about Cooper, what time do you have today or tomorrow to talk?"[119] Mr. Sheehan responded later that day: "I have [sic] here for the rest of the day today. Let me know what time works for you."[120] Later that night, Mr. Sheehan wrote to the EDA employee

[115] Exhibit 16.
[116] Exhibit 17.
[117] Exhibit 17.
[118] Exhibit 17.
[119] Exhibit 18.
[120] Exhibit 18.

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again, under the subject line "Cost benefit." Mr. Sheehan wrote: "They are working on it. Will get to you ASAP."[121]

Several days later, on November 18, 2014, Mr. Sheehan sent an email to the EDA employee with an updated CBA form for the Cooper Health application.[122] That revised form compared the costs of the L-3 Building in Camden not, as previously, to the costs of Cooper Health's existing locations in New Jersey, but instead to the costs of a claimed alternative location at 1900 Market Street in Philadelphia.[123] The CBA form stated that the purported 1900 Market Street location was 120,000 sq. ft. and cost $23.50 per sq. ft. to rent.[124] In other words, the revised CBA form effectively communicated to the EDA that Cooper Health was considering potential relocation sites in Camden or in Philadelphia. The Task Force interviewed the EDA employee who had these communications with Cooper Health and its representative, Mr. Sheehan. The EDA employee said that he did not recall the phone call with Mr. Sheehan, but he insisted that he would not have suggested to Cooper Health that it should claim to be considering an out-of-state relocation when it was not sincerely considering one. The EDA employee stated that he believed Cooper Health was in fact considering an out-of-state relocation.

Once all necessary documents for Cooper Health's Grow NJ application were submitted, the application was transferred to an EDA underwriter. On November 24, 2014, the EDA underwriter assigned to the application sent an email to Mr. Bush seeking "back-up on the proposed terms for each of the locations, NJ and PA, ie term sheets, letters of intent and/or draft lease agreements."[125] The underwriter, in other words, asked Cooper Health to provide documentation of the Camden and Philadelphia locations that purportedly were under consideration for relocation.

Several days later, on December 1, 2014, Cooper Health's Mr. Bush wrote to the EDA underwriter: "Sorry for the delay in the response. . . . I am touring alternate locations in PA on Wednesday and hope to have term sheets by the end of the week."[126] The underwriter responded: "Thanks, it is very important that I have some back-up to the lease terms as presented in the Cost Benefit analysis – it's all verbal at this point?"[127] Mr. Bush replied: "All quoted numbers are verbal

[121] Exhibit 19.
[122] Exhibit 20.
[123] Exhibit 20.
[124] Exhibit 20.
[125] Exhibit 21.
[126] Exhibit 21.
[127] Exhibit 22.

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from prospective landlords in Pennsylvania. I expect to have proposals to justify the numbers by the end of the week."[128]

On December 5, 2014, Mr. Bush sent the EDA underwriter, copying the EDA employee who had previously communicated with Cooper Health, and Parker McCay's Mr. Sheehan, a lease proposal from a real estate broker, dated that same day, for space in Centre Square in Philadelphia.[129] The proposal was for 113,756 sq. ft. in the building at 1500 Market Street, in Philadelphia's Centre Square, offered for either $22 or $24.75 per rentable sq. ft. depending on the terms of the lease. Mr. Bush explained in his cover email that the lease proposal was from a prospective Philadelphia landlord, and noted that "**[t]he terms are slightly more aggressive than those presented in the cost benefit analysis meaning that there is more of a burden to Cooper to remain in NJ**." (Emphasis added).[130] The Task Force interviewed the EDA employees who received this email from Mr. Bush. Both EDA employees told the Task Force that, based on Mr. Bush's representation that there was a "burden to Cooper to remain in NJ" because of the purported cost savings from relocating to Philadelphia, Cooper Health was sincerely considering relocating there.[131]

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[128] Exhibit 22. The Task Force has interviewed both the BDO and the underwriter responsible for the Cooper Health application. Both have indicated, credibly in our view, that they believed Cooper Health's representations that it was considering an out-of-state location as an alternative to Camden. Although Cooper Health has now publicly asserted that "the EDA, not Cooper, initiated requests for comparable leases of Philadelphia properties," both have denied this assertion. *See* Thomas W. Rubino, *Cooper Health official says the company's tax incentive award is appropriate, justified and legitimate*, NJ.COM, June 12, 2019, https://www.nj.com/opinion/2019/06/cooper-health-official-says-the-companys-tax-incentive-award-is-appropriate-justified-and-legitimate.html.

[129] Exhibit 23.

[130] Exhibit 23.

[131] Cooper Health's CEO certification, signed by the health system's CEO, Adrienne Kirby, was dated November 11, 2014—that is, prior to Cooper Health's November 18, 2014 submission of the CBA form with a purported Philadelphia alternative location at 1900 Market Street, and also prior to Cooper Health's December 5, 2014 submission of the lease proposal for 1500 Market Street in Philadelphia. Cooper Health did not submit a new CEO certification to EDA after it changed its application in this respect. Because Cooper Health has declined to cooperate with the Task Force's investigation, the Task Force has been unable to determine what Ms. Kirby did or did not know or believe concerning Cooper Health's relocation deliberations at the time she executed the certification.

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The EDA underwriter prepared a Confidential Memorandum of Analysis, dated December 9, 2014.[132] The memorandum stated that Cooper Health had demonstrated that "rental costs in Camden are higher than leasing comparable space in Philadelphia, PA . . . . As a result, [Cooper Health] has applied for Grow NJ tax credits to offset these costs and make New Jersey more competitive."[133] In the "Conclusions" section of the memorandum, the underwriter stated that Cooper Health's jobs were "at risk of being located outside of New Jersey" and that the grant of tax credits under the Grow NJ program would be "a material factor in the company's decision."[134] The EDA underwriter also prepared a Project Summary memorandum, which similarly stated that Cooper Health was considering alternative relocation sites in Camden and Philadelphia, that hundreds of New Jersey jobs were "at risk of being located outside the State," and that Grow NJ tax credits would be "a material factor in the applicant's decision to make a capital investment and locate in Camden."[135] Under the "Conditions of Approval" section of the memorandum, it stated as Condition No. 1 that Cooper Health "has not . . . committed to remain in New Jersey."[136] The memorandum concluded by recommending that EDA's Board "approve the proposed Grow New Jersey grant to encourage Cooper Health System to locate in Camden."[137] The memoranda were provided to EDA's Board and, on December 9, 2014, the Board voted to approve Cooper Health to receive almost $40 million in tax incentives.

The Task Force has found evidence that the claimed alternative site in Philadelphia was not a genuine alternative site but, rather, was created solely for the purpose of submitting evidence of an alternative site to the EDA, thereby bolstering Cooper Health's claim for tax incentives. On November 25, the day after the EDA underwriter had sent an email to Cooper Health's Andrew Bush asking for "back-up" for the locations described on Cooper Health's CBA form, including the Philadelphia location, Mr. Bush emailed a real estate broker, Jon Sarkisian at the CBRE brokerage firm, under the subject line "favor."[138] Mr. Bush's email asked the broker to produce a term sheet for a "credible" rental location in Philadelphia that would match the space (120,000 sq. ft.) and cost

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[132] Exhibit 24.
[133] Exhibit 24.
[134] Exhibit 24.
[135] Exhibit 25.
[136] Exhibit 25.
[137] Exhibit 25.
[138] Exhibit 26. The Task Force notes that CBRE has been entirely cooperative with the Task Force's investigation to date. The Task Force has no reason to believe that anybody at CBRE other than the persons named in this First Report had any awareness of or improper involvement in the matters discussed herein.

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($23.50 per rentable sq. ft.) specifications of the Philadelphia location described in the CBA that Cooper Health had submitted to the EDA on November 18, 2014:

> As part of our EDA application we need a term sheet for a potential location outside of NJ.
>
> I need a **credible location that is LESS expensive than L3**. I think that Center Sq may be the right comp – the building is listed by CBRE Given that this building is within the CBRE family – can you get me a term sheet for 120k sf? **Quietly? No probability of us moving to Center Sq, so I don't want to make too much noise**
>
> I need a full service number of $24/sf or less to make the numbers work. Space can be as-is for 10 or 15 year term.
>
> Let me know
>
> Thanks
>
> Andy

(Emphasis added).[139] The obvious reference is that Mr. Bush was asking Mr. Sarkisian to provide a sham term sheet that could be supplied to the EDA as evidence of its bona fide intent to relocate outside New Jersey, when in fact Cooper Health had no such intention.

Although obviously the EDA was not copied on that email, Cooper Health's application file contained numerous red flags that should have called into question the sincerity of its statement that it was considering relocating to Philadelphia and that the cost differential between the two proposed locations presented a "burden to Cooper to remain in NJ."[140] Cooper Health's initial application did not claim any possibility of an out-of-state relocation—and, indeed, expressly disclaimed the possibility. Only after the application was submitted to the EDA did Cooper Health provide purported evidence of an out-of-state location and claim that there was a "burden . . . to remain in NJ." Even at that point, Cooper Health made inconsistent representations about the Philadelphia site in question, first citing one address (1900 Market Street), and then citing another (1500 Market

[139] After Mr. Bush sent the request to Mr. Sarkisian for a "credible" location, Mr. Sarkisian responded later that day, noting that he had received the email as well as a voicemail from Mr. Bush. Mr. Sarkisian added, "I like [sic] to speak to you the numbers may not come in the area that you thought. Call me in the office tomorrow." Mr. Bush responded, "Will do." Exhibit 26.
[140] Exhibit 23.

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Street). Those facts should have alerted the EDA underwriter to a potential problem, prompting additional diligence. However, the EDA failed to further investigate the facts to ensure that Cooper Health was genuinely considering relocating to Philadelphia, and that the location was bona fide, suitable, and available.

The EDA Board approved Cooper Health for an almost $40 million award on December 9, 2014.[141] The Task Force requested that the EDA recalculate the award that Cooper Health could have received if it had communicated to the EDA, as it had communicated to the real estate broker, that there was "[n]o probability"[142] of Cooper Health relocating to Philadelphia instead of Camden. Based on a recalculated net benefits analysis, the EDA concluded that Cooper Health would have qualified for only a $7.15 million award at most. Therefore, the failures in the EDA's processing of Cooper Health's Grow NJ application appear to have resulted in over $32 million in improperly approved tax incentives, putting aside the potential ramifications of Mr. Bush's apparent misrepresentation.

b) Conner Strong & Buckelew, The Michaels Organization, and NFI

CSB, TMO, and NFI submitted Grow NJ applications on October 24, 2016.[143] The three companies sought tax incentives in connection with joint plans to move into a new office tower on the Delaware River waterfront of Camden, New Jersey (the "Camden Tower"). Floors 15 through 18 of the Camden Tower (110,161 sq. ft.) were allocated to CSB, floors 12 through 14 (101,511 sq. ft.) were allocated to TMO, and floors 9 through 11 (101,511 sq. ft.) were allocated to NFI. The Camden Tower was to be constructed by the Liberty Property Trust development firm.

i) Background Context

Although CSB, TMO, and NFI submitted their Grow NJ applications to the EDA in October 2016, the EDA was aware of their plans to relocate to Camden long before then.

In September 2014, more than two years before the companies filed their applications, senior EDA management held a meeting with Philip Norcross of Parker McCay and several

[141] Cooper Health could have potentially qualified for a larger award, but during EDA's processing of the application, Cooper Health removed a number of jobs from the application to keep the award under $40 million. Under EDA policy, awards over $40 million require additional scrutiny and processing time.
[142] Exhibit 26.
[143] Exhibits 27, 28, and 29.

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representatives from Liberty Property Trust. The purpose of the meeting, as described in an email setting it up, was to discuss "a large office building on the Camden Waterfront."[144]

A year later, on September 24, 2015, CSB's Executive Chairman, George E. Norcross, III, sent an email attaching a press release to the EDA's then President and Chief Operating Officer Tim Lizura discussing Liberty Property Trust's plans for the Camden waterfront, including the Camden Tower. The press release listed "local leaders who have **committed** to investing in the project either personally or through their firms," including "George E. Norcross, III, Executive Chairman, Conner Strong & Buckelew," "John O'Donnell, President, The Michael's Organization," and "Sidney Brown, Chief Executive Officer, NFI, and his family." (Emphasis added).[145]

That same day, then-Governor Chris Christie, then-Mayor Dana Redd, and others hosted a major press conference announcing the Camden waterfront development at the Camden Aquarium. George Norcross attended the event. At the event, a reporter for *NJTV News* asked Mr. Norcross, "It's been reported that you're going to put $50 million into the project, is that true?" He responded, "It's absolutely true. I **committed** to do this when I was trying to persuade one of the biggest real estate concerns in the country to become part of this effort, and we all thought that was going to be a credible act, and we're putting our money where our mouths are, and we're looking forward to being a part of it." (Emphasis added).[146] Press coverage around that time indicated that CSB, TMO, and NFI were expected to relocate to the new Camden development.[147]

Internal emails from the EDA show that Mr. Lizura attended the press event, at which he spoke to at least one reporter and one representative from Liberty Property Trust, the developer of the project.[148] But, later, when the companies were preparing their applications for tax incentives

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[144] Exhibit 30.
[145] Exhibit 31.
[146] *See* Michael Aron, *Christie Announces Historic $700 Million Redevelopment Project in Camden*, NJTV NEWS, Sept. 24, 2015, https://www.njtvonline.org/news/video/christie-announces-historic-700-million-redevelopment-project-in-camden/ (transcription from video).
[147] *See, e.g.*, Allison Steele, *Plans for Vast New Development on Camden Waterfront*, PHILA. INQUIRER, Sept. 24, 2015, https://www.inquirer.com/philly/business/20150924_Top_developer_to_announce_Camden_waterfront_project.html (reporting, based on an anonymous source, that CSB was "considering moving its headquarters into the development" and TMO and NFI were also "expected to join the project").
[148] Mr. Lizura sent an email to several EDA staff members saying that he was "[h]eading down now" when he was leaving for the event. *See* Exhibit 32.

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based on representations that they were considering out-of-state locations and requested an initial assessment of the net benefits test, an EDA employee indicated that he planned to run the test assuming that no jobs were at risk of leaving the state—and Mr. Lizura directed the employee to run a preliminary assessment as if the jobs were at risk.

Specifically, on August 31, 2016, Kevin Sheehan of Parker McCay sent an email to an EDA BDO requesting that preliminary award calculations be run for CSB, TMO, and NFI.[149] The BDO forwarded Mr. Sheehan's email to an EDA underwriting supervisor, Director of Bonds and Incentives John Rosenfeld, saying: "[These] are all the applicants that may go into the LPT [Liberty Property Trust] space at the Camden Waterfront. All three would like to know what their award could potentially be before focusing their efforts on an application for this space, especially since it's expensive."[150] When Mr. Rosenfeld ran the numbers for two of the three companies later that day, he explained the results internally to others at EDA as follows: "I would advise caution on these numbers but, based on the extremely limited information involved, it looks like these applicants COULD have a Net Benefit of approximately $36.8M and $43.3M respectively."[151]

A few days later, the assigned EDA BDO copied Mr. Lizura into her email chain with Mr. Rosenfeld, saying as follows: "Hi John, are these [calculations] including the new and retained job numbers that are listed below? Also Tim has requested to see the reports so he can review them as well, thanks!" Mr. Rosenfeld replied that he did not include any credit for income taxes related to jobs retained in New Jersey, because he had "assumed that this was a situation where the jobs would stay where they are in NJ without the award . . . ." Mr. Lizura flatly told Mr. Rosenfeld, "**The retained jobs are at risk. Can you run them as such**." (Emphasis added).[152]

Mr. Lizura's instruction to Mr. Rosenfeld to assume that the jobs were at risk, given the well-publicized commitment made by Mr. Norcross at the press conference that he attended, certainly invites skepticism. In an interview with the Task Force, Mr. Lizura said that he was merely instructing Mr. Rosenfeld to run the assessment using the numbers that Mr. Sheehan had provided and was not making a factual statement about whether the "retained jobs" were "at risk." He further indicated that, at that stage, he deferred to Mr. Sheehan about whether the jobs were "at risk" because Mr. Sheehan knew the tax-incentive programs well and understood their requirements. Mr. Lizura also stated that he viewed the statements in the September 2015 press

[149] Exhibit 33.
[150] Exhibit 33.
[151] Exhibit 33.
[152] Exhibit 33.

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release and press conference that CSB, TMO, and NFI had "committed" to the Camden waterfront development project only as a commitment to invest in the real estate project, and that he was not aware of whether CSB, TMO, or NFI had committed to relocate to Camden at any point before their applications were filed.[153] Given the statements a year earlier that the very companies applying had "committed" to Camden, the Task Force believes that these applications should have been scrutinized, particularly given the size of the awards at stake. Indeed, despite his instruction to Mr. Rosenfeld to defer to Mr. Sheehan's numbers about at-risk jobs, Mr. Lizura indicated during this interview with the Task Force that he instructed his team to pay particular attention to the applications because they involved companies related to Mr. Norcross. Mr. Lizura did not, however, identify any particular steps he asked the team to take to scrutinize the applications, and the Task Force has found no evidence of any. In any event, Mr. Rosenfeld, after re-running the test based on Mr. Lizura's instruction, said: "With the at risk jobs, they both get to about $88.8M in net benefit . . . ."[154] The final awards were granted based substantially on that calculation.

ii) The Applications

When CSB, TMO, and NFI submitted their Grow NJ applications on October 24, 2016, notwithstanding the prior public reports that the three companies had already "committed" to relocating to Camden, the companies all stated that they were considering a potential relocation to Philadelphia as an alternative.[155] Specifically, each company stated "Yes" in response to the application's question of whether jobs were at risk of being located outside of New Jersey and listed "Pennsylvania" as in competition with New Jersey for the jobs.[156] Each company stated, in virtually identical language, that the company's "business is expanding and requires additional space. If the credits are not awarded, the business will seek to relocate at a less expensive location outside of New Jersey."[157] Each company's application stated that the company had retained real

[153] Even if CSB's, TMO's, and NFI's only "commitment" was to invest in the real estate project, and not to relocate their offices there, as Mr. Lizura claims to have believed, it nonetheless is difficult to understand why a different understanding would not emerge once the companies filed their applications and indicated their intent to relocate there. The EDA had the authority to request documentation from CSB, TMO, and NFI that would have revealed the nature of the "commitment" the companies had made and when they made it, but the EDA failed to exercise such authority.
[154] Exhibit 33.
[155] Exhibits 27, 28, and 29.
[156] Exhibits 27, 28, and 29.
[157] Exhibits 27, 28, and 29.

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estate brokers "to identify Class A office space in Philadelphia."[158] Real estate proposal letters from real estate brokers for Philadelphia space for each company were attached to the applications.[159] However, TMO's and NFI's proposal letters for space in Philadelphia had already expired by the time the applications were filed. (CSB's proposal letter did not specify an expiration date.)

On November 18, 2016, the EDA underwriter assigned to the three companies' applications sent an email to Kevin Sheehan of Parker McCay, who represented all three companies, to ask whether the companies still had valid offers for space in Philadelphia, because the real estate proposal letters submitted with the companies' applications appeared to have expired.[160] The underwriter followed up ten days later, also asking Mr. Sheehan to clarify how many employees at the three companies were at risk of moving out of New Jersey.[161] Mr. Sheehan replied that "[a]ll employees are at risk in all 3 companies."[162] On November 30, 2016, Mr. Sheehan sent the EDA underwriter a new real estate proposal letter for CSB, dated December 1, 2016, outlining a proposal for space in Philadelphia.[163] The December 1, 2016 real estate proposal differed significantly from the prior real estate proposal that CSB had submitted with its application. The initial proposal offered approximately 150,000 sq. ft. of space on the third through seventh floors, and the eleventh and twelfth floors, of the building located at 1601 Market Street in Pennsylvania.[164] CSB's new letter offered the company "approximately 110,000" sq. ft. of space on the third through seventh floors and the thirteenth floor of the building. The letter stated that it would expire on December 31, 2016.[165]

Two months later, on March 1, 2017, Mr. Sheehan sent the EDA underwriter new real estate letters for NFI and TMO, outlining proposals for both companies for space at 1500 Spring Garden Street in Philadelphia.[166] Both real estate proposals differed from the initial, expired proposals that the companies submitted with their applications in respects, but the changes with respect to TMO's proposals were significant. TMO's initial real estate proposal, dated August 30, 2016, had offered

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[158] Exhibits 27, 28, and 29.
[159] Exhibits 34, 35, and 36.
[160] Exhibit 37.
[161] Exhibit 38.
[162] Exhibit 38.
[163] Exhibit 39.
[164] Exhibit 34.
[165] Exhibit 39.
[166] Exhibits 40 and 41.

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the company 103,491 sq. ft. of space on the second floor of 1500 Spring Garden Street.[167] The proposal further stated that, in the alternative, TMO was offered 103,710 sq. ft. of space on the first and seventh floors of the building.[168] TMO's second real estate proposal, dated February 28, 2017, offered the company 95,928 sq. ft. of space divided between the basement level, two separate suites on the first floor, a suite on the seventh floor, and another suite on the twelfth floor.[169] The proposal letter also stated that the space on the seventh floor—which comprised approximately a third of the total space offered to TMO—was "encumbered by a Right of First Offer in favor of [another company]."[170] Both NFI's and TMO's real estate proposal letters stated that they would expire on March 24, 2017.[171]

The differences between CSB's, NFI's, and TMO's first and second sets of real estate proposal letters for Philadelphia are summarized below:

Company	**CSB**		**NFI**		**TMO**	
Address	**1601 Market Street**		**1500 Spring Garden Street**		**1500 Spring Garden Street**	
Proposal	**First**[172]	**Second**[173]	**First**[174]	**Second**[175]	**First**[176]	**Second**[177]
Date	8/29/2016	12/1/2016	8/29/2016	2/28/2017	8/30/2016	2/28/2017
Total sq. ft.	153,345	~110,000	103,491	93,308	103,491 OR 103,710	95,928
Floors	3-7, 11-12	3-7, 13	2	2	2 OR 1,7	Basement, 1, 7, 12
Expiration	Unspcfd.	12/31/2016	9/9/2016	3/24/2017	9/9/2016	3/24/2017

[167] Exhibit 35.
[168] Exhibit 35.
[169] Exhibit 41.
[170] Exhibit 41.
[171] Exhibits 40 and 41.
[172] Exhibit 34.
[173] Exhibit 39.
[174] Exhibit 36.
[175] Exhibit 40.
[176] Exhibit 35.
[177] Exhibit 41.

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The EDA underwriter prepared Project Summary memoranda based on the information provided by the companies.[178] Each company's memorandum stated that the company was considering between relocation in the Camden Tower or an alternative location in Philadelphia, that their New Jersey jobs were "at risk of being located outside the State," and that Grow NJ tax credits would be a "material factor" in the company's decision whether to locate in Camden.[179] Under the "Conditions of Approval" section of each memorandum, it stated as Condition No. 1 that the company "has not . . . committed to remain in New Jersey."[180] Each memorandum concluded by recommending that EDA's Board "approve the proposed Grow New Jersey grant to encourage [the respective company] to locate in Camden."[181] The memoranda were provided to EDA's Board and, on March 24, 2017, the Board voted to approve CSB, TMO, and NFI for total tax incentive awards of almost $245 million—$86,239,720 for CSB, $79,378,750 for TMO, and $79,377,980 for NFI.

The Task Force has discovered evidence appearing to indicate that the three companies did not genuinely consider Philadelphia as an alternative location to Camden. In August 2016, only a few months before submitting their applications, and almost a year after the press conference during which their "commitment" to the Camden project was reported, Kevin Sheehan appears to have reached out to a real estate broker, Ken Zirk at CBRE, to solicit offers for real estate in Philadelphia. After the initial outreach, the companies collaborated to obtain proposals for Philadelphia real estate to submit to the EDA, and NFI led the efforts on behalf of all companies.

On August 26, 2016, NFI's Chief Financial Officer, Steven Grabell, sent an email to TMO's Chief Financial Officer, Joseph Purcell, and CSB's Chief Financial Officer, John Muscella, to explain that he had authorized the real estate broker "to proceed full speed ahead with getting a proposal for 1500 Spring Garden."[182] NFI's Mr. Grabell wrote that the building located at 1500 Spring Garden Street was large enough for both NFI and one other company to obtain proposals from, and further, the real estate broker had "identified an additional possibility for 95,000 square feet at 1601 Market" that the third company "could use."[183]

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[178] Exhibits 42, 43, and 44.
[179] Exhibits 42, 43, and 44.
[180] Exhibits 42, 43, and 44.
[181] Exhibits 42, 43, and 44.
[182] Exhibit 45.
[183] Exhibit 45. Meanwhile, Mr. Zirk reached out to another broker who represented the landlord for 1601 Market Street. Mr. Zirk's note, expressing interest in the building on behalf of CSB, was forwarded to the building's landlord, who was surprised by the request: "This does not make any sense, we get on Friday afternoon a [request for proposal] that is due on Monday? Where is this

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Several days later, on August 29, 2016, NFI's Mr. Grabell wrote to Mr. Zirk, the real estate broker, to ask when the companies would be getting term sheets for the 1500 Spring Garden and 1601 Market properties in Philadelphia.[184] Later that day, Mr. Zirk sent one proposal letter, for NFI alone, for 1500 Spring Garden Street.[185] That evening, Parker McCay's Mr. Sheehan wrote to the group of CFOs for the three companies and the broker, noting that the proposal was for NFI and asking, "Is there one for Michaels?"[186] In response, NFI's Mr. Grabell stated: "Enough space for Michael's in that building as well. **I think it would be a little suspicious to ask for a duplicate**. Any thoughts?" (Emphasis added).[187] TMO's Mr. Purcell responded and wrote that he had understood that all three of the companies were "going with the 1500 Spring Garden Property."[188] However, in view of the concern that it would be "a little suspicious" for multiple companies to claim the same alternative location in Philadelphia, TMO's Mr. Purcell wrote that he would be willing for TMO "to go with" a different location in another city entirely—Fort Washington, Pennsylvania, instead of Philadelphia—if one of the other two companies requested it.[189] NFI's Mr. Grabell replied that "1500 Spring Garden has space for 2 of us, but not 3. That is why we reached out to 1601 Market."[190] Mr. Grabell asked Mr. Zirk whether he would "feel comfortable getting a similar quote for Michael's for 1500 Spring Garden?"[191] Mr. Zirk responded that he would discuss with the landlord's broker "tomorrow first thing."[192] TMO ultimately obtained a

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tenant from? How would we not have known about a 100,000 SF prospects [sic]?" The broker responded with a lengthy explanation, noting, among other things, that CSB's "principal, George Norcross, is a major political figure in South Jersey & very well connected locally." The broker wrote to the landlord that CSB "had been attempting to [relocate to] Camden with Liberty Property Trust but the deal apparently got too expensive & they didn't get the tax breaks/incentives that they were seeking," so CSB had decided to move the jobs to Philadelphia instead. Exhibit 46. In fact, however, CSB had not yet applied for tax incentives in New Jersey at that point, let alone been rejected for them.

[184] Exhibit 47.
[185] Exhibit 47.
[186] Exhibit 48.
[187] Exhibit 48.
[188] Exhibit 48.
[189] Exhibit 48.
[190] Exhibit 48.
[191] Exhibit 48.
[192] Exhibit 48.

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proposal letter for 1500 Spring Garden, and CSB obtained a proposal letter for 1601 Market Street, which both companies submitted with their applications in October 2016.

Although the EDA did not have access to the companies' emails with the real estate broker, which the Task Force obtained, there were nonetheless clear red flags in CSB's, TMO's, and NFI's EDA application and in the public record that should have caused EDA personnel to question the three companies' statements that they were considering relocating out of the State. As discussed above, there were public statements, of which senior EDA leadership was aware, indicating that the three companies had already "committed" to relocate to Camden long before they claimed to be considering relocating to Philadelphia. Despite these public statements, EDA leadership appear to have instructed EDA staff that the companies' jobs were "at risk."

In addition, at the Task Force's public hearing on May 2, 2019, the current Managing Director of the EDA's the Underwriting department, David Lawyer (who did not work on these applications and was not responsible for the Grow NJ program at the time they were processed) testified that it was "unusual" for companies to submit expired proposal letters with their tax incentive applications, and the fact that the letters had expired when they were submitted "casts doubt on whether that site [was] available."[193] Mr. Lawyer also testified that the changes to the amount and the configuration of the space in TMO's alternative-site proposal, as well as the fact that a significant portion of the space was encumbered by a right of first offer, raised red flags about the sincerity of the company's consideration of the property.[194] Mr. Lawyer testified that, in his view, the issues with CSB's, TMO's, and NFI's real estate proposals raised serious questions, "because . . . there's a pattern."[195] Similarly, John Boyd, an expert in corporate site selection, testified that it is common for companies considering relocation to negotiate for extended offer periods to provide adequate time to assess the suitability of potential real estate.[196] That these companies did not do so but instead submitted expired real estate offers, therefore, was a red flag. Mr. Boyd further testified that in his experience, barring extraordinary circumstances like emergency relocation after a natural disaster, companies never want office space spread out over noncontiguous floors of a building of the sort TMO was purportedly considering, spread out across

[193] Hr'g Tr. (May 2, 2019) at 150:4-25, 162:12-16.
[194] Hr'g Tr. (May 2, 2019) at 163:12-17, 164:14-19.
[195] Hr'g Tr. (May 2, 2019) at 164:23-165:6.
[196] Hr'g Tr. (May 2, 2019) at 108:10-109:6.

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four separate floors, including the building's basement.[197] The EDA staff, however, took no action to further investigate based on these and other red flags.

In 2017, the EDA approved CSB, TMO, and NFI for almost $245 million in tax incentive awards collectively—approximately $86.2 million for CSB, $79.4 million for TMO, and $79.4 million for NFI. The Task Force requested the EDA recalculate the awards the three companies could have received if they had communicated to the EDA that they were not considering any potential relocation to Philadelphia instead of Camden—which, based on the evidence discussed above, appears to have likely been the truth. Based on recalculated net benefits analyses, the EDA concluded that CSB's award would have stayed the same ($86.2 million), that TMO would have qualified for only a $60.8 million award at most (rather than $79.4), and that NFI would have qualified for only a $27.2 million award at most (rather than $79.4). Therefore, the EDA's failure to investigate the red flags in these companies' applications could have resulted in over $70 million in improperly approved tax-incentive awards.

5. Lack of Proper Reporting Channels

The EDA does not have official reporting channels in place for the processing, review and recording of internal or external complaints about Program awardees or applicants and does not maintain a "hotline" or reporting line for outside parties to report potential misconduct related to the EDA's tax incentive or other programs. The absence of such reporting mechanisms makes it more likely that misconduct—whether on the part of EDA employees or companies—will be missed.

Several EDA employees we interviewed suggested that external complaints or tips should be elevated to an individual in Human Resources or the Deputy Attorney General, but there was no official reporting line or process for ensuring that all complaints and tips were carefully considered and escalated to the appropriate individuals. Nor was there an official record of such complaints or tips maintained within the EDA. Two BDOs we interviewed recalled outreach from FBI agents regarding a potentially fraudulent application. Those BDOs recalled that the information was generally "disseminated" amongst the directors and Deputy Attorney Generals, but there was no formal system for tracking flagged companies. In another instance, a local contact advised a BDO Program Manager that a Grow NJ awardee had recently fired 80 employees—or 30% of its workforce. The Program Manager who received this notice recalled that he referred the information to the Director of Portfolio Management and Compliance but was not involved in any further action. The Managing Director of Business Development indicated that there was no policy regarding how to treat this type of information but believed the information would have been "socialized" within

[197] Hr'g Tr. (May 2, 2019) at 109:11-110:8.

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the EDA and referred to the Portfolio Management and Compliance group if it involved a tax incentive grant recipient. Although we believe that, in the latter example, the information ultimately reached the appropriate individuals, an express policy regarding the steps required to process and record this type of information would substantially improve the EDA complaint processing to ensure that information from outside parties regarding potential misconduct is not missed.

VI. THE ACCELERATED RECERTIFICATION PROGRAM (THE "ARP")

A. Introduction

As discussed above, in order to fully investigate the administration of the Programs, the Task Force undertook to examine the EDA's processing of awards for companies that applied for and received tax-incentive credits under the Programs. Given the findings of the Comptroller's audit, moreover, the Task Force has sought to determine whether each company in scope was compliant with applicable statutory, regulatory, and administrative requirements when the EDA approved its application and when it received tax credits under Grow NJ or ERG. To facilitate an investigation and review process that promotes resource efficiency, collaboration with companies, and expedient processing for compliant companies, the Task Force established the ARP. During its initial outreach and communications with companies in scope, the Task Force received overwhelming interest in the ARP. As a result, the Task Force announced the ARP during its first public hearing on March 28, 2019.

Without an expedited process of the sort provided by ARP, the Task Force would have conducted a broader investigation into each company's award. This could have included expansive document requests, interviews of relevant company personnel, and extensive document and data review. As an alternative, the ARP provides companies a streamlined process to proactively establish that they are in compliance with the Programs' requirements. If a company declined to participate in the ARP, or if the Task Force deemed it ineligible, the company's award is subject to the broader investigative process necessary to carry out the Task Force's mission.

B. ARP Participant Companies

The Task Force deems companies eligible for the ARP if the company (1) completes and submits an initial affidavit (the "ARP Initial Affidavit") and (2) the Task Force has not received or identified information suggesting misconduct, fraud, or other non-compliance with applicable requirements with respect to the company's application for, approval for, or issuance of tax incentives.

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The Task Force requires each company's CEO, or equivalent personnel, to execute the ARP Initial Affidavit, which provides additional company information to the Task Force. The ARP Initial Affidavit requires companies to describe their efforts to comply with the Task Force's document preservation directive and to identify document custodians and third parties that may possess relevant documents. Companies must also agree to voluntarily and promptly produce relevant documents to the Task Force. As of the date of this Report, 53 companies have pursued participation in the ARP. Despite the overwhelming participation in ARP, we note that approximately 8 otherwise eligible companies expressly declined to participate in the ARP. We appreciate that each company operates under a different set of resources, frameworks, and stakeholders. Therefore, we emphasize that at this time, we cannot— and have not—drawn any conclusions about companies that did not elect to participate in the ARP.

There have been several instances where companies sought inclusion into the ARP, but their eligibility is still under consideration by the Task Force for myriad reasons. In some instances, the Task Force has become aware of concerning information regarding the company's application or award. For example, for a number of companies, the Task Force has learned through independent evidence and information that the company's assertions regarding its intention to relocate are questionable. In these cases, proposed jobs may not have actually been at risk of leaving or locating outside of New Jersey, contrary to the companies' representations to the EDA. The Task Force reserved the option to investigate further before allowing the companies in question to participate in the ARP.

For other companies, the Task Force has become aware of information suggesting that these companies committed to locate in New Jersey before they submitted their EDA application. In other circumstances, the Task Force is aware of information suggesting misrepresentations or misconduct in connection with the jobs requirements of the award. In these cases, the Task Force reserved the ability to further investigate and review written responses and assertions made to the EDA to determine whether a company's application contained misrepresentations.

Several companies that exhibited threshold issues of the sort described above submitted the ARP Initial Affidavit. In the interest of transparency and continued cooperation, the Task Force contacted these companies to discuss obstacles to their ability to participate in the ARP. In many instances, companies were not deterred by this message and have continued to work with the Task Force to provide requested documents and information. The Task Force is reviewing this information before confirming the companies' categorization going forward.

Finally, there is a tranche of companies that the Task Force disqualified or deemed ineligible for ARP participation. The Task Force has disqualified companies where the Task Force has

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identified a reasonable basis to believe that further investigation may reveal instances of misconduct, fraud, violations of applicable requirements, or other issues suggesting the company's lack of good faith. Separately, the Task Force may also disqualify companies where they fail to comply with the Task Force's requests or the ARP requirements.

C. ARP Process

In order to establish a process that would enable it to determine whether a company was in compliance with Program requirements, the Task Force carefully reviewed related statutes, EDA regulations and requirements, and met with key EDA personnel to determine exactly what it means "to be compliant." Thereafter, the Task Force created a framework for information requests, document collection, and interviews that would provide adequate information for the Task Force to review and make a determination of compliance with Program requirements. The Task Force has taken care to continue an open dialogue with each participating company to better understand the company's framework, business, and key stakeholders. Accordingly, while the Task Force has established a process for the ARP, it also is working collaboratively with each company, with an understanding that each company's documentation, application, and purported needs for the tax incentives vary significantly.

From a process perspective, once companies submit the ARP Initial Affidavit and are deemed eligible by the Task Force, the Task Force requests certain written responses, with supporting documents where necessary ("Verifying Documents"), related to each company's application. The Task Force's ARP for Grow NJ requires the company to submit additional documentation related to the company's good faith business plan to relocate or locate in New Jersey, its plan for new or retained full-time jobs, and its expenditures comprising its capital investment. The Task Force's ARP for ERG requires submission of documentation related to the project's financing gap and development and the project developer's good standing. While the ARP requires documentation beyond what the EDA requested, these requests are narrowly tailored to identify representative materials that will allow the Task Force to examine the company's application and award.[198] As part of the review process, the Task Force engages in open communication with the company for clarifications, context, and additional information.

A company must provide a final affidavit from its CEO, or equivalent personnel, ("Verification Affidavit") and the requested Verifying Documents. To assist companies, the Task Force provides a template Verification Affidavit that the company tailors to its specific

[198] For example, to assess the company's good faith intentions to locate to New Jersey, the Task Force requests contemporaneous business records or communications discussing the relocation plan and the suitability of the proposed alternative site.

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circumstances. Thereafter, the company submits a draft affidavit. The Task Force reviews the information supplied to determine whether the company applied for its tax-incentive in good faith and with accurate information; met the application's requirements; and complied with the program requirements for each and every subsequent year it participated in the Programs. If the Task Force can make these determinations based on the information the company provides, the Task Force will accept a final Verification Affidavit. Upon successful completion of ARP, the Task Force will send a verifying closing letter ("Closing Letter"), confirming the company's successful re-certification.[199]

D. Initial Findings

The ARP process has provided the Task Force with opportunities to identify deficiencies with the Programs' designs and with the EDA processes to implement the Programs. By engaging with companies in the ARP and by collecting, reviewing, and analyzing information and data from the company's internal deliberations, the Task Force has been able to evaluate the requirements and EDA regulations from the company perspective.

Based on this examination, the Task Force has determined that both the existing legislation and the EDA requirements are ambiguous in certain respects that has impacted the EDA's ability to ensure consistency in how these requirements are applied across project applicants.[200] Some examples include:

- **EDA verification of cost benefit analysis**: An ARP company explained that after it submitted its application materials and cost benefit analysis, the EDA did not request any support for the line-item estimates in the company's cost benefit analysis, which showed that New Jersey was more expensive than the proposed alternate location. The company agreed that at the time of its application, the EDA had no verification that the line items in

[199] However, the Task Force's Closing Letter has no binding effect on any other agency or office of the State of New Jersey. Moreover, should the Task Force become aware of credible reason to believe there was misconduct, the Task Force reserves the right to make such information known to other law enforcement agencies.

[200] We understand that the EDA has, in the last year or so, begun to implement solutions to these deficiencies through its own processes and approval requirements.

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its proposed estimate were accurate and not exaggerated, estimated, or manipulated in any way.[201]

- **Clear legislative guidance and definitions for award bonuses categories**: After another ARP company submitted its initial application to the EDA, the EDA questioned whether it qualified as a technology business for the purposes of an award bonus. Under the Grow NJ statute as amended by EOA 2013, "technology" is a "targeted industry" such that qualifying "technology" companies are eligible for an additional grant of up to $500 annually per job.[202] However, neither the Grow NJ statute, nor EDA's implementing regulations, nor any policy documents maintained by EDA define what constitutes a "technology" company. Based on the Task Force's review, the Task Force found that EDA employees struggled over the appropriate characterization for the company.

- **EDA requirements related to applicants' submissions regarding potential alternative locations**: The EDA has not consistently required applicants to submit the same materials regarding the viability of the proposed alternative site.

VII. RECAPTURE

The Task Force seeks to achieve not only recommendations for the tax-incentive programs prospectively but to recommend recapture of improperly credited taxpayer dollars. These recommendations and efforts for recapture have involved cooperation and coordination with several areas of New Jersey State government, including the EDA, the Department of Taxation, and the New Jersey Attorney General's Office.

A. Statutory Recapture Process

The current Grow NJ legislation specifically sets forth language identifying the EDA's authority to recapture tax-incentive awards under certain circumstances.

Under the Grow NJ Act, applicants must enter into an incentive agreement with the EDA before the awardees receives any tax credits. One of the required provisions of this incentive agreement is that the applicant commits to remaining in its New Jersey facility for a minimum period of time. Typically, this period would include a ten-year term, during which the company

[201] The Task Force closely examined supporting information provided by the company, including the actual costs accrued after the company successfully received its grant and moved to New Jersey, and found no indication that the proposed analysis was made in bad faith.
[202] *See* N.J. Stat. §§ 34:1B-246(c)(8), 34:1B-243 ("targeted industry" definition).

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receives its award amount as annual credits, plus an additional five years after all annual credits are issued.[203] The statute further requires that if the company fails to honor this commitment, the EDA may recapture all or part of the tax credits awarded, although EDA retains the discretion to recognize the period of time that the company complied with the award requirements.[204]

B. Task Force Recommendations for Recapture

The Task Force has instituted its own processes to recommend recapture of tax-incentive awards and to assist the EDA with its recapture of tax-incentive awards.

When companies have indicated a willingness to cooperate and disclose any potential non-compliance, the Task Force has offered, and will continue to recommend and connect the company with the State Treasury for settlement. The Task Force considers such settlement recommendations based on the company's specific factual circumstances. However, for the Task Force to consider a settlement recommendation, the company must be willing to agree to several terms. First, the company must voluntarily terminate its tax-incentive award, including taking all steps that the EDA requires for the company to terminate its award. Second, the company must repay the value of the tax-incentive benefit already claimed. Third, if it becomes aware of credible evidence of criminal misconduct relating to the tax-incentive programs, the Task Force reserves its right to make such information known to other enforcement authorities. Finally, any settlement agreement with a State agency does not bind any other agency or office of the State of New Jersey. Companies that settle do not admit to any liability.

Separate from potential settlements, the Task Force has also referred, and will continue to refer, certain companies and awards to the EDA to consider whether additional credits should issue or whether previously received credits should be recaptured. The Task Force may also refer companies to appropriate law enforcement authorities for further investigation. Should law enforcement authorities pursue a criminal investigation and charges, this could generate sufficient evidence that a company's award was improperly awarded.

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[203] *See* N.J. Stat. Ann. § 34:1B-243 (defining the "eligibility period" as "the period in which a business may claim a tax credit," beginning with the first year the company certifies for a credit but that the term will be no longer than 10 years); *Id.* (defining "commitment period" as "1.5 times the eligibility period").
[204] *See* N.J. Stat. Ann. § 34:1B-245(d); *see also* N.J. Admin. Code § 19:31–18.10(b)(3).

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Currently, the Task Force has referred a number of applicants for suspension /or termination of their tax-incentive awards or obtained voluntary termination. In all, the aggregate amount of the grants at issue exceeds $500 million.

VIII. RECOMMENDATIONS

Executive Order No. 52 called for the Task Force to offer advice concerning the future of New Jersey's tax-incentive programs. Although the Task Force's work remains ongoing, its investigation and analysis to date have revealed certain deficiencies in the design, implementation, and oversight of the Programs now in place. Based on its findings, the Task Force offers the following recommendations with respect to the State's current and future tax-incentive programs, which will be supplemented as the Task Force's work continues.

Recommendation 1: The Task Force's investigation to date has found that special interests have had a significant hand in molding the current Programs' legislation and implementing regulations in their favor. As a result, in certain respects, the Programs have not been "neutral" in their design but have instead been structured to favor the business interests of certain parties, and in some cases to disfavor other parties. Future tax-incentive legislation should be designed to ensure that legitimate public policy goals are applied neutrally, without favoring specific business interests.

Recommendation 2: Future tax-incentive legislation should be transparent with respect to the benefits or costs of the programs. Under the current Grow NJ program, all tax incentive awards are statutorily required to "yield a net positive benefit to the State."[205] Based on this statutory provision, the State should profit from the program. However, this requirement is undermined by provisions of the statute allowing the benefits calculation to include the value of certain taxes that the State will never actually collect. By allowing such so-called "phantom taxes" to be included in the benefits calculation, the "net positive benefit to the State" that is supposed to be required by the law may be rendered illusory, obfuscating the potential costs of the tax incentives and contributing to public confusion.

Recommendation 3: To further promote transparency and public understanding, the goals of future tax-incentive legislation should be clearly defined, and the program should be structured to effectuate those explicit goals—not other unspecified aims. Currently, the Grow NJ Act expressly states that a "purpose of the [Grow NJ] program is . . . to preserve jobs that currently exist

[205] N.J. Stat. § 34:1B-244(a)(3).

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in New Jersey but which are in danger of being relocated outside of the State."[206] However, as discussed in Section IV(A)(1)(e) of this First Report, certain provisions of the Grow NJ Act are sufficiently vague that companies may be able to receive tax credits for relocating existing jobs in New Jersey to Camden or Atlantic City, even if the jobs were never "in danger of being relocated outside the State." Tax incentives in these circumstances clearly do not advance the statutory aim of preserving jobs in the State. If it was also an intended purpose of Grow NJ to incentivize the relocation of existing jobs from other parts of New Jersey to Camden or Atlantic City, it would have aided public understanding to set out this purpose explicitly in the statute, along with the other intended purposes.

Recommendation 4: Relatedly, the Task Force's examination has found that the current statutory text for the Programs contains ambiguities in certain respects. This is illustrated by the issues relating to the "material factor" test that applies to projects in Camden and Atlantic City. It also applies in other areas: for example, as discussed in Section VI(D) of this First Report, there was one instance in which it was unclear whether a company qualified under certain provisions of Grow NJ for "technology" companies—a statutory term that is not defined in the law. Ambiguities in statutory text are inevitable. However, when such ambiguities arise in the administration of a statute, the responsible agency should both determine the resolution of the issue and further publicize its decision so that the rules are clear and known and are applied consistently. When the EDA addresses statutory ambiguities such as this one, it should embody its decisions in published rules (whether in the form of regulations, formal policies, or other guidance documents) that are available to the public.

Recommendation 5: Future legislation should be designed to ensure that the EDA can better control whether companies that meet the employment or other requirements for only a small portion of their commitment period are eligible to receive their full annual award. It should also include provisions ensuring that companies cannot receive a full year's award without meeting the requirements for a full year, and without providing a full year's worth of data to prove their compliance.

Recommendation 6: The EDA should issue comprehensive written policies and procedures to guide its employees in administering the Programs and should implement formal internal training mechanisms with respect to all aspects of the current Programs and any future tax-incentive programs. Although the Task Force fully appreciates that the Programs are complex and often amended, the Task Force's investigation to date has nonetheless found undeniable

[206] N.J. Stat. § 34:1B-244(a).

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deficiencies in certain EDA employees' understandings of the applicable requirements in various respects. The EDA's shortfall in the issuance of regulations and policy and guidance documents likely contributed to these deficiencies, as it limited the resources available to these employees.

Recommendation 7: As described above, the Task Force, third parties, and the media have all discovered significant and adverse information about program applicants, much of which required very little effort. Thus, it seems quite clear that—whatever the EDA's underwriters are doing in the way of independent research on applicants—the work has been deficient. Moreover, the notion of awarding applicants millions, tens of millions, or even hundreds of millions of dollars in tax incentives without a rigorous background check on the company, its officers, and affiliates defies common sense. Thus, we strongly urge that any new legislation include a provision directing the EDA to use a qualified professional services firm to conduct rigorous background checks.

Recommendation 8: With respect to the specific issue of assessing an applicant's representation that the applicant is considering locating outside of New Jersey, the Task Force's investigation to date has found clear deficiencies in the EDA's assessments. There have been instances in which Grow NJ applicants have made representations concerning the possibility of an out-of-state location that should have raised serious red flags concerning the applicant's sincerity, and yet the EDA failed to take any action to investigate the issue. As discussed above, the Grow NJ Act explicitly states that a "purpose of the [Grow NJ] program is . . . to preserve jobs that currently exist in New Jersey but which are in danger of being relocated outside of the State."[207] If tax incentives are awarded to incentivize a company to stay in the State when the company never actually intended to leave, then public funds are essentially wasted. The Task Force has found, however, that the EDA's administration of the Grow NJ program has in many ways not sufficiently appreciated this principle. The EDA should improve its performance with respect to this aspect of the program, including by providing clear guidance and training to employees on how to conduct such assessments and instructing them on the importance of this issue. The EDA should provide its employees with a clear framework to apply in assessing applicant representations concerning alternative locations.

Recommendation 9: Grow NJ applicants are required to include certifications, signed by the company's CEO (or an equivalent officer), representing that the CEO "has reviewed the information submitted to the [EDA in connection with the application] and that the representations contained therein are accurate."[208] However, issues may arise when a company modifies its

[207] N.J. Stat. § 34:1B-244(a).
[208] N.J. Stat. § 34:1B-244(d).

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application at some point after it is submitted, but does not submit a new CEO certification attesting to the truthfulness of the new information. The EDA should have a formal policy or regulation requiring the submission of a new CEO certification whenever an application is materially changed after its submission.

IX. NEXT STEPS

As we noted at the outset, the Task Force is continuing its investigation. It will continue to review documents it has received in response to requests to the EDA and third parties, and to interview witnesses to gain a deeper understanding of any flaws in the design, implementation, or administration of the programs. Among other things, the Task Force intends to:

- Hold further public hearings in which the public will have the opportunity to share its views and perspectives;
- Focus its investigation on the design, implementation, and administration of the ERG Program;
- Continue its investigation of the EDA's oversight over Grow NJ and ERG applications;
- Consider additional ways to make the application and compliance verification process more robust;
- Continue the re-certification process for companies participating in the ARP; and
- Continue its efforts to recapture tax-incentive awards where warranted and, as necessary, make additional referrals to the appropriate enforcement authorities.

In addition, the Task Force will examine the impacts of certain aspects of the Programs that may differ from other states' programs, from prior New Jersey tax-incentive programs, or from best practices described by policy experts. In that regard, the Task Force intends to further examine the policy recommendations made by two of the experts that testified during the first day of the public hearings, Josh Goodman, Senior Officer for State Fiscal Health, at The Pew Charitable Trust, and Jon Whiten, Deputy Director of State Communications at the Center on Budget and Policy Priorities. In particular, the Task Force intends to explore:

- Whether the State should consider targeting its tax incentives to businesses that will increase the State's economic growth by serving national and international markets, rather than local markets;
- Whether the State should shorten the timeframes for receiving tax incentives, in an effort to spend less on incentives while achieving the same impact, and to enable it to better predict the costs and benefits of awarding incentives to businesses;

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- Whether the Programs' approach to awarding tax incentives in distressed areas sufficiently benefits the residents of those areas and what steps, if any, could be taken to fine tune New Jersey's approach to using tax incentives to help economically distressed areas to ensure that residents of distressed areas actually benefit from tax incentives targeted at improving the economy in distressed areas;
- Relatedly, whether to revise the method for calculating the net benefit to the State for companies moving to distressed areas;
- Whether capping the tax incentives by setting annual cost limits would improve the Programs, and what other options for increasing fiscal protections might be undertaken;
- Whether New Jersey should regularly conduct independent evaluations of the effectiveness of the tax incentives programs and to establish systems mandating greater oversight and annual evaluations of the Programs; and
- Whether the State should limit or prohibit the transfer of tax credits awarded under the Programs.

The Task Force will also seek the input of additional policy experts to the extent they have views on these issues.

EXHIBIT 27

Internal reports contradict regulators' public findings over San Onofre spent fuel

sandiegouniontribune.com/news/watchdog/story/2019-09-22/internal-reports-contradict-nrc-public-findings-

September 22, 2019

When a 50-ton cask filled with radioactive waste got wedged 18 feet above the bottom of its concrete silo back in August 2018, work crews at the San Onofre nuclear plant were able to lower the container to its intended resting place after nearly an hour.

Majority plant owner Southern California Edison halted plans to transfer millions more pounds of spent nuclear fuel from wet to dry storage while federal regulators investigated what happened and made sure the process was safe.

Federal inspectors found many of the waste-filled canisters had been scraped and scratched as they were lowered into the interim storage facility. Even so, the U.S. Nuclear Regulatory Commission allowed the waste transfer program to resume in July.

Documents recently obtained by The San Diego Union-Tribune show that an agency field inspector reviewing the August 2018 incident issued internal reports noting that the canisters were designed — and certified — to be lowered into the storage vault without any scratches.

NRC inspector Lee Brookhart wrote that the required final safety analysis report and the certificate of compliance and technical specifications call for no scratches on the caskets.

"The original FSAR (final safety analysis report) statement for no scratches mirrored the CoC/TS (Certificate of Compliance and Technical Specifications) design basis that no scratches would ensure the code adherence," Brookhart wrote in March.

NRC officials did not respond Friday to questions about those internal reports. An Edison spokesman said the utility is fully compliant with federal regulations and the reloading work has been proceeding safely.

Edison spokesman John Dobken said Friday the utility is following federal rules.

"There's another process available for licensees: 72.48," Dobken said, referring to the U.S. Code of Federal Regulations section that allows a licensee to make changes in procedures or design of the casks used to store spent nuclear fuel. "That's what we used to account for the incidental contact going forward," he said.

The regulation is here:
https://www.nrc.gov/reading-rm/doc-collections/cfr/part072/

Dobken said that the company visually inspected eight of the canisters and found no evidence that the scratches would prevent the containers from safely storing spent nuclear fuel.

The canisters Edison is relying on to store spent fuel are licensed to be use for two decades.

The current plan calls foreventuallymoving the canisters away from San Diego once a more permanentstoragesite is agreed to. But critics of the process worry that the scratches outside so many of the canisters could make them difficult to move.

“If you have scrapes, scratches and gouges, that is a trigger for cracks to start,” said Donna Gilmore, an activist in San Clemente who runs a community group called San Onofre Safety.

Brookhart, the NRC inspector, concluded in March that a formal design change would be required to allow the canisters to remain in service.

Instead of pursuing changes to the approved canister design process, Edison relied on a different safety standard to argue that its existing method are compliant and safe.

Brookhart did not agree that a different methodology would satisfy the requirements of the canisters’ previous certification.

“I just don’t see how that meets CoC,” the NRC inspector said. “... Essentially the change (in methodology) is adding an alternative to the code to not have to do inspections and repair these new defects.”

Brookhart’s supervisors at the regulatory agency did not embrace the inspector’s conclusions. On July 15, the commission allowed Edison to restart the fuel transfer program and move forward with decommissioning the plant.

“The licensee implemented an oversight program to ensure that contractors conducted decommissioning work activities in accordance with procedural requirements as well as license expectations,” the NRC said in a report to an Edison vice president, Doug Bauder.

“The licensee implemented operational, radiological and housekeeping programs to ensure safe storage of spent fuel,” senior regulators concluded.

San Diego attorney Michael Aguirre, who has filed several lawsuits aimed at stopping the burial of 3.6 million pounds of nuclear waste in the beach north of Oceanside, said the internal reports show that the NRC disregarded its own inspector in favor of Southern California Edison.

“These decisions should be based on professional inspectors and not on lobbyists and political players at the NRC,” Aguirre said. “It underscores why the downloading has to stop because it is interfering with the ability to transfer the canisters to a safer location.”

Questions over the interim storage of nuclear waste at San Onofre have persisted since the plant was closed in 2012. At least 8 million people live within 50 miles of the plant and many of them are scared that the site could present a public health threat.

Under U.S. law, the U.S. government is responsible for the permanent storage of the San Onofre waste — as well as all of the other spent nuclear fuel in North America. But for decades, federal officials have been unable to agree on a permanent storage facility.

The San Onofre decommissioning plan calls for moving the waste into about 80 heavy concrete canisters by the end of next year so Edison can dismantle the rest of the shuttered plant and return the property to its owner, the U.S. Navy.

Two years ago, Edison agreed to make “commercially reasonable” efforts to relocate the San Onofre waste to settle a lawsuit Aguirre filed in 2015.

EXHIBIT 28

Spent Fuel Storage in Pools and Dry Casks Key Points and Questions & Answers

On this page:

  - How does the NRC conduct oversight of Licensees?
  - How does the NRC verify that canisters are properly loaded in accordance with their NRC Certificate of Compliance?
  - How can the fuel or internal components be inspected on canisters with welded lids?
  - How would welded stainless steel canisters be repaired if necessary?

- Questions and Answers – Waste Confidence & Future Plans
  - How long is spent fuel allowed to be stored in a pool or cask?
  - What is the plan for storage of spent nuclear fuel going forward? Will on-site storage continue to be the way for the foreseeable future?
  - These casks are already pretty old and could be storing spent fuel for decades to come. How can you protect them from deteriorating over time, especially from effects that have been seen at other nuclear installations such as alkali-silica reaction or chloride-induced stress corrosion cracking?
  - How are the long-term impacts of onsite storage of spent fuel analyzed, and what measures are taken to minimize potential impacts on public health and safety?
  - After a plant is decommissioned there will be no infrastructure to handle the repackaging of spent fuel if the storage systems need replacement. Is there a plan for this contingency, and what are the safety implications of reopening the storage cask?

- Questions and Answers – Security
  - What about security? How do you know terrorists won't use all of this waste against us?
  - How are dry storage systems canisters at ISFSIs protected against terrorism such as the September 11, 2001 terrorist attacks using hijacked airplanes?

- Questions and Answers – Emergency Planning
  - Are potential seismic effects considered in the assessment of canisters for continued operation? –EP
  - What are the emergency plans for nuclear waste at an ISFSI in the case of mishandling, leaks, natural disasters or acts of terrorisms?
  - What emergency plans are required for spent fuel storage facilities at nuclear power plants undergoing decommissioning or sites that have completed decommissioning?

Index to all Frequently Asked Question Pages

TOP

Questions and Answers – General

What is spent nuclear fuel?

"Spent nuclear fuel" refers to fuel elements that have been used at commercial nuclear reactors, but that are no longer capable of economically sustaining a nuclear reaction. Periodically, about one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with fresh fuel.

TOP

Why does spent fuel need to be cooled?

Spent fuel continues to generate heat because of radioactive decay of the elements inside the fuel. After the fission reaction is stopped and the reactor is shut down, the products left over from the fuel's time in

the reactor are still radioactive and emit heat as they decay into more stable elements. Although the heat production drops rapidly at first, heat is still generated many years after shutdown. Therefore, the NRC sets requirements on the handling and storage of this fuel to ensure protection of the public and the environment.

TOP

Why not require real time radiation monitoring or EPA RadNet monitors around an independent spent fuel storage installation (ISFSI)?

The regulations require that an independent spent fuel storage installation (ISFSI) must have the capability for continuous monitoring of the storage confinement system in a manner such that the licensee will be able to determine when corrective action needs to be taken to maintain safe storage conditions. For dry spent fuel storage, periodic monitoring is sufficient, provided that periodic monitoring is consistent with the dry spent fuel storage cask design requirements. The monitoring period must be based upon the spent fuel storage cask design requirements. Therefore, the NRC determined that adequate radiological monitoring capabilities already exist at licensed facilities.

All ISFSIs have multiple radiation monitors to ensure they meet NRC dose limits. This is typically accomplished using multiple thermoluminescent dosimeters (TLDs) on the ISFSI fence. These TLDs are regularly monitored. The results of the monitoring program are one of many items, procedures, and operations reviewed by NRC staff. NRC staff inspection reports are made publicly available, unless they contain classified, safeguards, or sensitive information.

TOP

How are licensees required to fund dry storage facilities?

Licensees are required to set aside funding for the management of spent fuel after a plant permanently shuts down until the fuel is transferred to the Department of Energy (DOE) for final disposal. Although the annual costs for continued storage are manageable, cumulative costs will continue to increase.

Under 10 CFR 50.54(bb), licensees are required to obtain approval from the Commission concerning the program by which they intend to manage the irradiated fuel. This includes all plans to provide funding for the management of the fuel at the reactor until title and possession of the fuel is transferred to DOE for permanent disposal in a repository.

The NRC has requirements in 10 CFR 72.22(e) for license applicants to show they have the necessary funds available to cover estimated construction costs, estimated operating costs over the license term, and estimated decommissioning costs. NRC staff review this at the time of initial license application and at the time of license renewal to determine if the applicant has demonstrated reasonable assurance that funding will remain available for the duration of the facility's license.

TOP

What is high burnup fuel?

Burnup is a measure of how much energy is obtained from the fission of uranium, or fuel, in the reactor. Burnup is measured in gigawatt-days per metric ton of uranium (GWd/MTU). Spent fuel is considered high burnup at a value greater than 45 GWd/MTU.

For more information, see the Backgrounder on High Burnup Spent Fuel

TOP

Could high burnup fuel degrade in storage?

The NRC has conducted testing through the National Laboratories and found that high burnup fuel is robust against storage and transportation loads. The inert environment inside the casks maintained during storage provides assurance that high burn up fuel will maintain its integrity under normal and accident conditions. Ongoing long-term demonstrations of loaded high burn-up fuel with other material types are being conducted by the U.S. Department of Energy and Electrical Power Research Institute (EPRI), and are expected to confirm the previous laboratory testing.

For more information, see the following:

- NUREG-2224 – Dry Storage and Transportation of High Burnup Spent Nuclear Fuel
- High Burnup Dry Storage Cask Research and Development Project: Final Test Plan

TOP

What were the inspection results of the canisters located at the Diablo Canyon ISFSI?

The assessment of the conditions on the Diablo Canyon canisters are described in the Electrical Power Research Institute report EPRI-3002002822 and the Sandia National Laboratories report SAND2014-16383. The canister surfaces appeared in good condition with no signs of degradation or corrosion. Researchers noted a mixture of dust and pollen, along with sodium chloride (NaCl) and some magnesium sulfate (MgSO4) on the surface of the canisters. Sodium chloride can cause corrosion in some metals, but it is unlikely given the environment the casks are in.. Using temperature and humidity data from the Vandenberg weather station, the time required for chloride induced stress corrosion cracking (CISCC) to corrode through the cask would be greater than 1,800 years. NRC staff will continue to monitor the situation to ensure such corrosion does not become a problem. Another CISCC-inducing compound, magnesium chloride (MgCl2), was not present on the Diablo Canyon canisters. The conclusion section of the SANDIA report explains limitations for the sample collection and analysis.

Additional information is available in the following EPRI and Sandia reports:

- EPRI-3002002822
- SAND2014-16383
- Susceptibility Assessment Criteria for Chloride-Induced Stress Corrosion Cracking (CISCC) of Welded Stainless Steel Canisters for Dry Cask Storage Systems

TOP

Questions and Answers – Spent Fuel Pool Safety

What do you look at when you license a fuel storage facility? How do I know it can withstand a natural disaster?

The NRC's requirements for both wet and dry storage can be found in Title 10 of the Code of Federal Regulations (10 CFR), including the general design criteria in Appendix A to Part 50 and the spent-fuel

storage requirements in Part 72. The staff uses these rules to determine that the fuel will remain safe under anticipated operating and accident conditions. There are requirements on topics such as radiation shielding, heat removal, and criticality. In addition, the staff reviews fuel storage designs for protection against:

- natural phenomena, such as seismic events, tornados, and flooding
- dynamic effects, such as flying debris or drops from fuel handling equipment and drops of fuel storage and handling equipment
- hazards to the storage site from nearby activities

TOP

How do you know the fuel pools are safe? Does the NRC inspect these facilities, or just the reactor itself?

NRC inspectors are responsible for verifying that spent fuel pools and related operations are consistent with a plant's license. For example, our staff inspects spent fuel pool operations during each refueling outage. We also performed specialized inspections to verify that new spent fuel cooling capabilities and operating practices were being implemented properly.

TOP

What would happen to a spent fuel pool during an earthquake? How can I be sure the pool wouldn't be damaged?

All spent fuel pools are designed to seismic standards consistent with other important safety-related structures on the site. The pool and its supporting systems are located within structures that protect against natural phenomena and flying debris. The pools' thick walls and floors provide structural integrity and further protection of the fuel from natural phenomena and debris. In addition, the deep water above the stored fuel (typically more than 20 feet above the top of the spent fuel rods) would absorb the energy of debris that could fall into the pool. Finally, the racks that support the fuel are designed to keep the fuel in its designed configuration after a seismic event.

TOP

Can spent fuel pools leak?

Spent fuel pools lined with stainless steel are designed to protect against a substantial loss of the water that cools the fuel. Pipes typically enter the pool above the level of the stored fuel, so that the fuel would stay covered even if there were a problem with one of the pipes. The only exceptions are small leakage-detection lines and, at two pressurized water reactor (PWR) sites, robust fuel transfer tubes that enter the spent fuel pool directly. The liner normally prevents water from being lost through the leak detection lines, and isolation valves or plugs are available if the liner experiences a large leak or tear.

TOP

How would you know about a leak in such a large pool of water?

The spent fuel pools associated with all but one operating reactor have liner leakage collection to allow detection of very small leaks. In addition, the spent fuel pool and fuel storage area have diverse

instruments to alert operators to possible large losses of water, which could be indicated by low water level, high water temperature, or high radiation levels.

TOP

How can operators get water back in the pool if there is a leak or a failure?

All plants have systems available to replace water that could evaporate or leak from a spent fuel pool. Most plants have at least one system designed to be available following a design basis earthquake. In addition, the industry's experience indicates that systems not specifically designed to meet seismic criteria are likely to survive a design basis earthquake and be available to replenish water to the spent fuel pools. Furthermore, plant operators can use emergency and accident procedures that identify temporary systems to provide water to the spent fuel pool if normal systems are unavailable. In some cases, operators would need to connect hoses or install short pipes between systems. The fuel is unlikely to become uncovered rapidly because of the large water volume in the pool, the robust design of the pool structure, and the limited paths for loss of water from the pool.

TOP

Do U.S. nuclear power plants store their fuel above grade? Why is this considered safe?

For boiling water reactor (BWR) Mark I and II designs, the spent fuel pool structures are located in the reactor building at an elevation several stories above the ground (about 50 to 60 feet above ground for the Mark I reactors). The spent fuel pools at other operating reactors in the U.S. are typically located with the bottom of the pool at or below plant grade level. Regardless of the location of the pool, its robust construction provides the potential for the structure to withstand events well beyond those considered in the original design. In addition, there are multiple means of restoring water to the spent fuel pools in the unlikely event that any is lost.

TOP

How are spent fuel pools kept cool? What happens if the cooling system fails?

The spent fuel pool is cooled by an attached cooling system. The system keeps fuel temperatures low enough that, even if cooling were lost, operators would have substantial time to recover cooling before boiling could occur in the spent fuel pool. Licensees also have backup ways to cool the spent fuel pool, using temporary equipment that would be available even after fires, explosions, or other unlikely events that could damage large portions of the facility and prevent operation of normal cooling systems. Operators have been trained to use this backup equipment, and it has been evaluated to provide adequate cooling even if the pool structure loses its water-tight integrity.

TOP

What keeps spent fuel from re-starting a nuclear chain reaction in the pool?

Spent fuel pools are designed with appropriate space between fuel assemblies and neutron-absorbing plates attached to the storage rack between each fuel assembly. Under normal conditions, these design features mean that there is substantial margin to prevent criticality (i.e., a condition where nuclear fission would become self-sustaining). Calculations demonstrate that some margin to criticality is maintained for a variety of abnormal conditions, including fuel handling accidents involving a dropped fuel assembly.

TOP

Questions and Answers – Dry Cask Safety

What is dry cask storage?

Dry cask storage allows spent fuel that has already been cooled in the spent fuel pool for several years to be surrounded by inert gas inside a container called a cask. The casks are typically steel cylinders that are either welded or bolted closed. The steel cylinder provides containment of the spent fuel. Each cylinder is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and members of the public.

TOP

What is an "ISFSI"?

An independent spent fuel storage installation, or ISFSI, is a facility that is designed and constructed for the interim storage of spent nuclear fuel. These facilities are licensed separately from a nuclear power plant and are considered independent even though they may be located on the site of another NRC-licensed facility.

TOP

What kind of license is required for an ISFSI?

NRC authorizes storage of spent nuclear fuel at an ISFSI in two ways: site-specific or general license. For site-specific applications, the NRC reviews the safety, environmental, physical security and financial aspects of the licensee and proposed ISFSI and, if we conclude it can operate safely, we issue a license. This license contains requirements on topics such as leak testing and monitoring and specifies the quantity and type of material the licensee is authorized to store at the site. A general license authorizes storage of spent fuel in casks previously approved by the NRC at a site already licensed to possess fuel to operate a nuclear power plant. Licensees must show the NRC that it is safe to store spent fuel in dry casks at their site, including analysis of earthquake intensity and tornado missiles. Licensees also review their programs (such as security or emergency planning) and make any changes needed to incorporate an ISFSI at their site. Of the currently licensed ISFSIs, 48 are operating under general licenses and 15 have specific licenses.

TOP

How does the NRC determine that a dry storage system is safe?

Before approving any dry storage system and issuing a Certificate of Compliance or a license, the NRC staff conducts a thorough engineering review to ensure the system design meets all necessary safety requirements. Dry storage systems must be designed to protect the public and workers from radiation exposure. In addition, dry storage systems must be able to withstand credible natural disasters and accidents. The NRC staff's dry storage system reviews are documented in safety evaluation reports, which are publicly available in the NRC Agencywide Documents Access and Management System (ADAMS). The NRC staff also conducts quality assurance inspections of vendors who design and manufacture the storage systems and operating spent fuel storage facilities to ensure compliance with the NRC's safety requirements.

For more information, see NUREG/BR-0528

TOP

What are the requirements for the selection and use of a dry storage system at an NRC licensed commercial power reactor site?

A licensee's selection of a dry cask storage system is based on the operational needs of a specific reactor site (A list of approved casks can be found in 10 CFR 72.214). A licensee must first determine whether a particular system addresses the storage site's parameters, including analyses of potential earthquake intensity and tornado missiles. A licensee must provide reasonable assurance that the location's conditions meet the necessary safety requirements for adequate protection. The evaluation requirements for a dry storage system user can be found in 10 CFR 72.212.

TOP

What Risk Assessments have been conducted for dry storage systems?
The NRC and the Electrical Power Research Institute (EPRI) have performed risk assessments for dry storage systems. These analyses considered the release of radioactive gases and found the radiation doses to be below NRC's safety requirements. The NRC staff also evaluated a post-accident release of radioactive gases from breached storage canisters that contain damaged fuel assemblies. EPRI has also conducted a risk assessment regarding the radiological risks to the public during the life cycle of a bolted spent fuel cask. NUREG-1864 assesses a comprehensive list of initiating events, including dropping the cask during handling, and external events during onsite storage (such as earthquakes, floods, high winds, lightning strikes, accidental aircraft crashes, and pipeline explosions). All of these studies concluded that the risks of the public receiving a dose above regulatory limits is very low.

For more information, see the following:

- NUREG-1864
- EPRI Technical Report 1002877

TOP

How do the NRC requirements ensure that dry storage systems do not release radioactive material and expose workers and members of the public to radiation?

The NRC requires dry storage systems to meet NRC safety requirements at all times, including during or after a design basis accident. A design basis accident is any event that could significantly affect the storage system. Accident conditions include events such as fuel rod rupture and air flow blockage, as well as natural phenomena like earthquakes, burial under debris, lightning strikes, and other phenomena (e.g., seiches, tsunamis, and hurricanes). Different accident conditions are evaluated as appropriate depending on the storage cask's location. NRC requirements in 10 CFR 72.104 define annual dose limits for normal operations and anticipated events, while requirements in 10 CFR 72.106 define dose limits for a design basis accident. These dose limits do not pose a significant safety concern to workers or the public, and are a fraction of the average annual dose received from background radiation.

TOP

How are dry storage systems inspected?

Nondestructive examination (NDE) methods for the inspection of canisters already exist and have been used in the nuclear industry for decades. These NDE methods include visual testing (VT), Eddy current testing (ECT), and Ultrasonic testing (UT). ECT utilizes magnetic fields to identify cracks and defects. Similarly, UT utilizes sound waves as the method for detection. Together, the three methods can detect and characterize potential aging effects like localized corrosion. Methods to apply existing NDE techniques to stainless steel canisters have been developed, and currently are being tested by both the Electrical Power Research Institute (EPRI) and dry storage system manufacturers.

Additional information is available in the following EPRI reports:

- EPRI-3002008234
- EPRI-3002010617
- EPRI-3002010621

TOP

What can remote visual testing be used to detect?

Remote visual testing (RVT) is a nondestructive way to detect cracking, corrosion, wear and component failures. The ability of RVT methods to detect cracking was reviewed and documented in NUREG/CR-7246. Crack size was found to be an important feature that limits the detection of cracks by RVT. Very small cracks are harder to detect using RVT. Detection by RVT is also challenged when cracks are located in the proximity of surface features, such as grinding marks or weld ripples. RVT is still a viable inspection method despite its limitations. Because the detection of CISCC cracks on canisters using RVT could be challenging, the example aging management programs developed by NRC staff and aging management guidance developed by the Electrical Power Research Institute (EPRI) have relied on indications of localized corrosion, such as pitting, that can be reliably detected using visual testing methods.

For more information, see the following:

- NUREG/CR-7246
- NUREG-2214
- EPRI-3002008193

TOP

How does the NRC conduct oversight of Licensees?

Licensees are responsible for operating their facilities safely. The NRC verifies licensees' compliance with safety regulations through its inspection program. This includes inspections of operating facilities and cask vendors. The frequency of these inspections is based on the licensee's performance and the presence of activity (cask loadings, extreme weather conditions, etc.). The NRC requires prompt corrective action by the licensee if a safety problem or failure to comply with requirements is discovered. Enforcement action may follow depending on the severity of the inspection findings.

For more information on how specifically inspections are done, see the NRC Inspection Manual, Manual Chapter 2690

TOP

How does the NRC verify that canisters are properly loaded in accordance with their NRC Certificate of Compliance?

Before the licensee has loaded a single canister, the NRC inspects the licensee's spent fuel loading procedures by observing and assessing the implementation of those procedures during a "dry run" rehearsal before actual loading is performed. The NRC also observes the initial cask loading. This means the very first cask loaded by a licensee is always observed. NRC inspectors generally observe and review licensee's identification, parameters, and characteristics of each fuel assembly. Verification is also performed through review of procedures that lead to the selection and verification of fuel assemblies prior to each loading. After the first loading has been observed, inspectors will periodically observe future cask loadings to ensure canisters are still being properly loaded. If a misloading is identified the licensee must immediately conduct an evaluation to show the NRC the loading still meets the acceptance criteria. In no misloading case has there ever been a safety concern.

TOP

How can the fuel or internal components be inspected on canisters with welded lids?

At this time there are no methods available for inspecting the internal components of welded stainless steel canisters once they are loaded. Several measures are taken during the loading process to ensure there will be no need to re-open a welded canister. Each canister is leak tested prior to use to ensure the inert helium environment will remain inside the canister. The inert environment prevents the stored spent fuel from degrading and eliminates the need to inspect the fuel or the interior of the canister. If there is a safety need to open a welded canister, there is a procedure approved by NRC staff in the dry storage system's safety analysis report.

TOP

How would welded stainless steel canisters be repaired if necessary?

In the unlikely event that a canister repair would be needed, corrective actions would be performed on a case-specific basis for the affected dry storage system component. Corrective actions may be proposed to mitigate an identified degradation before the canister integrity is compromised, or to bring a canister back into compliance if the degradation has compromised the canister integrity. The licensee would propose corrective actions to the NRC in either case, and NRC staff would evaluate whether the corrective actions are sufficient to preserve the intended safety functions of the dry storage system and maintain compliance with the regulations of 10 CFR Part 72. Proposed repair methods also require demonstration and compliance with an NRC-approved quality assurance program.

TOP

Questions and Answers – Waste Confidence & Future Plans

How long is spent fuel allowed to be stored in a pool or cask?

NRC regulations do not specify a maximum time for storing spent fuel in pool or cask. The agency's “waste confidence decision" expresses the Commission's confidence that the fuel can be stored safely in either pool or cask for at least 60 years beyond the licensed life of any reactor without significant environmental effects. At current licensing terms (40 years of initial reactor operation plus 20 of extended operation), that would amount to at least 120 years of safe storage.

However, it is important to note that this does not mean NRC "allows" or "permits" storage for that period. Dry casks are licensed or certified for 20 years, with possible renewals of up to 40 years. This shorter licensing term means the casks are reviewed and inspected, and the NRC ensures the licensee has an adequate aging management program to maintain the facility.

TOP

What is the plan for storage of spent nuclear fuel going forward? Will on-site storage continue to be the way for the foreseeable future?

The U.S. policy for nuclear waste management, as set forth in the Nuclear Waste Policy Act, is for permanent disposal of spent fuel in a deep underground geological repository. Decades of scientific research supports the use of a repository for disposal of spent fuel. Federal responsibility for siting and building a repository remains national policy. The NRC acknowledges the challenges encountered over the years in siting and licensing the proposed repository at Yucca Mountain. The Commission remains confident that a repository will be built. The Commission does not consider that accumulated spent fuel will be stored permanently at current or former reactor sites and does not endorse permanent storage at reactor sites.

Although the NRC considers that 25 to 35 years is a reasonable timeframe for repository development, it acknowledges that there is sufficient uncertainty in this estimate that the possibility that more time will be needed cannot be ruled out. International and domestic experience have made it clear that technical knowledge and experience alone are not sufficient to bring about the broad social and political acceptance needed to construct a repository. The time needed to develop a societal and political consensus for a repository could add to the time to site and license a repository, or overlap it to some degree.

TOP

These casks are already pretty old and could be storing spent fuel for decades to come. How can you protect them from deteriorating over time, especially from effects that have been seen at other nuclear installations such as alkali-silica reaction or chloride-induced stress corrosion cracking?

Dry cask storage systems have been used at U.S. nuclear power plants for more than 30 years with an excellent safety record. Part of the reason for that success is the robust design of the systems. Another reason is proper care and maintenance, including implementation of aging management programs (AMPs) required by the NRC.
The NRC conducted an extensive review of the materials used in dry cask storage systems, looking at how these materials might degrade over time. This review was documented in NUREG-2214. The NRC reviewed specific dry cask storage system designs, and the environments in which the systems operate. The report describes the scientific methods used to determine the likely effects of aging on the storage systems, and what might cause those effects. It also includes examples of generic AMPs licensees may use to develop their own programs. Additional guidance on aging management for dry storage systems was published in NUREG-1927. NRC inspectors examine a licensee's AMPs to verify that any potential degradation is quickly identified, and corrective actions taken to ensure the storage cask continues to function properly.

Two ways dry storage systems could possibly degrade over time are alkali-silica reaction (ASR) on concrete, and chloride-induced stress corrosion cracking (CISCC) of welded stainless steel canisters. No ASR has been reported on a dry storage system to date, though it is something licensees must include in

their AMPs. NRC staff research on CISCC concluded that the risk is not credible during the first 20 years of operation because of the long time needed for cracks to grow through the stainless steel canister wall. After 20 years, CISCC is covered by the AMP. The Electrical Power Research Institute (EPRI) has also conducted a thorough assessment of the potential for CISCC in dry storage system canisters.

TOP

How are the long-term impacts of onsite storage of spent fuel analyzed, and what measures are taken to minimize potential impacts on public health and safety?

All storage systems approved by the NRC have been reviewed to ensure they meet all the regulatory safety requirements. These requirements address the credible hazards from natural disasters and accidents that the spent fuel storage systems may encounter. Long term, the NRC requires dry storage system users to have Aging Management Programs (AMPs) to ensure safety. NUREG-1927 and NUREG-2214 provide more detailed information about aging management activities for dry storage systems. These guidance documents will continue to be updated as necessary.

NRC staff also conduct an environmental review of each independent spent fuel storage installation (ISFSI) to comply with the National Environmental Policy Act (NEPA). The NRC's NEPA requirements are in 10 CFR Part 51. In 2014, NRC staff evaluated the environmental impacts of continued storage of spent fuel. This evaluation is documented in NUREG-2157 and shows that the long-term storage of spent fuel has a low environmental impact.
For more information, see the following:

- NUREG-1927
- NUREG-2214
- NUREG-2157

TOP

After a plant is decommissioned there will be no infrastructure to handle the repackaging of spent fuel if the storage systems need replacement. Is there a plan for this contingency, and what are the safety implications of reopening the storage cask?

Storage casks should not be opened unless there is a specific safety need. Most welded stainless steel canisters are designed to be transportable inside a specifically designed transportation overpack. This allows fuel to be transported without directly handling the fuel. The canisters are leak tested and this assures that the helium environment will be maintained inside the canister. A helium environment is important because helium is an inert gas, meaning it does not undergo chemical reactions. If safety issues are identified, it is the responsibility of the licensee to propose corrective actions, and the NRC's responsibility to ensure these actions maintain the safety functions of the storage system. Each specific dry storage system has specific procedures for opening the canister outlined in the dry storage system or the independent spent fuel storage installation (ISFSI) safety analysis report. These procedures are reviewed by NRC staff.

TOP

Questions and Answers – Security

What about security? How do you know terrorists won't use all of this waste against us?

For spent fuel, as with reactors, the NRC sets security requirements and licensees are responsible for providing the protection. We constantly remain aware of the capabilities of potential adversaries and threats to facilities, material, and activities, and we focus on physically protecting and controlling spent fuel to prevent sabotage, theft, and diversion. Some key features of these protection programs include intrusion detection, assessment of alarms, response to intrusions, and offsite assistance when necessary. Over the last 20 years, there have been no radiation releases that have affected the public. There have also been no known or suspected attempts to sabotage spent fuel casks or storage facilities. The NRC responded to the terrorist attacks on September 11, 2001, by promptly requiring security enhancements for spent fuel storage, both in spent fuel pools and dry casks.

TOP

How are dry storage systems canisters at ISFSIs protected against terrorism such as the September 11, 2001 terrorist attacks using hijacked airplanes?

The best defense against hijacked airplanes is airport security, enforced by the Department of Homeland Security's (DHS) Transportation Safety Administration. DHS, the U.S. military, and the intelligence community are responsible for the defense of the country. The NRC regularly works with these agencies to assess the threat environment, and is always ready to alert its licensees if a specific, credible threat is identified.

Security requirements at NRC-licensed facilities are based on the potential threat level and the potential consequences of an event. The NRC details the security requirements for physical protection of spent fuel storage in 10 CFR Part 73 and 10 CFR Part 72. Further orders also provide additional security measures. Protection from, and responses to, security-related events are addressed in the licensee's NRC-approved Physical Security Plan, which is not publicly available. An independent spent fuel storage installation (ISFSI) licensee must comply with the security requirements which are implemented in their approved Physical Security Plan.

Over the past 20 years, there have been no known or suspected attempts to sabotage, or steal radioactive material from storage casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, the NRC is continually evaluating threats to stay best prepared. Licensees are routinely inspected to ensure they are following their NRC-approved Physical Security Plan. NRC staff have conducted security assessments for ISFSIs using several storage cask designs that were representative of most currently certified designs. The resulting assessments formed the basis for the NRC's conclusion that there was no need for further security measures at ISFSIs beyond those currently required.

For more information, see Frequently Asked Questions About Security Assessments at Nuclear Power Plants.

TOP

Questions and Answers – Emergency Planning

Are potential seismic effects considered in the assessment of canisters for continued operation? –EP

Yes, approved canister designs used at a specific independent spent fuel storage installation (ISFSI) location address the credible seismic hazards of that location. The canisters must maintain containment of the spent fuel under the predicted seismic loads for each location. In addition, the radiation exposure limits, thermal limits, confinement barrier integrity, structural performance, and nuclear criticality safety

must be maintained. These requirements continue throughout the life of the dry storage systems and are maintained and verified by aging management activities and inspections.

TOP

What are the emergency plans for nuclear waste at an ISFSI in the case of mishandling, leaks, natural disasters or acts of terrorisms?

An emergency plan for an independent spent fuel storage installation (ISFSI) is required by 10 CFR 72.32(c). The emergency plan identifies the actions to be taken to address a release and make the consequences less severe, regardless of the event. However, there is no credible accident scenario involving dry cask storage that would result in widespread consequences outside the facility boundary. That's because unlike operating power reactors, dry cask storage systems do not have the thermal or kinetic energy to spread radioactive contamination over a large area in the highly unlikely event a storage canister is breached. Emergency plans for ISFSIs are publicly available in ADAMS. Protection from and responses to security-related events are addressed in a licensee's NRC-approved Physical Security Plan, which are not publicly available.

For more information, see Frequently Asked Questions About Emergency Preparedness and Response.

TOP

What emergency plans are required for spent fuel storage facilities at nuclear power plants undergoing decommissioning or sites that have completed decommissioning?

Decommissioning reactors continue to be subject to the NRC's emergency planning requirements. For some period of time after the licensee ceases reactor operations, offsite emergency planning will be maintained. This period of time depends on when the reactor was last critical as well as site-specific considerations. Offsite emergency planning may be eliminated when the fuel has been removed from the reactor and placed in the spent fuel pool, and sufficient time has elapsed, such that there are no longer any postulated accidents that would result in offsite dose consequences large enough to require offsite emergency planning. There would be no requirement to maintain offsite systems to warn the public. Onsite emergency plans will be required for both the spent fuel pool and the Independent Spent Fuel Storage Installations, but offsite plans will not be required. If, however, an operating plant is located at the same site as the decommissioning plant, the emergency preparedness plans will still be in effect for the operating plant.

Although offsite emergency planning at a decommissioned site may no longer be required, licensees maintain offsite contacts since any emergency declaration requires notification of state and local officials as well as the NRC. In addition, due to the typically reduced staffs at a decommissioning facility they may rely even more on offsite assistance for fire, security, medical or other emergencies. These reduced EP requirements would remain in effect as long as fuel is onsite.

(Note: This general description also applies to emergency planning for specifically licensed ISFSIs; those requirements are spelled out in detail in 10 CFR 72.32.)

TOP

Page Last Reviewed/Updated Tuesday, August 27, 2019

EXHIBIT 29

From: MARK MORGAN <Mark.Morgan@sce.com>
Sent: Friday, March 29, 2019 4:25 PM
To: Brookhart, Lee; Plotter, Jason; Simpson, Eric; Smith, Chris; Wise, John; Davis, Marlone; Katanic, Janine; Howell, Linda; Doug Bauder; ALBERT BATES
Cc: MARK MORGAN
Subject: [External_Sender] Latest products posted to the reading room

All,

SONGS has just posted the following products to the CERTREC Electronic Reading Room for your review:

1. The MPC Visual Assessment Report
2. A revised HI-2188437 to incorporate results of the Visual Assessment Report
3. A change to the 72.212 evaluation to evaluate incidental contact wear for ASME Code Compliance, and
4. An associated 72.48 evaluation.

If files are sorted by "name" in the reading room, they will be grouped together alphabetically under "Post Visual Assessment..."

In addition, Al asked me to pass along the latest version of our statement on Code Compliance, previously transmitted to you on Monday. The response has been updated, and is attached to this email.

Please let me know if you have any questions regarding this.

Thanks,
Mark
(949) 368-6745

NRC Review Question Response Form

Note 1: Complete a separate form for each inspector question.

Note 2: The item tracking number will be generated when the record is entered into the inspection database.

Question Title: Clarification of ASME Section 3 in Licensing Basis

Tracking Number: 11A AR Number: 0319-53473-3 Date Initiated: 03/21/2019

Holtec Support Required: Yes__ or No ___

Question description:

Appendix B Technical Specification 3.3 requires, that the AMSE BPVC, 2007, is the governing Code for the MPC. Additionally, Appendix B Table 3-1 tie the canister and FSAR to the requirements of ASME Section III in many areas.

The original FSAR statement for no scratches mirrored the CoC/TS design basis that no scratches would ensure the code adherence to ASME Section III.

Now under 72.48, a design change is needed to deviate to allow scratches. But instead of using ASME BPVC code criteria to inspect the canister and properly disposition the defects which would maintain conformance to the code, the calculation utilizes Archard's wear equation to bound the condition. I just don't see how that meets CoC.

Now I understand, how SCE has argued, it is not a methodology. I think it is more of CoC and Appendix B change, myself. Essentially, the change is adding an alternative to the code to not have to do inspections and repair these new defects. Alternatives to the code can only be done via license amendment. Or maybe per TS Appendix B 3.3.2.

NB-4131 "Material originally accepted on delivery in which defects exceeding limits of NB-2500 are known or discovered during the process of fabrication or installation is unacceptable. The material may be used provided the condition is corrected in accordance with the requirements of NB-2500

ASME Section III NB-2538, "Elimination of Surface Defects" requires that defects are required to be examined by either magnetic particle or liquid penetrant method to ensure that the defect has been removed or reduced to an imperfection of acceptable size."

Instead of doing that (which I understand is impossible) which would maintain code compliance, the 72.48 deviates using a calculational method to bound the defect. The only "method" that should be used to disposition these defects is some method allowed or described in the BPVC code or the licensee would need an alternative to the code to maintain compliance with the regulatory licensing basis.

NRC Review Question Response Form

Requested Clarification (If needed): None

SONGS / Holtec Response:

NOTE: For clarity, the NRC question (comment) is separated by paragraph and a response to each is provided.

NRC Comment 1

Appendix B Technical Specification 3.3 requires, that the AMSE BPVC, 2007, is the governing Code for the MPC. Additionally, Appendix B Table 3-1 tie the canister and FSAR to the requirements of ASME Section III in many areas.

Response to Comment 1

It is agreed that the ASME BPVC, 2007 is the governing code for the MPC and that C of C Appendix B, "Approved Contents and Design Features," Table 3-1 ties the canister and FSAR to the requirements of Section III in many areas. However, other sections of the code apply as well and the relationship is described below.

Section III is the construction code portion of the ASME B&PV Code. It assumes that the other parts of the Code are also involved as appropriate. ASME Code material specifications are in Section II. They are selected in accordance with Section III. NDE is generally performed in accordance with Section V. Welding is performed in accordance with Section IX. Preservice examinations required by the component specifications to be done by the manufacturer are often performed in accordance with Section XI. Typically, the primary jurisdiction of the Section III construction code ends when a component is stamped. Because the MPC is not actually stamped, Holtec considers jurisdiction of Section III ends when the MPC leaves the manufacturer. Although Appendix B of the C of C is silent on which Section of the ASME Code applies during inservice inspections, use of Section XI, as selected by Holtec, is typical throughout the nuclear industry and is not prohibited by the C of C. Therefore, the ASME Code Section XI has jurisdiction after the MPC leaves the manufacturer.

NRC Comment 2

The original FSAR statement for no scratches mirrored the CoC/TS design basis that no scratches would ensure the code adherence to ASME Section III.

Response to Comment 2

There is no indication in the CoC, its Appendices (Technical Specifications or Approved Contents and Design Features), or NRC SER that the statement in Chapter 9 of the FSAR related to no risk of scratching was considered in the NRC's evaluation of the ASME Code compliance of the MPC.

There is no violation of ASME Section III requirements, nor any cause for repair activities, stemming from minor scratches or wear marks that result from incidental contact between the MPC and the CEC internal features during download operations at site.

HI-STORM UMAX FSAR Rev. 4: 9.5.vii states

> *Because the MPC insertion (and withdrawal) occurs in the vertical configuration with ample lateral clearances, there is no risk of scratching or gouging of the MPC's external surface (Confinement Boundary). Thus the ASME Section III Class 1 prohibition against damage to the pressure retaining boundary is maintained.*

The Section III requirements for pressure containing plate materials is that surface defects will be removed (NB-2538). In NCA-9000, *defective material* is defined as material that does not meet specified requirements. Similarly a defect is defined in general as a rejectable flaw and a flaw is defined as an imperfection or unintentional discontinuity that is detectable by visual, surface or volumetric methods (Section XI Glossary, IWA-9000 (1992)).

A scratch, if it occurred during installation, would not be a defect requiring repair per the Code. A scratch is a non-conformance and the engineering disposition concluded that scratches are not rejectable due to potential effects on peak stresses, as explained in HI-2188437. This is because localized scratches or wear marks are only capable of producing peak stresses, which are only objectionable from a fatigue or brittle fracture standpoint. The HI-STORM UMAX and FW FSARs (Table 3.1.10 of both address fatigue and HI-STORM FW FSAR Section 3.4.5 for brittle fracture) explain why neither fatigue nor brittle fracture present any risk to a MPC.

A scratch would not be rejectable due to interference with material testing in NB-2000 since all of these tests would be completed prior to canister delivery.

Therefore, the only remaining cause (without further analysis) of rejection of a scratch located on the exterior of the canister wall generated during installation would be a condition where the amount of localized wall thinning was below an allowable wall thickness based on Section III.

If a scratch during installation occurs, it can, under Section XI jurisdiction, either be dispositioned as a scratch (i.e., since it not a planar flaw) by reverting back (in accordance with IWA-3100 (b)) to the Construction Code, which would be Section III; or, if desired, be dispositioned by Section XI, Table IWB-3514-1, as if it were a planar flaw (which is more conservative than Section III). The information supplied by SCE and Holtec to date is not intended to disposition any indication; but, to provide assurance that any potential scratches will remain well within ASME Code allowable limits. So the SONGS canister scratch could be acceptable down to a minimum allowable wall under Section III. And the Holtec MPC with 0.500 inch wall could, if desired, allow a scratch as if a planar flaw that was up to 10% of nominal wall thickness (an allowed wall of 0.450 inches).

This means that the 0.625 inch nominal wall for a SONGS canister could, using engineering judgment, be reduced without further analysis by 0.175 inches to 0.450 inches, which is an allowable wall based on the licensed 0.500 inch baseline UMAX MPC as discussed in HI-2188437.

A scratch that might be formed during incidental contact of an MPC wall with the divider shell inside the cavity enclosure container during downloading would not result in a rejectable flaw condition, considering the large allowable margin for such localized thinning. This is based on engineering judgment and operational experience. Knowledge of basic wear principles with two soft materials having incidental contact under light lateral loads and many years of operating experience with acceptable canister loading of horizontal canisters inform this judgment. Scratches of a light nature, though somewhat likely, present no risk since the impact is negligible.

NRC Comment 3

Now under 72.48, a design change is needed to deviate to allow scratches. But instead of using ASME BPVC code criteria to inspect the canister and properly disposition the defects which would maintain conformance to the code, the calculation utilizes Archard's wear equation to bound the condition. I just don't see how that meets CoC.

Response to Comment 3

ECO-5021-042 is not a design change. It is a proposed change to clarify the HI-STORM UMAX FSAR. The ECO and supporting 72.48 are explicit in this regard. They further note that they are evaluated as if they were a design change to assure a more comprehensive documented review.

A change is not required to allow scratches since the FSAR statement that there is no risk of damage to the ASME Section III Class 1 pressure retaining boundary that might result from scratching remains valid.

It is not necessary to conclude that the intent of the FSAR was to state that no scratches would occur since incidental contact could occur. More likely the intent was to note that, compared to other designs with much higher contact loads and no clearance, there was negligible risk that shallow scratches in the vertical designs would be rejectable. When SCE and Holtec were asked (after the August 3, 2018 event) to justify this engineering judgment, accepted engineering practices were used for the estimation of scratches as well as laboratory tests and canister inspections. This was not a required calculation for design purposes, but the use of standard engineering explanations, all of which substantiated the initial judgment.

NRC Comment 4

Now I understand, how SCE has argued, it is not a methodology. I think it is more of CoC and Appendix B change, myself. Essentially, the change is adding an alternative to the code to not have to do inspections and repair these new defects. Alternatives to the code can only be done via license amendment. Or maybe per TS Appendix B 3.3.2.

Response to Comment 4

It is not correct to call these slight scratches "defects". By the definition of the ASME code, a defect is a flaw that is rejectable. None of these scratches approach criteria that require removal or repair. That judgment has been substantiated by accepted wear laws, first principles,

laboratory tests, operating experience, and examination of installed loaded canisters that this judgment was and still is valid.

As noted in the Response to Comment 4, questions regarding the judgment arose from various stakeholders following the hang-up of the MPC on August 3, 2018. It was apparently presumed that the lateral loads during passage of the MPC into the cavity enclosure container must be higher than previously considered. After assessing the actual loads and their effect on the surfaces of the canister, the original judgment was validated.

NRC Comment 5

NB-4131 "Material originally accepted on delivery in which defects exceeding limits of NB-2500 are known or discovered during the process of fabrication or installation is unacceptable. The material may be used provided the condition is corrected in accordance with the requirements of NB-2500.

Response to Comment 5

SCE and Holtec agree with this ASME Code requirement. It is appropriately implemented by the fabricator as an attribute of the manufacturing process and its controls. Appropriate documentation is provided to Holtec and SCE certifying compliance with FSAR invoked requirements of the ASME Code.

As previously noted, no defects (i.e., rejectable flaws) were discovered or are anticipated during the process of installation. Therefore no corrections are required per NB-2500.

NRC Comment 6

ASME Section III NB-2538, "Elimination of Surface Defects" requires that defects are required to be examined by either magnetic particle or liquid penetrant method to ensure that the defect has been removed or reduced to an imperfection of acceptable size."

Response to Comment 6

No defects (rejectable flaws) have been identified that have resulted from scratches or are expected to result from scratches due to incidental contact during down-loading. The bounding scratches estimated in response to the various inquiries are theoretical projections not identified flaws.

This is consistent with the judgment in the FSAR, and validated by the means explained above. The requirement of NB-2538 might have removed a scratch during construction if it interfered with the ability to complete the surface or volumetric material examinations of the pressure boundary material.

Once this had been completed and the canister delivered, a similar surface defect occurring during installation would not need to be removed because these material examinations had already been completed.

NRC Review Question Response Form

NRC Comment 7

Instead of doing that (which I understand is impossible) which would maintain code compliance, the 72.48 deviates using a calculational method to bound the defect. The only "method" that should be used to disposition these defects is some method allowed or described in the BPVC code or the licensee would need an alternative to the code to maintain compliance with the regulatory licensing basis.

Response to Comment 7

As previously noted no "defects" due to incidental contact are anticipated. The calculational methods are tools to estimate potential scratch depth and are in no way a means to disposition any defect; real or projected.

Neither the identification nor removal of shallow scratches, wear or rub marks due to installation is required to maintain compliance with ASME Section III or the ASME B&PV Code generally.

Assigned Response Team Member: David Rackiewicz

Assigned Independent / Peer Review Team Member: Bob Yale/Ken Wilson

NRC Inspector: Lee Brookhart

Response provided date / time: 3/23/19

EXHIBIT 30

Includes Errata dated June 5, 1981.

NUREG-0490

Final Environmental Statement

related to the operation of
San Onofre Nuclear Generating Station,
Units 2 and 3

Docket Nos. 50-361 and 50-362

Southern California Edison Company
San Diego Gas & Electric Company
The City of Riverside
The City of Anaheim

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

April 1981

Available from

GPO Sales Program
Division of Technical Information and Document Control
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Printed copy price: $8.00

and

National Technical Information Service
Springfield, VA 22161

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 5 1981

Docket Nos.: 50-361/362

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Gentlemen:

SUBJECT: ISSUANCE OF ERRATA TO FINAL ENVIRONMENTAL STATEMENT (SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3)

The Nuclear Regulatory Commission has issued the enclosed errata to the Final Environmental Statement (FES) related to the San Onofre Nuclear Generating Station, Units 2 and 3. Although implicit in the FES, this errata clarifies the staff's consideration of reasonable alternatives to the proposed action. The enclosed discussion should be added to Section 10.1.

Sincerely,

Frank J. Miraglia

Frank J. Miraglia, Acting Chief
Licensing Branch No. 3
Division of Licensing

Enclosure:
Errata (20 copies)

cc: See next page.

ERRATA

FINAL ENVIRONMENTAL STATEMENT

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

ALTERNATIVES TO THE PROPOSED ACTION

During the construction permit stage, the staff analyzed alternative sites, plant designs, and methods of power generation, including the alternative of not adding the production capacity. The staff concluded, based on its analysis of these alternatives, as well as on a cost-benefit basis, that additional capacity was needed that a nuclear-fueled plant would be environmentally acceptable, and that SONGS, at a specified site and of a specified design, were acceptable from both economic and environmental perspectives. Since that time, construction of SONGS has been nearly completed and many of the economic and environmental costs associated with the construction of the facility have already been incurred and must be viewed as "sunk costs" in any prospective assessment.

The staff believes that the only reasonable alternative to the proposed action of issuance of operating licenses for SONGS appropriately considered at this stage is denial of the operating licenses for the facility, thereby not permitting the addition of the essentially built generating capacity to the applicant's generating system. Alternatives such as construction of the units at another site, extensive modifications to the facility, or construction of facilities utilizing different energy sources would each require additional construction activity with its accompanying economic and environmental costs. Therefore, unless major safety or environmental concerns resulting from operation of SONGS are revealed that were not evident and considered during the construction permit review, these alternatives are unreasonable as compared to operating the already constructed facility. No such concerns have been identified with respect to operation of SONGS.

The continued need for the capacity to be generated by SONGS is discussed in section 8 of this FES.

Accordingly, the staff concludes that the preferrable alternative is operation of SONGS.

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Mr. D. W. Gilman

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NUREG-0490

Final Environmental Statement

related to the operation of
San Onofre Nuclear Generating Station,
Units 2 and 3

Docket Nos. 50-361 and 50-362

Southern California Edison Company
San Diego Gas & Electric Company
The City of Riverside
The City of Anaheim

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

April 1981

SUMMARY AND CONCLUSIONS

This Environmental Statement was prepared by the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation (hereinafter referred to as the staff).

1. The action is administrative.

2. The proposed action is the issuance of Operating Licenses jointly to the Southern California Edison Company (SCE) and the San Diego Gas and Electric Company (SDG&E) for the startup and operation of Units 2 and 3 of the San Onofre Nuclear Generating Station, adjacent to San Onofre Unit 1, located on the Pacific coast in the State of California, County of San Diego (Docket Nos. 50-361 and 50-362).

   The City of Anaheim, California, and the City of Riverside, California, have recently been added as co-holders of the Construction Permits for San Onofre 2 and 3, and will soon request to be included as applicants for Operating Licenses. The four groups are co-owners of the facility, and are referred to herein as the applicant.

   Both units will employ pressurized water reactors to produce up to 3410 thermal megawatts (MWt) each. Steam turbine-generators will use this heat to provide a net power output of up to 1106 electrical megawatts (MWe) each. The exhaust steam will be cooled by once-through flow of water pumped from the Pacific Ocean and returned to it through a diffuser-type system.

3. The information in this statement represents the second assessment by the staff of the environmental impacts associated with the San Onofre Nuclear Generating Station, Unit Nos. 2 and 3, pursuant to the requirements of the National Environmental Policy Act (NEPA) of 1969 and 10 CFR Part 51 of the Commission's Regulations. After receipt of an application (1970) to construct this plant, the staff carried out a review of impacts that would occur during the construction and operation of this plant. This evaluation was issued as a Final Environmental Statement in March 1973. As a result of this environmental review, a staff safety review, an evaluation by the Advisory Committee on Reactor Safeguards, and a public hearing in San Diego, California during January 16-24, 1973 and May 14-22, 1973, and in San Clemente, California, during March 13-15, 1973, the U.S. Atomic Energy Commission (AEC) [now Nuclear Regulatory Commission (NRC)] issued permits in October 1973 for the construction of Units 2 and 3. As of December 1980, Unit 2 was approximately 97% complete and Unit 3 was approximately 68% complete. The applicant has applied for licenses to operate the nuclear units and has submitted the required safety and environmental reports to support this application (March 1977). The staff has reviewed the activities associated with the proposed operation of these units and their potential impacts, both beneficial and adverse, are summarized as follows:

   a. Cooling water heated to about 11°C (20°F) above inlet temperature will be discharged from each unit to the Pacific Ocean at a rate of about 53 m^3/s (846,000 gpm) (Sect. 3.2.2). The heated water may result in the destruction of at least a portion of the San Onofre Kelp Bed during the summer months. However, the long-term thermal impacts are not likely to be severe (Sect. 5.4.2.1) and violations of the state thermal standards are unlikely (Sect. 5.3.1).

   b. An impact on aquatic resources may occur in the cooling water intake structure through entrainment of plankton and impingement of fish. These losses are not expected to have a significant impact on the overall biotic populations in the area.

   c. Chemical effluents from Units 2 and 3 should cause only minimal impact in the area of the discharge, and no significant impact on the aquatic biota in the Pacific Ocean (Sect. 5.4.2.2).

   d. The program for operation and maintenance of transmission lines has been designed to reduce environmental impact. Existing transmission lines and towers will be used where possible. About 7.2 ha (17.8 acres) will be occupied by new towers, access roads, and switchyards (Sect. 2.2.2).

   e. About 16 ha (40 acres) of coastal land which could otherwise have been used primarily for recreation or maintained as wildlife habitat will be occupied by Units 2 and 3 (Sect. 2.2.2).

f. The removal of approximately 1.4 km (0.85 mile) of beach from unrestricted public use, as required by the Construction Permit, is a significant cost of operation.

g. No detectable impacts are anticipated from releases of radioactive materials as a consequence of normal operation (Sect. 5.5.1.6).

h. The risk associated with accidental radiation exposure is very low (Sect. 7).

i. Nothing of known local historic or archaeological interest will be disturbed on the plant site by the operation of Units 2 and 3. A survey along the transmission right-of-way evaluated 41 archaeological sites; of these 23 will be nominated for inclusion in the National Register of Historic Places (Sect. 5.2).

4. The following Federal and State agencies were asked to comment on the Draft Environmental Statement:

- Department of Agriculture
- Department of the Army (Corps of Engineers)
- Department of Commerce
- Department of Energy
- Department of the Interior
- Department of Health, Education and Welfare
- Department of Housing and Urban Development
- Department of Transportation
- Environmental Protection Agency
- Federal Energy Regulatory Commission
- Advisory Council on Historic Preservation
- California Department of Health (Water Pollution Control Commission, Air Pollution Control Commission, Occupational Health Office)
- California Department of Natural Resources
- California Department of Parks and Recreation

Comments on the Draft Environmental Statement were received from the following:

- Department of Agriculture, Economics, Statistics, and Cooperatives Service
- Department of Agriculture, Science and Education Administration
- Department of Agriculture, Soil Conservation Service
- Department of the Army, Corps of Engineers
- Department of Commerce
- Department of Energy, Federal Energy Regulatory Commission
- Department of Health, Education and Welfare
- Department of Housing and Urban Development
- Department of the Interior
- Environmental Protection Agency
- Mr. Marvin I. Lewis
- Rourke and Woodruff Law Offices
- Richard J. Wharton
- Union of Concerned Scientists
- Southern California Edison Company
- Frank H. Grundel
- San Diego Association of Governments

Copies of these comments are appended to this Final Environmental Statement as Appendix A. The staff has considered these comments, and the responses are located in Section 11.

5. This Final Environmental Statement was made available to the public, to the Environmental Protection Agency, and to other specified agencies in April 1981.

6. On the basis of the analysis and evaluation set forth in this statement, and after weighing the environmental, economic, technical and other benefits against environmental costs and after considering available alternatives at the construction stage, it is concluded that the action called for under NEPA and 10 CFR Part 51 is the issuance of operating licenses for Units 2 and 3 of the San Onofre Nuclear Generating Station subject to the following conditions for the protection of the environment:

   (A) License Conditions
   Before engaging in activities that may result in a significant adverse environmental impact that was not evaluated or that is significantly greater than evaluated in this Environmental Statement, the licensee shall provide written notification of such activities to the Office of Nuclear Reactor Regulation and receive written approval from that office before proceeding with such activities.

   (B) Significant Environmental Technical Specification Requirements

      (1) If, during the operating life of the Station, effects or evidence of potential irreversible damage are detected, the licensee will provide to the staff an analysis of the problem and a proposed course of action to alleviate the problem.

      (2) The licensee will carry out the operational environmental monitoring programs outlined in Section 6.

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FOREWORD

This environmental statement was prepared by the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation (hereinafter referred to as the staff) in accordance with the Commission's regulations, 10 CFR 51, which implement the requirements of the National Environmental Policy Act of 1969 (NEPA).

The NEPA states, among other things, that it is the continuing responsibility of the Federal government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Further, with respect to major Federal actions significantly affecting the quality of the human environment, Sect. 102(2)(C) of the NEPA calls for preparation of a detailed statement on:

(i) the environmental impact of the proposed action;

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(iii) alternatives to the proposed action;

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and,

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

An environmental report accompanies each application for a construction permit or for a full-power operating license. A public announcement of the availability of the report is made. Any comments by interested persons on the report are considered by the staff. In conducting the required NEPA review, the staff meets with the applicant to discuss items of information in the environmental report, to seek new information from the applicant that might be needed for an adequate assessment, and generally to ensure that the staff has a thorough understanding of the proposed project. In addition, the staff seeks information from other sources that will assist in the evaluation and visits and inspects the project site and surrounding vicinity. Members of the staff may meet with state and local officials who are charged with protecting state and local interests. On the basis of all the foregoing and other such activities or inquiries as are deemed useful and appropriate, the staff makes an independent assessment of the considerations specified in Sect. 102(2)(C) of the NEPA and 10 CFR Part 51.

This evaluation leads to the publication of a draft environmental statement, prepared by the Office of Nuclear Reactor Regulation, which is then circulated to Federal, state, and local governmental agencies for comment. A summary notice of the availability of the applicant's environmental report and the draft environmental statement is published in the Federal Register. Interested persons are also invited to comment on the proposed action and on the draft statement.

After receipt and consideration of comments on the draft statement, the staff prepares a final environmental statement, which includes a discussion of questions and concerns raised by the comments and the disposition thereof; a final benefit-cost analysis, which considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects with the environmental, economic, technical, and other benefits of the facility; and a conclusion as to whether - after the environmental, economic, technical, and other benefits are weighed against environmental costs and after available alternatives have been considered - the action called for, with respect to environmental issues, is the issuance or denial of the proposed permit or license or its appropriate conditioning to protect environmental values. This final environmental statement and the safety evaluation report prepared by the staff are submitted to the Atomic Safety and Licensing Board for its consideration in reaching a decision on matters in controversy regarding the application. The same format as used in the Draft Environmental Statement is used in this Final Statement to facilitate its review.

This environmental review deals with the impact of operation of San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3). Assessments that are found in this statement supplement or modify those described in the Final Environmental Statement (FES-CP) that was issued in March 1973 in support of issuance of construction permits for the units. The information found in the various sections of this Statement updates the FES-CP in four ways: (1) by identifying differences between environmental effects of operation (including those which would enhance as well as degrade the environment) currently projected and the impacts that were described in the preconstruction review, (2) by reporting the results of studies that had not been completed at the time of issuance of the FES-CP and that were required by the NRC staff to be completed before initiation of the operational review, (3) by evaluating the applicant's preoperational monitoring program and by factoring the results of this program into the design of a postoperational surveillance program and into the development of environmental technical specifications, and (4) by identifying studies being performed by the applicant that will yield additional information relevant to the environmental impacts of operating SONGS 2 & 3.

Copies of this statement are available for inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C.; the Mission Viejo Branch Library, 24851 Chrisanta Drive, Mission Viejo, California; and the NRC Office of Inspection and Enforcement, 1990 N. California Boulevard, Walnut Creek, California. Copies of this statement may be obtained as indicated on the inside front cover. Mr. Dino C. Scaletti is the NRC Project Manager for this statement. Mr. Scaletti may be contacted at (301) 492-8443.

1. INTRODUCTION

1.1 HISTORY

On May 28, 1970, the Southern California Edison Company and the San Diego Gas and Electric Company filed an application with the Atomic Energy Commission (now Nuclear Regulatory Commission) for permits to construct San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3). Construction Permits Nos. CPPR-97 (Unit 2) and CPPR-98 (Unit 3) were issued on October 18, 1973, following reviews by the AEC regulatory staff and the Commission's Advisory Committee on Reactor Safeguards, as well as a public hearing before an Atomic Safety and Licensing Board in San Diego and San Clemente, California on January 16 to 24, March 13 to 15, and May 14 to 22, 1973. An additional session of the hearing was held in Los Angeles, California on May 19, 20, and 21, 1976. The conclusions reached in the staff's environmental review were issued in a Final Environmental Statement (FES-CP) in March 1973.

As of December 1980, construction of Unit 2 was about 97% complete and construction of Unit 3 was about 68% complete. Each unit has a pressurized-water reactor that will produce up to 3410 MWt and a net electrical output of up to 1106 MWe.

In November 1976 Southern California Edison Company and San Diego Gas and Electric Company submitted an application including a Final Safety Analysis Report (FSAR) and Environmental Report (ER) requesting issuance of operating licenses for Units 2 and 3. These documents were docketed on March 22, 1977, and the operational safety and environmental reviews were initiated at that time.

The City of Anaheim, California, and the City of Riverside, California have recently been added as co-holders of the Construction Permits for San Onofre 2 and 3 and will soon request to be included as applicants for Operating Licenses. The four groups are co-owners of the facility and are referred to herein as the applicant.

1.2 PERMITS AND LICENSES

The applicant has provided a status listing of environmentally related permits, approvals, licenses, etc., which are required from Federal, regional, state, and local agencies in connection with the proposed project (ER, Sect. 12). The staff has reviewed that listing. An amendment to the permit from the California Coastal Commission may be required to obtain approval for the modified exclusion area plan. The staff is not aware of any other potential non-NRC licensing difficulties that would significantly delay or preclude the proposed operation of the plant.

2. THE SITE

2.1 RESUME

The staff visited the SONGS site in May 1977 primarily to determine what changes had occurred at the site and in surrounding areas since the preconstruction environmental review in late 1972. In addition, more detailed information about the operation of SONGS 2 & 3 was obtained as a result of this visit.

Population distribution estimates have been updated and extended to the year 2020. The major land use change has been the construction of the plant itself. Transmission line routes have undergone some changes.

An updated description of the surface-water hydrology is given in Sect. 2.3.1.

The section on meteorology has been revised to include the results of recent observations.

Considerable additional field work and sampling is reflected in the description of terrestrial and aquatic ecology in Sect. 2.5.

2.2 REGIONAL DEMOGRAPHY AND LAND USE

2.2.1 Population change

Population for 1976 by sectors within 80 km (50 miles) of the plant and the projected population estimates to the year 2020 are provided in Tables 2.1-2 through 2.1-15 of the ER. The population within a 16-km (10-mile) radius of the site in 1976 was 57,241. By 1980 this population was expected to increase to 67,547 – an annual growth rate of 4.2% (ER, Sect. 2.1.3.2.1). The major cities in the area and their 1975 populations are San Clemente (20,794), 6.4 km (4 miles) northeast; San Juan Capistrano (13,658), 16.8 km (10.5 miles) northwest; Oceanside (54,900), 27.2 km (17 miles) southeast; and San Diego (1,518,000), 81.6 km (51 miles) southeast. Table 2.1 provides 1976 population data by sector within 16 km (10 miles) of the site.

Table 2.1. Population by sector and distance with 10 miles of San Onofre site (1976)

Sector	Distance (miles)						
	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	Total 0 to 10
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	656	54	3532	5298	21,979	31,519
NNW	0	732	630	0	0	6,541	7,903
N	0	0	0	4300	0	519	4,819
NNE	0	0	0	0	0	0	0
NE	0	0	4600	0	0	0	4,600
ENE	0	0	0	0	0	0	0
E	0	0	0	0	4300		4,300
ESE	0	0	0	0	0	3,100	3,100
SE	0	0	0	0	0	1,000	1,000
SSE	0	0	0	0	0	0	0
Total	0	1388	5284	7832	9598	33,139	57,241

Source: ER, Table 2.1-2.

(To convert miles to kilometers, multiply by 1.6.)

Table 2.2 presents projected population and annual growth rates within 16 km (10 miles) of the plant between 1976 and 2020. The total percentage change in population for the area between 1976 and 2020 is projected to be 99.4%. These projections are based on surveys made by the Southern California Association of Governments, the Comprehensive Planning Organization of San Diego County, the California State Department of Finance, and the applicant (ER, Sect. 2.1.3.2.3).

Table 2.2. Projected population and annual growth rate within 16 km of the San Onofre site

Year	Projected population	Annual growth[a] (%)		Change (%)
1976	57,241	4.2		
1980	67,547			
1980	67,547	2.9		
1990	89,521			
1990	89,521	0.3	1.6	99.4
2000	91,949			
2000	91,949	1.0		
2010	101,945			
2010	101,945	1.1		
2020	114,139			

[a]Compounded annually.

Source: Adapted from ER, Table 2.1-8.

2.2.2 Changes in land use

Since issuance of the FES-CP in 1973, the construction of SONGS 2 & 3 is the only major change in land use in the site vicinity. Site preparation required the excavation of 16.39 ha (40.5 acres) of the San Onofre Bluffs, which otherwise could be used primarily for recreation. Most of this material was deposited on 34 ha (84 acres) at Japanese Mesa, a relatively flat area just north and across Interstate 5 from the site on Camp Pendleton Marine Base (ER, Sect. 4.1.2). In addition, about 304.8 m (1000 ft) of beach front has remained closed except as a passageway during the construction period (ER, Appendix 12-B, p. 7).

The area within an 8-km (5-mile) radius of the site occupies parts of two counties. The part of this area that lies in Orange County is entirely within San Clemente. The predominant land use in San Clemente is single family residential, light commercial, and recreational. Industrial land use in San Clemente is limited to light industry only. Because the available developable land is steep, future development in that area is expected to be slow with only low residential densities permitted by the city (ER, Sect. 2.1.4.3.1). In San Diego County, the 8-km (5-mile) radius area lies within Camp Pendleton Marine Base. About 95% of Camp Pendleton is unimproved land that is used for military purposes, recreation, and conservation (FES-CP, Sect. 2.2.2). Figure 2.1-12 of the ER provides a detailed land use map of the area within an 8-km (5-mile) radius of the site.

Heavy-haul components for the plant arrive by barge or by vessel at the Del Mar Boat Basin near Oceanside, about 22.5 km (14 miles) south of the site (ER, Suppl. 2, Item 37). The haul route, which was not available at the time the FES-CP was issued, required that a road be cut through the bluffs between the beach and Highway 101, about 11 km (7 miles) north of the Del Mar Boat Basin (ER, Suppl. 2, Item 37).

The description of the transmission lines as presented in Sect. 3.7 of the FES-CP has been modified (Sect. 3.2.5). No new rights-of-way were required: about 5.2 ha (12.8 acres) will be used for new tower bases and for access-road extensions, and 2 ha (5 acres) of land will be covered by the Talega Substation (ER, Suppl. 2, Item 36). Three changes in land use adjacent to the San Onofre–Santiago transmission line route have occurred since the issuance of the FES-CP: (1) construction of a paved road immediately adjacent to a significant portion of the proposed transmission line, (2) bulldozing of a firebreak adjacent to the transmission line on Camp Pendleton Marine Base, and (3) active operation of a large aggregate borrow site adjacent to the line in a third location (ER, Appendix 6A).

2.2.3 Changes in the local economy

Construction activity peaked in late 1979 with an estimated work force of about 3000. The applicant has estimated, after discussions with officials of the labor unions represented at SONGS 2 & 3, that 20%, or about 600 workers, relocated to the southern California area from other parts of the country (ER, p. S.2-167). Although all union craft workers at the site were hired from unions located within a 96-km (60-mile) radius of the site, all of the workers who relocated were travel card members who were assigned by the local unions to SONGS 2 & 3 after the local list was exhausted. Because the construction workers lived throughout the metropolitan areas of San Diego, Orange County, and Los Angeles, the impact of the workers' income was diffuse.

From 1974 through 1976 the applicant estimated that about $4.1 million was spent within a 48-km (30-mile) radius of the site for materials and services. These expenditures accounted for about 0.2% of the total forecast plant cost (ER, p. S.2-174).

2.3 WATER USE

2.3.1 Surface-water hydrology

The only significant water resource in the vicinity of SONGS is the Pacific Ocean. A few streams are located near the site, but these are intermittent.

The currents in the San Onofre vicinity are a superposition of many effects. This current system can be decomposed into individual components. The two most persistent components are the California Current and the tides.

The California Current is evident close to shore and north of Point Conception. However, south of this point the coastline recedes to the east, and water is available for entrainment from the east side of the current. This entrainment tends to make the California Current more diffuse south of Point Conception. Furthermore, the effect of this entrainment in addition to upwelling, winds, and baroclinic instabilities[1] can produce a counter-rotating eddy through the Channel Islands which is known as the Southern California Eddy; the nearshore northward flowing current is the Southern California Countercurrent. Observations indicate that this eddy can exist year-round; however, it is strongest in the fall and in the early winter.

Tides along the California coast are a mixed type with diurnal and semidiurnal components. The diurnal period lasts about 25 hr, and the semidiurnal period is about half the duration of the diurnal. As a result of tidal rotation, flood tide flows up the coast and ebb tide flows down the coast. A more detailed discussion of the tides in the San Onofre vicinity can be found in Sect. 2.6.3 of the FES-CP.

The total near-shore current is the sum of the large-scale current systems, the tides, and other effects such as local winds and offshore storms. The net result is a highly complex current structure that is quite variable in speed and direction. An additional complication is stratification. During the winter when vertical homogeneity exists, near-shore currents are fairly uniform with depth. However, during the summer the presence of the thermocline divides the water column so that only certain components of the net flow are uniform with depth. These components, such as tides, are driven over the entire water column. Surface driving forces (the wind) will penetrate the epilimnion; however, the thermocline represents a barrier to these stresses reaching the hypolimnion. The wind energy is then concentrated in the epilimnion, resulting in an increased intensity of wind-driven flow which can dominate all other components. In contrast, the hypolimnion is relatively free of wind effects and, therefore, is strongly influenced by the tides. The net result is a two-layered flow regime in which the flow in the two layers is only weakly correlated. This already-complicated flow structure can be altered by large amplitude internal waves. The breaking of these waves provides periodic vertical mixing.

A survey of the currents in the San Onofre area was conducted in 1972 by Intersea Research Corporation.[2] Data from this study have been analyzed by Koh and List.[3] From this analysis the following summary information has been extracted.

1. A net drift current can occur in a number of directions; however, the onshore/offshore component of the drift is necessarily smaller than the longshore component.

2. The longshore component of the drift changes direction every 3 to 6 days with downcoast flow typically having a longer duration.

3. The magnitude of the longshore drift is less than 30 cm/sec (0.6 knot).

4. The onshore/offshore component of drift is less than 15 cm/sec (0.3 knot).

5. An upcoast component of drift usually is associated with an onshore component of drift, and vice versa.

6. Both components of tidal flow are typically 10 cm/sec (0.2 knot).

The most detailed study of natural temperature variations in the San Onofre vicinity is that of Koh and List.[3] This study was based on daily temperature measurements from 1966 through 1970 taken at the ends of piers at Balboa, San Clemente, Oceanside, and La Jolla. These data were separated into three frequency ranges - low, middle, and high. The low-frequency component represents data averaged over two months, and it reflects seasonal variations. After removal of these low frequencies, the data were averaged over one week. This is the middle-frequency band, which represents variation within periods from one week to two months. The residual data, the high-frequency band, represents daily to weekly fluctuations. Figure 2.1 is a plot of temperature vs time for the three frequency bands and the raw data for San Clemente. The temperature ranges from 12.1°C (54°F) to 22.9°C (73°F). The low-frequency curve shows an annual temperature cycle with a maximum in midsummer and a minimum in midwinter.

As part of their analysis, Koh and List performed a correlation study among the temperature records from the various locations. Both the low- and middle-frequency ranges showed very high correlations at zero lag time between Oceanside and San Clemente. This indicates that the mechanisms influencing these frequency components have a length scale greater than the distance between the two sampling locations. Therefore, temperature variations at San Onofre within periods of one week or longer can be represented adequately by the corresponding temperature variations at either San Clemente or Oceanside. The correlation of the high-frequency components between these two stations is very weak, indicating that short-term temperature fluctuations are a spatially localized phenomenon. This fact is substantiated by near-surface-temperature measurements made from a moving boat which show that horizontal temperature variations of 1.1°C (2°F) over 1.6 km (1 mile) are not uncommon off the coast of southern California.[3]

An additional feature of the thermal structure in the San Onofre vicinity is vertical stratification. During the winter this region is, in general, isothermal over the water column. As warming progresses, a vertical temperature gradient is established and reaches a maximum in late summer. This natural gradient has been as much as 0.55°C/m (0.3°F/ft).

Ocean salinity in the San Onofre vicinity shows little spatial variation. An annual salinity cycle does exist as a result of annual cycles in the local meteorology and large-scale current systems. During this cycle, salinity typically ranges from 33 to 34 ppt, with the minimum occurring in winter and the maximum occurring in summer.

2.3.2 Groundwater hydrology

The average elevation of the water table at the beach line is +1.5m (+5 ft) mean lower low-water level (MLLW) with a slope of less than 1%; inland, the gradients range from 2 to 8% toward the ocean. Some groundwater can be obtained from the San Onofre Groundwater Basin, and it is used at Camp Pendleton Marine Base, but it is not a resource used by the Station. The Station obtains its domestic supply of freshwater from the Tri-Cities Municipal Water District.

2.3.3 Water quality

Dissolved oxygen concentration in southern California coastal waters ranges from about 5 to 13 mg/liter. Observations at the site vary from 5.4 to 10.0 mg/liter (2 to 3.6 grains/gal). The pH of southern California surface waters varies from 7.5 to 8.4 with a mean of about 8.0.

Measurements of coliform concentrations at the site were made during the period 1967 to 1975. Most of the measurements gave a mean probable number (MPN) of 4 to 43 colonies/100ml (1 to 13 colonies/oz). Only two measurements exceeded 43, and these occurred in 1972 and both gave a MPN value of 460 (140).

Turbidity in the vicinity of the site is due primarily to the suspension of bottom material in the surf zone. Outside the surf zone, turbidity generally decreases as distance from shore increases. Typical depths of Secchi Disc visibility range from 2 to 5 m (6.5 to 16 ft).[4] The vertical variation of turbidity is often quite complex, with alternating layers of clear and turbid water. Visible plumes of turbidity have been observed occasionally on the ocean surface in the vicinity of the Unit 1 offshore discharge structure. These plumes have been observed and, depending on ambient conditions, are caused by the intake and subsequent discharge of naturally turbid water and the entrainment of naturally turbid water into the discharge stream as it moves towards the surface (ER, Sect. 2.4.3.8.2).

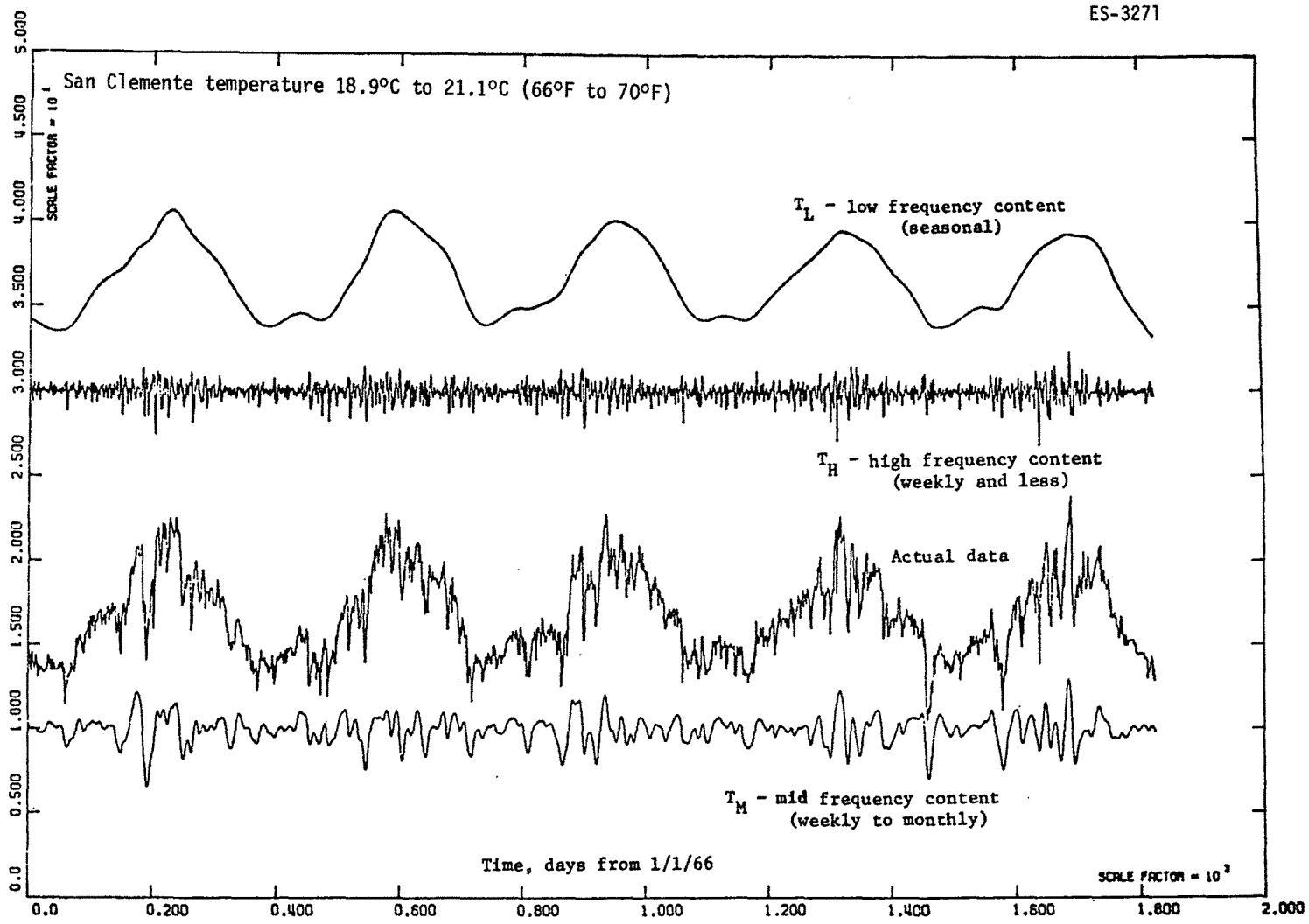

Fig. 2.1. Daily temperatures and decompositions into various frequency bands at San Clemente. Source: R. C. Y. Koh and E. J. List, *Report to Southern California Edison Company on Further Analysis Related to Thermal Discharges at San Onofre Nuclear Generating Station*, Sept. 30, 1974, Fig. 3.2.

2.3.4 Storm runoff

The probable maximum 1-hr thunderstorm rainfall is 17.8 cm (7.0 in). Much of the country to the north and east of the Station site drains into the San Onofre Creek, which flows into the ocean 2 km (1-1/4 miles) northwest of the site. The land immediately east of the site now drains into a 3.7-m-wide (12-ft-wide) ditch that parallels Interstate Highway 5 (I-5) just east of the Station. Both lanes of I-5 also drain into this ditch, which discharges into San Onofre Creek. Storm runoff from the hills above the site drains through one 182-cm-(72-in.-) and one 107-cm-(42-in.-)diam culvert that run north along the highway right-of-way and then turn under the site to the beach. The culverts and channel are designed for the runoff associated with a 1% chance (100-year) storm. To preclude flooding at the site during the occurrence of a probable maximum thunderstorm, an earthen dike will be constructed to the east side of I-5 to divert runoff and debris from the foothills area to San Onofre Creek.

2.4 METEOROLOGY

2.4.1 Regional climatology[5-9]

The climate of the coastal regions of southern California is strongly influenced by the Pacific Ocean. Summers are relatively cool with daytime temperatures averaging only in the low-to-mid-20s (°C) (70°F); daytime seabreezes are frequent. Outbreaks of hot, dry desert air from east of the coastal mountains (Santa Ana winds) may intrude onto the coastal plain several times each year, primarily in the fall, but temperatures exceed 32°C (90°F) usually less than five days annually. The proximity to the Pacific Ocean also results in mild winters, with daytime highs in the upper teens (°C) (60s°F) and nighttime lows around 5 to 10°C (40s°F). Temperatures below freezing are rare.

Precipitation along the coastal plain averages around 250 mm (10 in.) annually. The rainfall is very seasonally dependent with 85% of the total occurring from November through March; almost no rain falls during the summer months. Average relative humidities range from about 80% during the early morning hours of summer and fall, down to around 55% during winter afternoons.

2.4.2 Local meteorology[5,6,8,9]

The San Onofre site is located on the relatively narrow coastal plain, near the mouth of San Onofre Canyon. Coastal bluffs, nearby hills and valleys, and the Pacific Ocean contribute to the complexity of the site topography. Within 8 km (5 miles) of the site, elevations range from 525 m (1725 ft) above sea level [about 5.5 km (3.5 miles) east of the site] to sea level along the Pacific Ocean.

To assess the local meteorological characteristics of the San Onofre site, climatological data from San Diego, California [80 km (50 miles) southeast of the site]; from Los Angeles, California [95 km (60 miles) northwest]; and data collected onsite are available. These data are reasonably representative of the climatological conditions expected in the vicinity of the site.

In the site area, average daily maximum and minimum temperatures range between 25°C (77°F) and 18°C (64°F) in August, the warmest month, and between 18°C (65°F) and 8°C (46°F) in January, the coolest month. The extreme maximum temperature recorded was 44°C (111°F) at San Diego in September 1963; the extreme minimum temperature was -5°C (23°F) at Los Angeles in January 1937.

The area receives about 250 mm (10 in.) of rain annually; December, January, and February — the wettest three-month period — averages about 150 mm (6 in.), and June, July, and August combined averages less than 2.5 mm (0.1 in.). The maximum 24-hr rainfall recorded among these stations is 157 mm (6.2 in.) at Los Angeles in January 1956. Snowfall is a rarity, with a trace [less than 0.25 mm (0.01 in.)] being the most ever recorded. Heavy fogs [visibility of 0.4 km (0.25 mile) or less] occur on about 30 to 40 days each year along the coast with about half of the occurrences during October through January.

Windflow at the site has a strong diurnal dependence primarily due to the land-sea breeze effect. During daytime hours the windflow has a predominant onshore directional component, whereas at night windflow tends toward a seaward direction. Table 2.3 shows the wind direction with the greatest frequency of occurrence for each hour of the day for the three-year period of January 25, 1973, through January 24, 1976, as measured at the 10-m (33-ft) level of the onsite meteorological tower. Figure 2.2 shows the directional frequency of onsite winds. About 25% of the total windflow over the site was from the northeast and north-northeast (principally nighttime offshore flow); 19% of the flow occurred from the west and west-northwest (daytime onshore flow). Winds were calm [windspeeds less than 0.34 m/sec (0.75 mph)] less than 1% of the time at the 10-m (33-ft) level.

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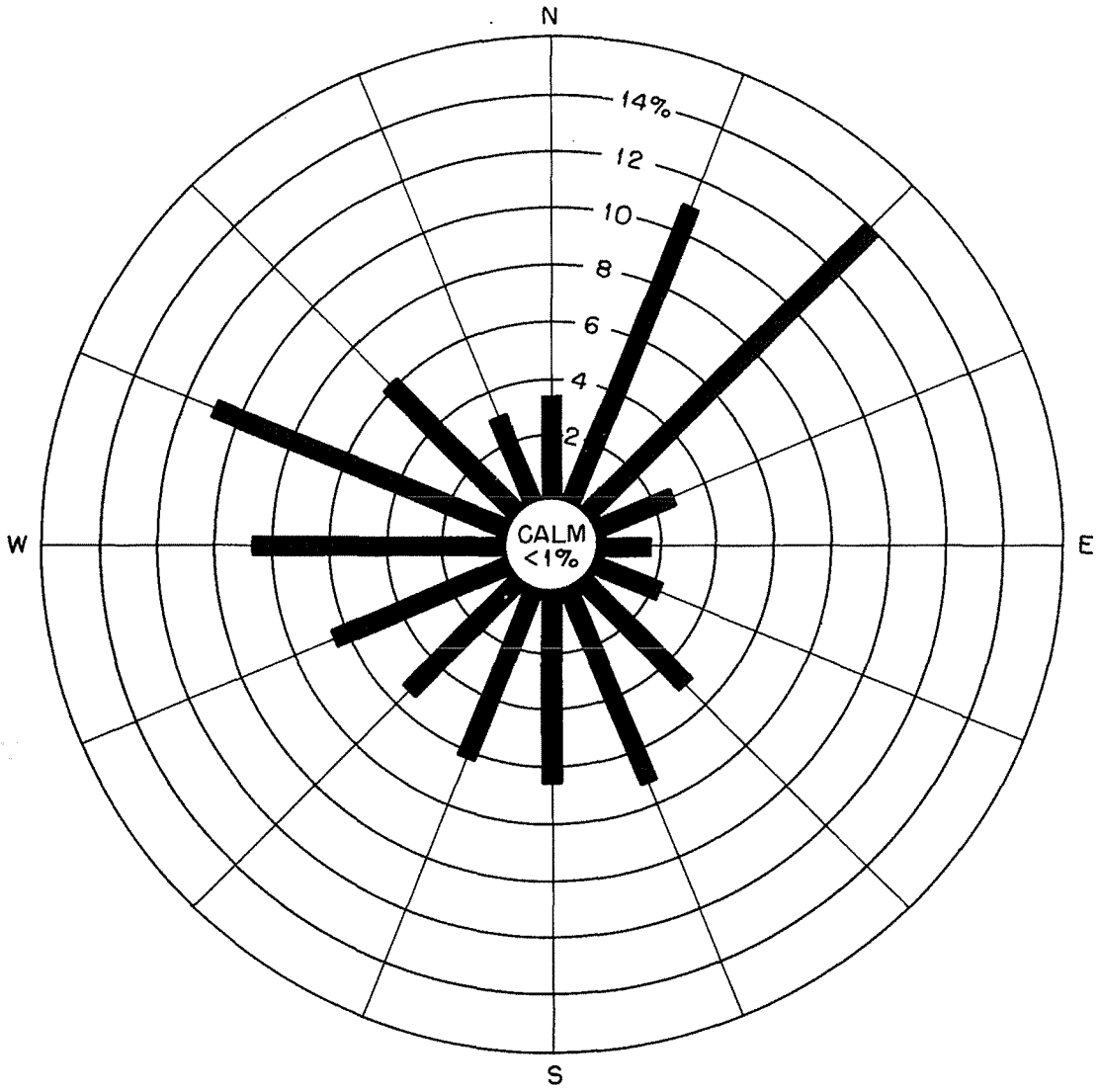

Fig. 2.2. Directional frequency of wind at the San Onofre site. Onsite data at 10 m (33 ft) above ground level, Jan. 25, 1973 through Jan. 24, 1976. Bars show the direction from which the wind blows. Calms are those winds with hourly average speeds less than 0.34 m/sec (0.75 mph).

Table 2.3. Wind direction with greatest frequency of occurrence by time of day at San Onofre Nuclear Generating Station

Data measured at 10-m (33-ft) level of onsite meteorological tower

Hour (AM)	Wind direction	Frequency (%)	Hour (PM)	Wind direction	Frequency (%)
1	NE	28	1	WNW	25
2	NE	26	2	WNW	27
3	NE	27	3	WNW	27
4	NE	28	4	WNW	27
5	NE	30	5	WNW	22
6	NE	30	6	WNW	16
7	NE	25	7	NW	14
8	NE	19	8	NE	13
9	S	12	9	NE	16
10	W	17	10	NE	20
11	W	20	11	NE	23
Noon	WNW	22	Midnight	NE	25

2.4.3 Severe weather[5-13]

Although infrequent, thunderstorms, tornadoes, tropical cyclones, and dust storms can affect the site area. Thunderstorms occur less than 5 days annually. Tropical storms are also rare in the site area, with a storm entering the region less than once every 10 years. The "fastest mile" of wind recorded at Los Angeles was 28 m/sec (62 mph) (March 1952). Snow, glaze, and hail are almost nonexistent in the site vicinity.

Between 1952 and 1975, 23 tornadoes and 21 waterspouts were reported within a 34,000-km^2 (13,000-mi^2) area containing the site. Staff analysis of these tornado data indicates that the mean path area of a tornado in this region is about 0.3 km^2 (0.1 mi^2). Using the methods of Thom, this results in a recurrence interval of 70,000 years for a tornado or waterspout at the plant site.

Dust storms are relatively infrequent within the site region; between 1940 and 1970, dust or blowing dust and sand reduced visibility to under 11 km (7 miles) about 1 hr annually. About 8 days each year there is a high meteorological potential for air pollution.

2.4.4 Atmospheric dispersion[5,6,14,15]

Southern California Edison Company (SCE) has provided joint frequency distributions of wind speed and direction by atmospheric stability class, based on the vertical temperature gradient, collected onsite during the period January 25, 1973 to January 25, 1976. The distributions were for wind speed and direction measured at both the 10- and 40-m (33- and 131-ft) levels with the vertical temperature difference between the 6.1- and 36.6-m (20- and 120-ft) levels. SCE has also conducted a tracer test program to assess the atmospheric dispersion in the landward directions at the San Onofre site. Section 6.2.5 describes the onsite meteorological program and the tracer test program.

The staff has made reasonable estimates of average atmospheric dispersion conditions for SONGS 2 & 3 using an atmospheric dispersion model for long-term releases; this model is based on the "Straight-Line Trajectory Model" described in Regulatory Guide 1.111. The onsite tracer tests showed that ground-level relative concentrations normalized by windspeed were similar whether the source of release was elevated or ground level; thus it was assumed that all plant releases were from ground level. The calculations also include considerations of intermittent releases during more adverse atmospheric dispersion conditions than indicated by an annual average calculation as a function of total duration of release. The calculations include an estimate based on the criteria outlined in Regulatory Guide 1.111 of maximum increase in calculated relative concentration and deposition due to the spatial and temporal variation of the airflow not considered in the straight-line trajectory model. Radioactive decay of effluents and depletion of the effluent plume were also considered as described in Regulatory Guide 1.111.

In the evaluation, we used meteorological data collected onsite between January 25, 1973 and January 24, 1976. All releases were evaluated using joint frequency distributions of wind speed and direction measured at the 10-m (33-ft) level by atmospheric stability [defined by the temperature difference between the 36.6- and 6.1-m (120- and 20-ft) levels]. Data recovery for this time period was 88%.

Table 5.1 presents the calculated values of relative concentration (χ/Q) and relative deposition (D/Q) for specific points of interest.

2.5 SITE ECOLOGY

2.5.1 Terrestrial ecology

The FES-CP describes the terrestrial ecology of the San Onofre site (FES-CP, Sect. 2.8.1). Field work for this description, however, was conducted only during November 1971 and contained very little quantitative data. Consequently, the issuance of the construction permit was subject to the applicant's expansion of its current environmental monitoring program "to determine environmental effects which may occur as a result of site preparation and construction of Units 2 and 3, and to establish an adequate preoperational baseline by which the operational effects of Units 2 and 3 may be judged" (FES-CP, p. iv). In response, the applicant conducted terrestrial ecological studies for a period of 1 year on a 0.61-ha (1.5-acre) quadrat located immediately south of Units 2 and 3 construction site (ER, Appendix 2A). This monitoring program documented seasonal changes in the biotic communities over a 1-year time span and fulfilled the recommendations of NRC Regulatory Guide 4.11.

About 80% of the study area is in a natural plant community of coastal sage scrub, and the remaining 20% has been disturbed by man-related activities. Total cover on the study area ranged from 81 to 98%. The greatest cover was found in February, decreasing toward midsummer. Vegetative diversity in the coastal sage scrub community was relatively low; California sagebrush (Artemesia californica) was the dominant species (65% relative cover). Coyote bush (Baccharis pilularis) ranked second in the study area (9% relative cover) but had higher relative cover in the disturbed areas than in the climax stand. The applicant's survey suggests that surface disturbances significantly alter the composition of the coastal sage scrub community by encouraging the invasion of exotic perennial and annual plant species, especially mustards and grasses. Establishment of these plants occurred only in areas that have been disturbed (ER, Appendix 2A). As expected for this very small study area (0.61 ha), no endangered plant species were observed.

Fauna observed within the study area included 5 species of reptiles, 12 species of mammals, and 36 species of birds; no amphibians were sighted. None of the species observed in the study area are threatened or endangered as defined by the U.S. Department of the Interior[16] (ER, Sect. 2.2.1.2).

The endangered animal species[16] whose ranges include the vicinity of the plant and associated transmission lines are listed in Table 2.4. Two of these species have been observed by the applicant. The California brown pelican has occurred several times on the beach adjacent to the construction area (ER, Sect. 2.2.1.2), and the California least tern has a nesting colony located near the Del Mar Boat Basin, a facility used by the applicant to move heavy components (see Sect. 2.2.2).

Examination of the geographical distributions[17,18] of the 266 endangered plant species in California[19] indicates that 26 of these species occur in those counties (Orange and/or San Diego) traversed by the transmission lines (Table 2.5). No endangered plant species, however, were observed during the applicant's biological study of the San Onofre-Santiago transmission line route.[20] Biological surveys of the other transmission line routes have not been conducted, but no habitats adjacent to or within the transmission line right-of-way have been classified by state or Federal authorities as being critical to any endangered species (ER, Suppl. 1, Item 22).

2.5.2 Aquatic ecology

The aquatic ecology of the site was described in the FES-CP issued in March 1973, and was based on descriptive data obtained from literature concerning the southern California coast. The FES-CP site description contained minimal baseline information on spatial and temporal differences in species occurrences and population densities. The data obtained since issuance of the FES-CP is primarily from three sources: (1) a thermal effects study performed jointly by Environmental Quality Analysts, Inc., and Marine Biological Consultants, Inc., in 1973 using data and results obtained from 1964-72 by Bendix Marine Advisers, Inc., and Intersea Research Corporation.[21] (2) the SONGS 1 Environmental Technical Specifications (ETS) monitoring program begun in November 1974, conducted by the Lockheed Aircraft Service Company's Department of Marine biology,[22-27]

Table 2.4. Endangered animal species[a] whose ranges include Orange and San Diego counties, California

Common name	Scientific name	Habitat	Reason for decline
California brown pelican	*Pelecanus occidentalis californicus*	Pacific coast from Canada to Mexico	Egg shell thinning due to pollutants such as DDT
California least tern	*Sterna albifrons brownii*	Pacific coast from S. San Francisco Bay, California, to S. Baja, California	Loss of nesting habitat (sandy beaches) due to increased human activity
American peregrine falcon	*Falco peregrinus anatum*	Coast and higher mountains inland	Egg shell thinning due to DDT; human disturbance
Southern bald eagle	*Haliaeetus leucocephalus leucocephalus*	Estuarine areas and inland around large lakes, reservoirs, and wetlands	Disturbance of nesting birds; illegal shooting; loss of nest trees; contamination of food chain by persistent pesticides
Light-footed clapper rail	*Rallus longirostris levipes*	Coastal salt marshes	Destruction of its natural habitat by filling for housing and industrial use, marine development, and water pollution destroying food species and/or habitat

[a]U.S. Department of the Interior, "Endangered and Threatened Wildlife and Plants," 41 F.R. 47180–47198.

Table 2.5. Endangered plant species of Orange and San Diego counties, California

Plant name[a]		Habitat and geography[a]
Scientific	Vernacular	
Acanthomintha ilicifolia	San Diego thornmint	Clay depressions on mesas and slopes; coastal sage scrub, chaparral; SW San Diego County
Arctostaphylos glandulosa var. *crassifolia*	Thickleaf manzantia	Sandy mesas and bluffs; chaparral; coast of San Diego County
Aster chilensis		Dry banks, grassy fields, etc., sea level to 5000 ft; many plant communities; mountains of San Diego County to Santa Barbara County
Astragalus tener titi	Coastal dunes rattleweed	Sandy places near the coast; coastal strand; near San Diego
Berberis nevinii	Nevin's bayberry	Sandy and gravelly places below 2000 ft; coastal sage scrub, chaparral; San Diego County
Brodiaea filifolia	Thread-leaved brodiaea	Heavy clay soil below 2000 ft; coastal sage scrub, chaparral; San Diego County
Brodiaea orcuttii	Orcutt's brodiaea	Near streams and around vernal pools and seeps, up to 5500 ft; chaparral; Yellow Pine Forest, San Diego County
Chorizanthe orcuttiana	Orcutt's chorizanthe	Sandy places; coastal sage scrub; San Diego County
Cordylanthus maritimus ssp. *maritimus*	Salt marsh bird's beak	Coastal salt marsh; Lower California to Oregon
Dicentra ochroleuca	Yellow dicentra	Occasional in dry disturbed places below 3000 ft; chaparral; Santa Ana and Santa Ynez mountains
Dichonda occidentalis	Western dichondra	Mostly dry sandy banks in brush or under trees; coastal sage scrub, chaparral, southern oak woodland; coastal San Diego and Orange counties
Dudleya multicaulis	Many-stemmed dudleya	Dry stony places below 2000 ft; coastal sage scrub, chaparral; San Onofre Mountain, Orange and San Diego counties
Dudleya stolonifera	Laguna Beach dudleya	Cliffs in coastal sage scrub; canyons near Laguna Beach, Orange County
Eryngium aristulatum var. *parishii*	San Diego coyote-thistle	Vernal pools; chaparral; San Diego region
Ferocactus viridescens	San Diego barrel cactus	Dry hills; coastal sage scrub, valley grassland; around San Diego, NW Lower California
Galium angustifolium ssp. *borregoense*		Creosote bush scrub; Borrego Valley, E. San Diego County
Githopsis filicaulis (last reported in 1884)	Mission Canyon blue-cup	Mission Canyon, San Diego
Hemizonia conjugans	Otay tarweed	Mesas; coastal sage scrub; SW San Diego County
Hemizonia floribunda	Tecate tarweed	Dry slopes and valleys below 3500 ft; coastal sage scrub, chaparral; S. San Diego County, N. Lower California
Limnathes gracilis var. *parishii*	Parish slender meadow-foam	Moist lake shores and wet places from 4500 to 5000 ft; Yellow Pine Forest; Cuyamaca and Laguna mountains
Monardella linoides ssp. *viminea*		Rocky washes below 1000 ft; coastal sage scrub, chaparral; SW San Diego County
Monardella macrantha var. *halli*	Hall's monardella	San Gabriel and San Bernardino mountains to Cuyamaca and Santa Ana mountains
Nolina interrata	San Diego nolina	Dry slope; chaparral; W. of Dehesa School, 8 miles east of El Cajon, San Diego County
Orcuttia californica var. *californica*	California orcuttia	Drying mud flats; valley grassland; San Diego County
Poa atropurpurea	San Bernardino bluegrass	Meadows and grassy slopes from 6000 to 7000 ft; Montane Coniferous Forest; San Diego County
Pogogyne abramsii	San Diego pogogyne	Beds of dried pools; chaparral, coastal sage scrub; mesas from San Diego to Miramar

[a] Nomenclature, habitat, and geography from P. A. Munz, *A Flora of Southern California*, University of California Press, Berkeley, Calif., 1974; and W. R. Powell, Ed., *Inventory of Rare and Endangered Vascular Plants of California*, Special Publication No. 1, Berkeley, Calif., 1974.

Source: U.S. Department of the Interior, "Endangered and Threatened Species, Plants," 41 F.R. 24542–24572.

(To convert ft to m, multiply by 0.3048.)

and (3) the Annual Report to the California Coastal Commission, August 1976-1977, by the Marine Review Committee,[28] a special study group established by the California Coastal Commission to estimate the consequences of operating SONGS 2 & 3. Because the ETS program contains the most recent data, included seasonal fluctuations in species occurrences and population densities, and evaluated the effects of SONGS 1 operation on the local marine environment, the description of the site aquatic ecology that follows is based on these data (obtained from November 1974 through December 1976). SONGS 2 & 3 are adjacent to SONGS 1, on the same site. Additionally, the effects of SONGS 1 operation are now a part of the environment of SONGS 2 & 3 and should therefore be included in a complete description of the site ecology.

The biotic communities relevant to an adequate description of the site ecology are the plankton, nekton, benthic, kelp, and intertidal communities.

2.5.2.1 Plankton

Bimonthly plankton sampling was conducted four times in 1975 and six times in 1976 at seven stations along the 10-m (33-ft) contour from 2.4 km (1.5 miles) upcoast to 6.7 km (4.2 miles) downcoast of the SONGS 1 intake/ discharge line (Fig. 2.3).

Phytoplankton

1975 Data. The 84 phytoplankton taxa recorded in the 1975 surveys are similar to those found in previous studies.[25] The phytoplankton was dominated numerically by dinoflagellates. Prorocentrum micans was the most abundant species, constituting 30 to 90% of the samples.[22] Other abundant organisms included Prorocentrum spp., Ceratium sp. A, and Ceratium sp. B. Several species of Peridinium and Dinophysis were also present. The number of taxa per station within each survey was relatively uniform. A complete list of phytoplankton taxa recorded during 1975 is given by station and survey in Appendix VIII, Table 2, p. 217 of ref. 25.

Chlorophyll α concentrations ranged from 0.24 to 2.32 mg/m^3 (0.004 to 0.04 grains/250,000 gal) during the four 1975 surveys.[25] Differences in chlorophyll α concentrations between stations were not significant. Differences were significant, however, between depths and between surveys; chlorophyll α concentrations were significantly greater at the 8-m (26-ft) depth, and the mean concentrations of September were significantly greater than those of the other survey months - May, July, and November.

Phaeopigment concentrations ranged from 0.08 to 1.23 mg/m^3 (0.076 to 0.174 grains/250,000 gal) during the four 1975 surveys.[25] Station differences were not significant, but differences in mean concentrations between surveys and between depths were significant. As with chlorophyll α, phaeopigment concentrations were greater at 8 m (26 ft) than at 1 m (3.3 ft), and the September survey showed the highest phaeopigment concentrations of all four surveys.

1976 Data. In 1976, 128 species or higher taxa of phytoplankton were reported from the six surveys conducted (Table II-2, pp. 11-13 of ref. 26). These taxa consisted of species when identifiable and higher taxa (genera, families, etc.) when identification to the species level could not be made. The taxa representing greater than 30% of any given sample by number were Nitzschia spp. (March and November), an unidentified pennate diatom (January, March, July, September, and November), Gonyaulax spp. (January and March), and Prorocentrum micans (May).[27]

Normal vertical distribution patterns were observed in 1976, as in 1975, with higher concentrations of chlorophyll α and phaeopigments again measured in the lower half of the 10-m (33 ft) water column. However, relatively high values of chlorophyll α were found during the January and May surveys in 1976, whereas in 1975, chlorophyll α concentrations were moderate in May and high in September. Also in contrast to 1975, there was no consistent vertical separation of diatoms from dinoflagellates.

Slightly higher surface temperatures at plankton stations nearest SONGS 1 during some surveys had no apparent effect on the distribution and abundance of phytoplankton; rather, distribution and abundance were apparently the result of natural spatial and temporal variation.[27]

Zooplankton

1975 Data. Zooplankton species encountered in the four 1975 surveys were common to the neritic waters of southern California.[22] A master species list of zooplankton found in the surveys is presented in Appendix VIII, Table 2, p. VIII-30 of ref. 22. The most common group consisted of copepodids of Acartia spp., usually accounting for more than 50% of the total number of individuals sampled.[22] Other species that commonly occurred in the samples were Paracalanus parvus copepodids, Oikopleura spp., Evadne nordmanni, Labidocera trispinosa copepodids,

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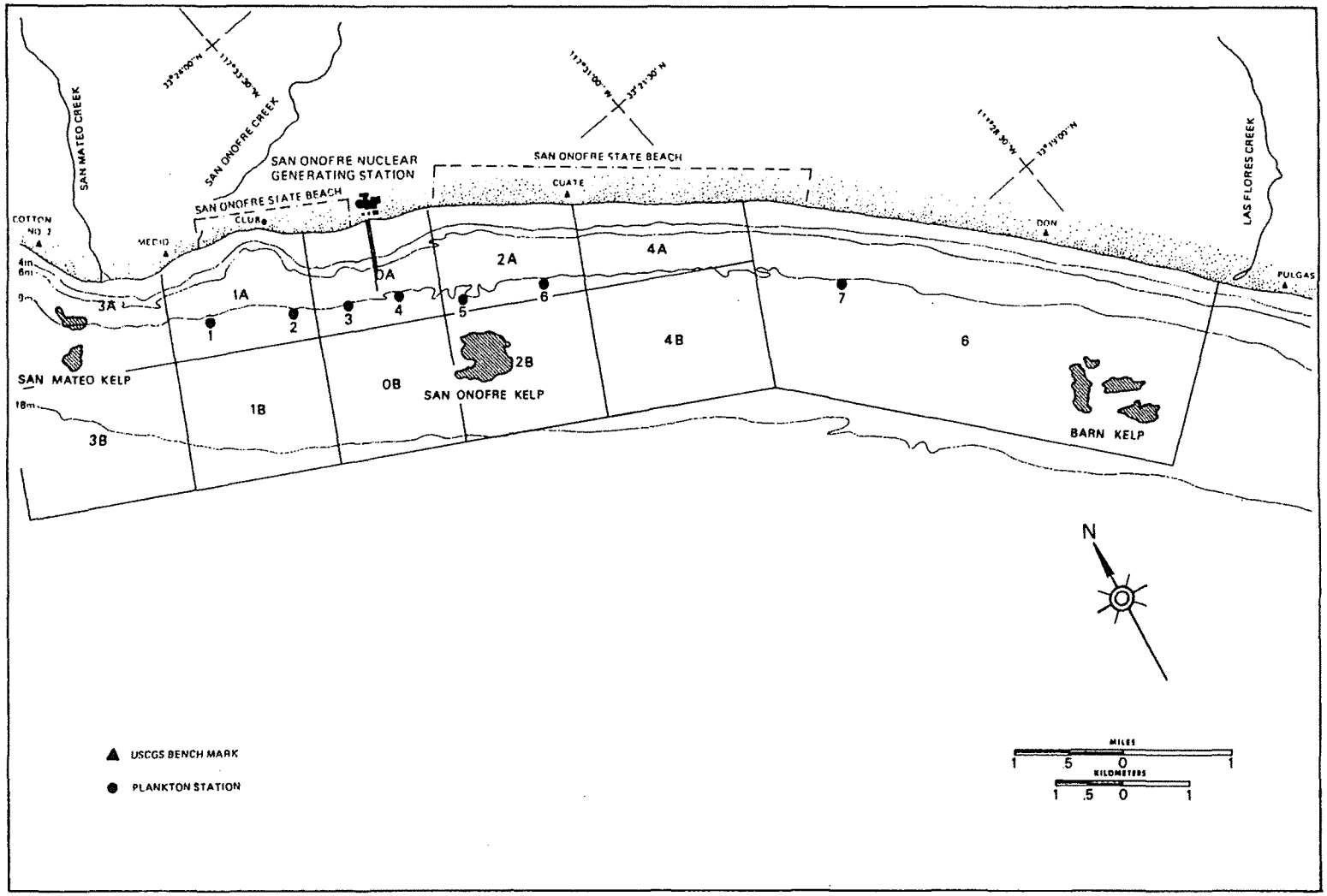

Fig. 2.3. Environmental Technical Specifications plankton station locations and environmental surveillance zones, San Onofre Nuclear Generating Station Unit 1. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976*, June 1977.

Sagitta euneritica, and Acartia tonsa. Less abundant species were adult Paracalanus parvus, cyphonautes larvae, Acartia clausi, and Clausocalanus spp. copepodids. Other species present usually accounted for less than 1% of any sample.[22]

Sampling stations were best differentiated by the distribution of five species: Sagitta euneritica, Corycaeus amazonicus, Oithona spp. copepodites, euphausiid larvae, and Podon polyphemoides. A clear separation of the stations, however, was not obtained, which suggests that no strong processes in the area acted to partition the environment.[25]

Total abundance per sampling station ranged from 600 to 10,900 per m^3 (568 to 10,322 per 250,000 gal) (Fig. 2.4), and total number of taxa ranged from 36 to 65 during the four surveys of 1975.[25] The number of taxa at station 4 near the SONGS 1 discharge was significantly higher than at all the other stations (Fig. 2.4).

1976 Data. In 1976, 115 species or higher taxa were reported from the six surveys performed (Table II-2, pp. 7-10 of ref. 26). Sixteen taxa were considered predominant because they were numerically dominant (number one in rank) during at least one survey, or because they represented more than 1% of the total number of individuals during the year.[27] These sixteen taxa constituted 90% of the total individuals recorded for the year.[27] The seasonal distribution of each of these taxa during the 1976 surveys is shown in Fig. 2.5. Significant differences were found among stations for all but five of the taxa, and significant differences were found between depths for all but six of them. All of these taxa exhibited significant differences among surveys.

Normal vertical distribution patterns were also observed in 1976, as in 1975, with higher concentrations of zooplankton observed in the lower half of the 10-m (33-ft) water column.

Although higher concentrations of zooplankton were measured near SONGS 1 in 1975, no effect of SONGS 1 was indicated by the 1976 studies. Even though water temperatures during the 1976 November survey (when SONGS 1 was off-line) were unusually warm for the season, the distribution and abundance of zooplankton, as with the phytoplankton, were apparently the result of natural spatial and temporal variation.[27]

2.5.2.2 Nekton

1975 Data

Quarterly nekton sampling was conducted in 1975 at six stations – three stations in the area of the SONGS 1 discharge (zone OA) and three stations about 6706 m (22,000 ft) downcoast (zone 6) (Fig. 2.6). The downcoast stations (zone 6) acted as control areas not under the influence of the SONGS 1 discharge.

A total of 3206 individuals representing 49 species or higher taxa were taken during the four 1975 surveys.[25] The most abundant fish was the queenfish (Seriphus politus), which accounted for nearly twice the number of individuals in the year's catch than the second most abundant species. Other abundant fish were the walleye surfperch (Hyperprosopon argenteum), white croaker (Genyonemus lineatus), spotfin croaker (Roncador stearnsii), jacksmelt (Atherinopsis californiensis), and white surfperch (Phanerodon furcatus). Fourteen species were both abundant and common. Five of the 14 species displayed significant differences in their distributions between zones; four of these – jacksmelt, white seabass (Cynoscion nobilis), white croaker, and queenfish - were significantly more abundant in zone OA, and the pile surfperch (Damalichthys vacca) was more abundant in zone 6.

The variability observed in abundance between zones was influenced significantly by the distribution of four species: white seabass, white croaker, white surfperch, and California corbina (Menticirrhus undulatus). The white seabass and white croaker were significantly more numerous in zone OA, and the California corbina and white surfperch were significantly more numerous in zone 6.

The number of individuals and number of taxa also varied significantly among surveys. However, the degree of similarity of species composition within zones did not differ significantly from the degree of similarity between zones.

1976 Data

A taxonomic summary of the 1976 nekton sampling data by station and by survey can be found in Table III-4, pp. 17-18 of ref. 26. A total of 46 species was reported from these surveys. Seven species – queenfish, white croaker, white surfperch, walleye

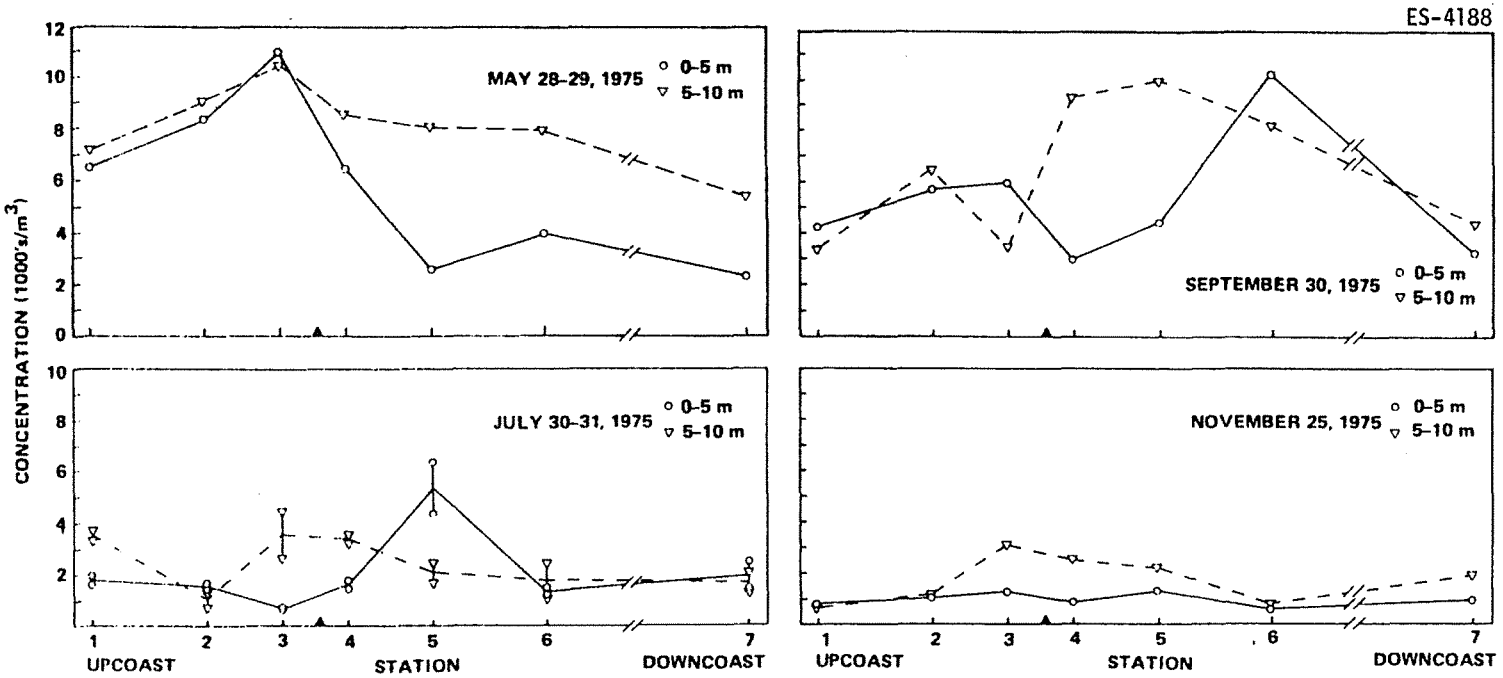

Fig. 2.4. Zooplankton concentrations from 1975 surveys. Open circles (o) and triangles (▽) indicate values from the upper and lower strata respectively. The relative distances of the plankton stations from SONGS 1 are shown. A solid triangle (▲) indicates the position of SONGS 1. A vertical bar connects the July replicates. Source: Lockheed Marine Biological Laboratory, *San Onofre Nuclear Generating Station Unit 1, Annual Analysis Report, Environmental Technical Specifications, January-December 1975*, 1976.

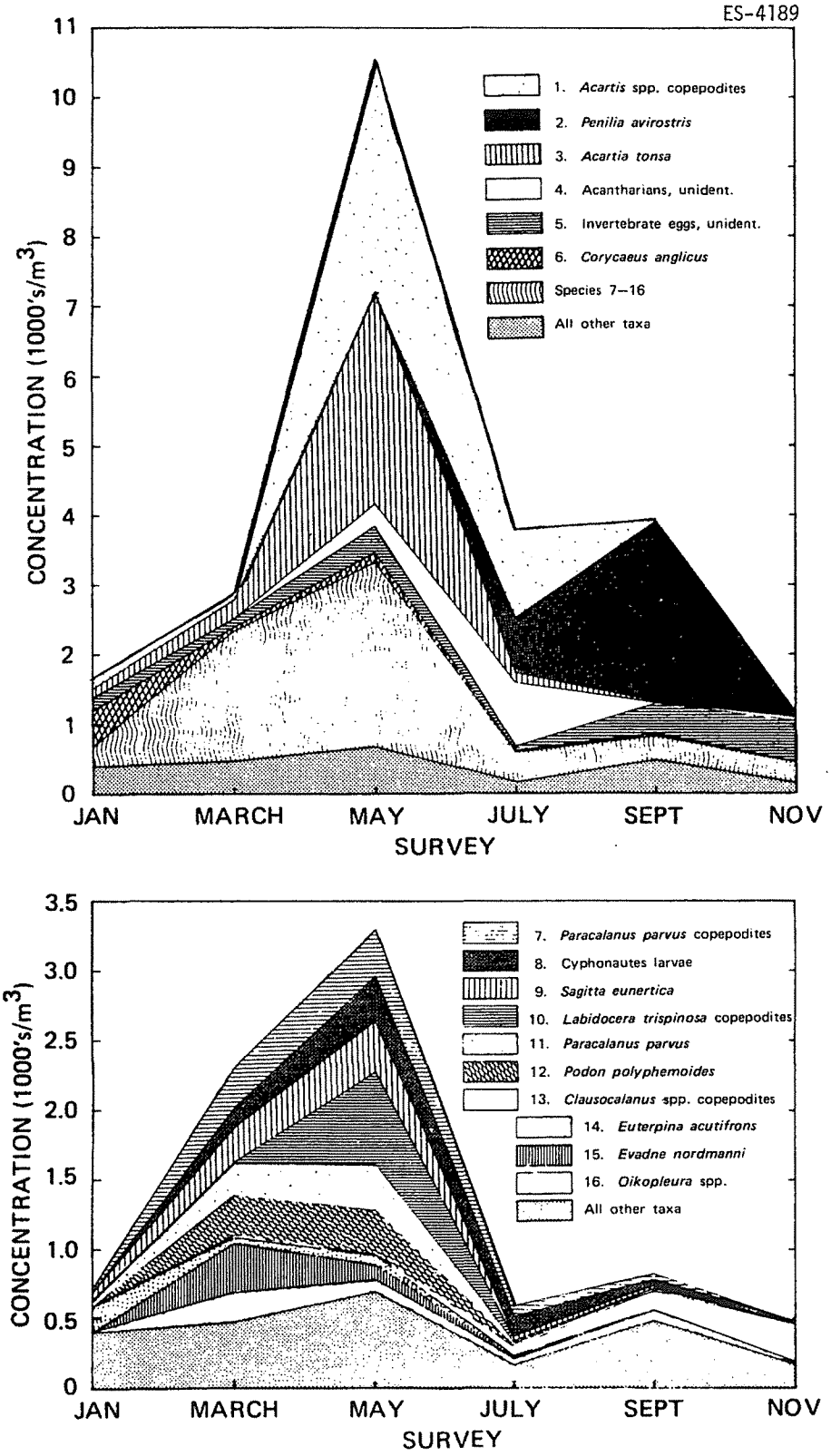

Fig. 2.5. Seasonal distribution of the 16 most abundant zooplankton taxa in 1976. Means of abundance during each survey are plotted. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis – 1976*, June 1977.

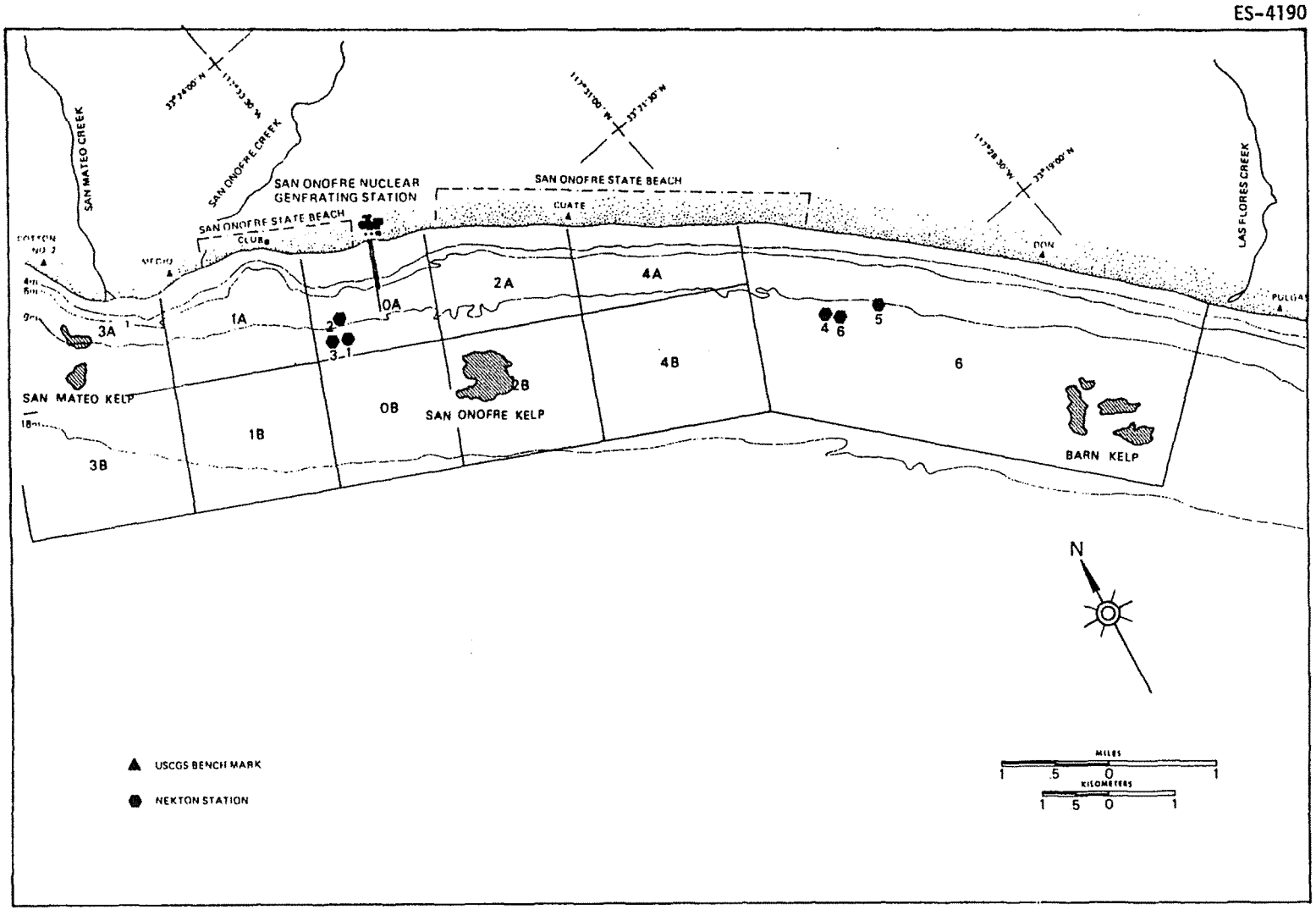

Fig. 2.6. Environmental Technical Specifications nekton station locations and environmental surveillance zones, San Onofre Nuclear Generating Station Unit 1. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976*, June 1977.

surfperch, black croaker (Chilotrema saturnum), spotfin croaker, and half moon (Medialuna californiensis) were captured in both zones.[27] As a group, these seven species accounted for 81.3% of the total catch for the year.[27] The first five of these species were tested for significant differences between zones and among surveys. Only the queenfish and white croaker showed a significant difference between zones, being significantly more abundant in zone OA than in zone 6. The remaining three species did not differ significantly between zones.

In contrast, six predominant species in 1975 (bottom nets) contributed 82.3% of the individuals collected.[25] Of the predominant species netted in both years, only the queenfish and white croaker were significantly more abundant in zone OA than in zone 6 during both years of the survey.

The spatial distribution of the queenfish, white croaker, and white surfperch differed significantly among the 1976 surveys. Temporally, the queenfish was found to be most abundant during the December survey and least abundant during the March survey. The white croaker was significantly more abundant during the December and March surveys than during the September and June surveys, and the white surfperch was significantly more abundant in the December catch than during all of the other 1976 surveys.

Significant differences were observed in the number of species between zones, with the number in zone OA being significantly greater than the number in zone 6. Four species best discriminated between zones OA and 6: white seabass, white croaker, yellowfin croaker (Umbrina roncador); and white surfperch.

There was also a significant difference among survey periods, with the number of species taken in March being significantly less than the number taken during all of the other surveys, which were not significantly different from each other.

The significant difference found in both number of individuals and number of species among surveys in 1976 was also found in 1975 although no obvious trend in species diversity was revealed (Fig. 2.7). On the other hand, a high similarity within zones existed during 1976; the 1975 data indicated similar but less distinct patterns.

The data suggest that the areas sampled in the two zones may support somewhat different nekton communities. Physical differences between the zones which may also affect the nekton results include the presence of the intake and discharge structures at SONGS 1 and riprap material in zone OA, general differences in substrate type and composition between the zones, turbidity, and the presence of a dense stand of the phaeophyte Cystoseria spp. in the area of the zone OA nekton stations. Temperature data collected during bimonthly cruises and nekton surveys revealed no obvious differences between zones, which indicates that temperature is not an important factor.

Fisheries statistics

Commercial and sport fisheries catch data for 1974 from the California Department of Fish and Game statistical blocks in the vicinity of SONGS 1 (Fig. 2.8) revealed that the number of fish per block ranged from 16,601 in block 737 to 123,246 in block 756.[27] With the exception of block 801, all of the blocks examined measured an increase in catch per unit effort between 1973 and 1974. However, the magnitude of the increase was small in comparison to the decrease shown by all of the blocks over the past 13 years.

The 1974 commercial catch reported a total of 46 taxa from the five blocks surrounding San Onofre.[27] The only taxon common to all five blocks was the Pacific bonito (Sarda chiliensis). Each of the five blocks yielded catches at about the expected level, based on the size of the blocks and the amount of coastline encompassed.[27]

2.5.2.3 Benthos

1975 Data

Three surveys conducted in 1975 at 11 benthic stations (Fig. 2.9) revealed a total of 160 species or higher taxa of epibenthic macrobiota (Tables X-1 to X-11, pp. X-12 to X-43 of ref. 22). The taxa represented members of 11 major taxonomic groups. Within zones not associated with kelp beds (zones OA and 6), the flora was dominated by rhodophyte taxa throughout the year. Mollusks were the dominant fauna during April and October, whereas molluscan and chordate taxa occurred in similar numbers during the July sampling period. Rhodophytes were also the dominant floral component and mollusks were the dominant faunal component of the kelp bed biota at all kelp bed stations during all survey periods.

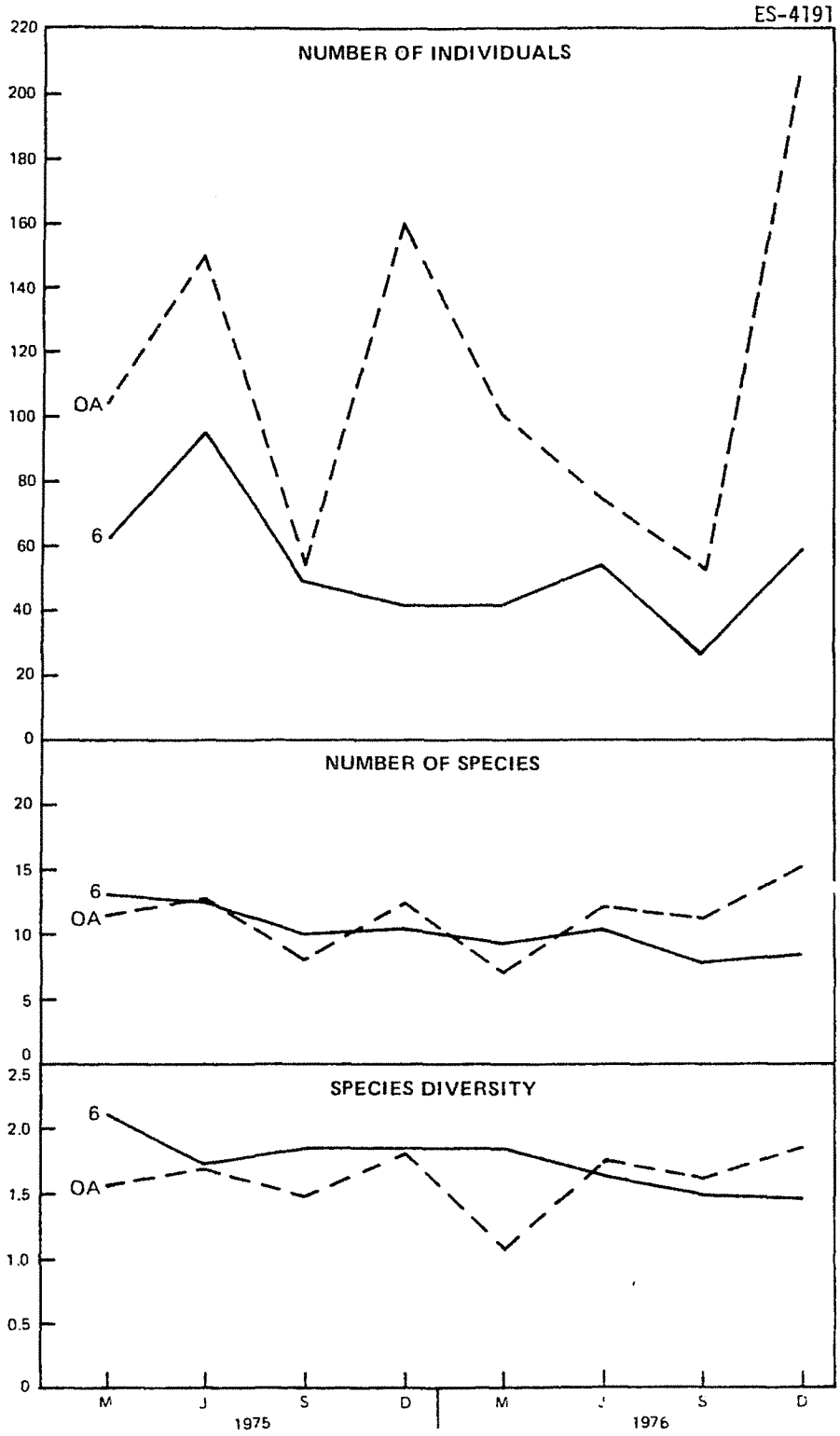

Fig. 2.7. The mean number of individuals and species per net by zone and species diversity of zones OA and 6 by survey during 1975 and 1976. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976*, June 1977.

The species whose distribution best discriminated between zones OA and 6 were the anthozoan Muricea californica, which occurred mostly in zone 6; the rhodophyte Prionitis spp., which was absent from zone 6; the holothuroid Parastichopus parvimensis, which occurred only in zone 6; and the gastropod Astrea undosa, which was observed only in zone OA.

The trophic composition based on the number of taxa of the two zones not associated with kelp beds (zones OA and 6) was similar among these zones and was dominated by suspension feeders and by primary producers during all surveys (Table 2.6).

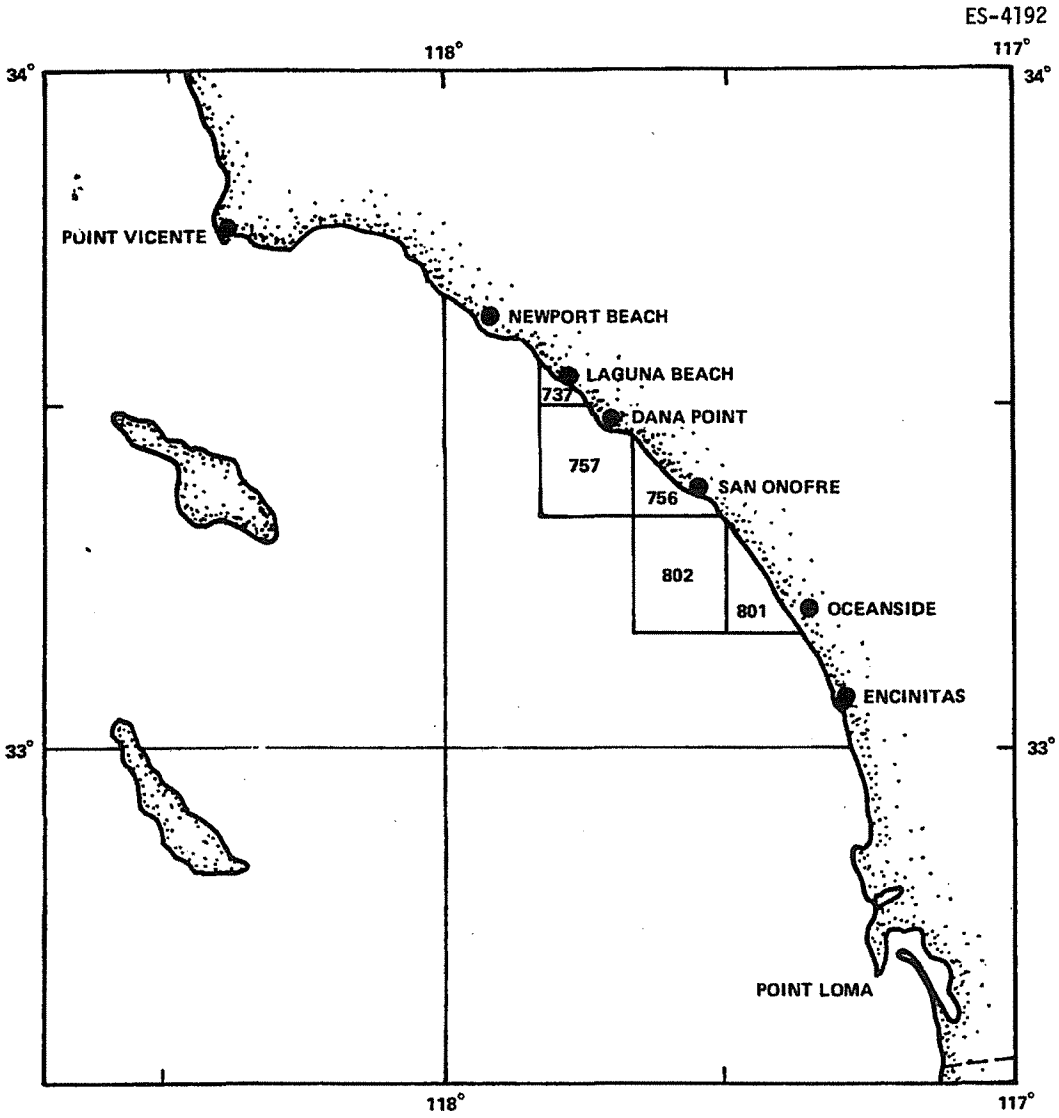

Fig. 2.8. California Department of Fish and Game catch statistic blocks in the vicinity of San Onofre. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis – 1976*, June 1977.

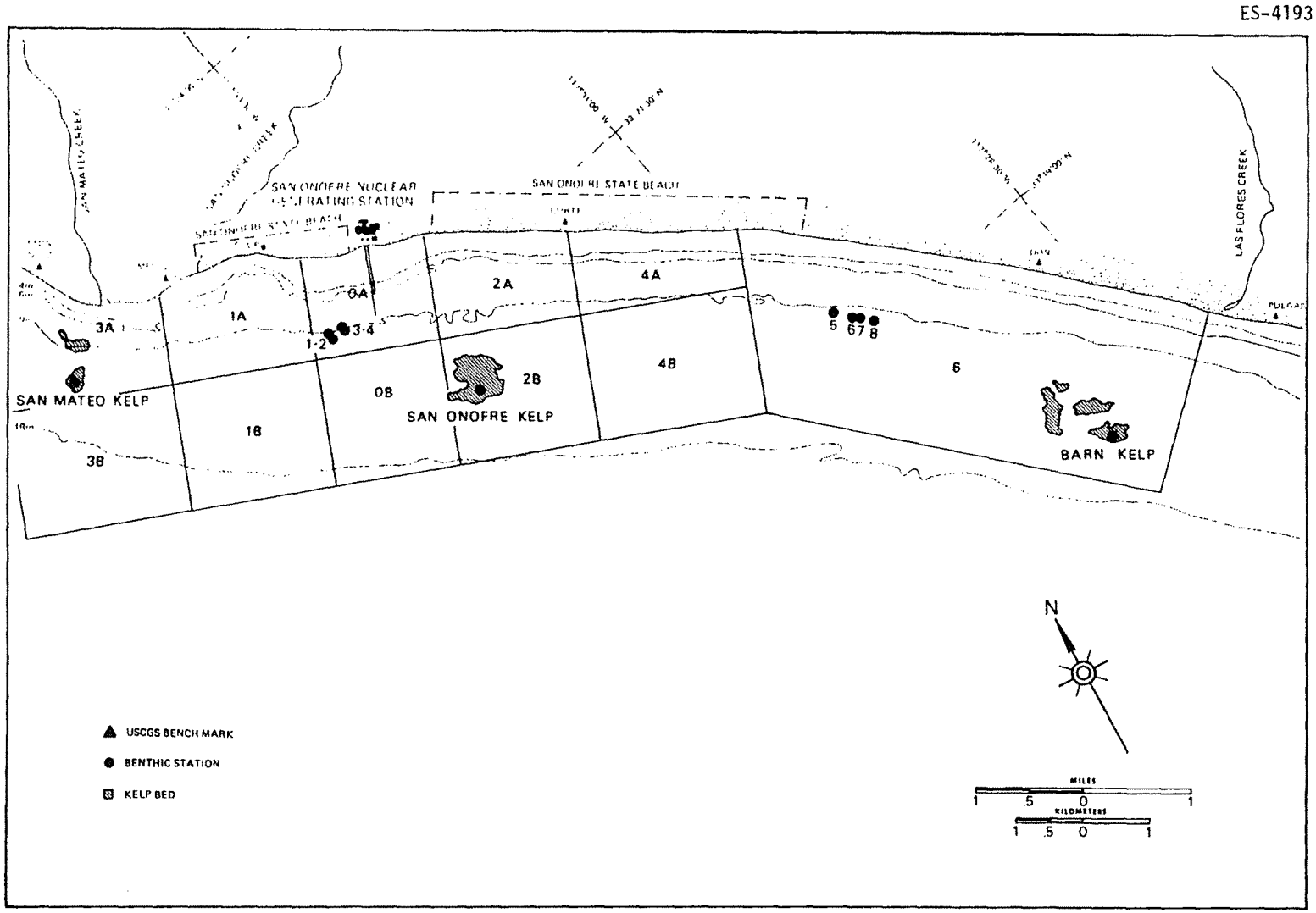

Fig. 2.9. Environmental Technical Specifications environmental surveillance zones, benthic station locations, San Onofre Nuclear Generating Station Unit 1. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976,* June 1977.

Table 2.6. Trophic composition (percent) of benthic taxa at discharge (zone 0A) and control (zone 6) based on the number of taxa of each trophic type present during 1975

Trophic types	April 10–18		July 15–18		October 13–17	
	Zone 0A	Zone 6	Zone 0A	Zone 6	Zone 0A	Zone 6
Primary producers	23	18	35	40	30	29
Suspension feeders	34	43	35	42	33	37
Grazers	10	3	12		12	5
Scavengers	13	13	7	10	12	11
Predators	20	22	12	7	13	18

Source: Lockheed Marine Biological Laboratory, *San Onofre Nuclear Generating Station Unit 1, Annual Analysis Report, Environmental Technical Specifications, January – December 1975,* 1976.

Kelp bed stations were best distinguished by four taxa: the gastropod *Cypraea spadicea*, which occurred only at San Onofre Kelp Bed; the anthozoan *Corynactis* spp., which occurred predominately at San Mateo and Barn kelp beds; the annelid *Spiochaetopterus costarum*, which did not occur at San Onofre Kelp Bed; and the white abalone, *Haliotis sorenseni*, which occurred only at San Onofre Kelp Bed. Twelve taxa were considered predominant at kelp bed stations: *Chelyosoma productum*, *Conus californicus*, *Corallina/Haliptylon*, *Corynactis* spp., Crustose corallines (unident.), *Dioptra* spp., *Leucilla nuttingi*, *Lytechinus pictus*, *Mitrella carinata*, *Muricea californica*, Pagurids (unident.), and *Rhodymenia* spp.

Trophic composition based on the number of taxa at the kelp bed stations was similar among stations and was dominated by suspension feeders (e.g., barnacles, which feed by filtering out suspended material) and primary producers (algae) during all surveys (Table 2.7).

Table 2.7. Trophic composition (percent) of benthic taxa at San Mateo (SMK), San Onofre (SOK), and Barn (BK) kelp beds based on the number of taxa of each trophic type present during 1975

Trophic types	April 10–18			July 15–18			October 13–17		
	SMK	SOK	BK	SMK	SOK	BK	SMK	SOK	BK
Primary producers	22	19	24	26	21	25	30	18	26
Suspension feeders	49	36	41	38	36	59	43	38	45
Grazers	2	17	9	8	12		7	10	4
Scavengers	12	12	9	12	12	9	7	12	10
Predators	15	17	17	16	18	6	12	22	16

Source: Lockheed Marine Biological Laboratory, *San Onofre Nuclear Generating Station Unit 1, Annual Analysis Report, Environmental Technical Specifications, January – December 1975,* 1976.

1976 Data

Diving surveys of the epibenthic macrobiota were conducted quarterly during 1976 at the same 11 benthic stations. A total of 159 species or higher taxa, which were members of 11 major taxonomic groups, were identified during the four surveys.[27] A taxonomic summary of these data by station and by survey is presented in Tables IV-1 and IV-2, pp. 21-28 of ref. 26. Zones 0A and 6 contained twelve predominant taxa whose combined abundance accounted for 84.3% of the total percent cover and 65.1% of the total enumerated individuals.[27] Seven of the twelve predominant taxa consisted of large taxonomic categories that were not field identifiable to a lower taxon. These seven taxa included parvosilvosa, unidentified ectoprocts, unidentified crustose coralline algae, and unidentified hydroids, rhodophytes, pelecypod siphons, and pagurids. These large taxonomic groups totaled 72% of the total percent cover and 20% of the total enumerated individuals for the entire year's data.[27] The magnitude of the abundances of these large taxonomic groups may be somewhat misleading, however, because each of these categories can contain members of several different species.[27]

The predominant taxa identified to at least the generic level consisted of *Rhodymenia* spp., *Bryopsis hypnoides*, *Diopatra ornata*, *Muricea californica*, and *Patiria miniata*. The distribution of these taxa among zones and stations is presented in Table V-12, p. 68 of ref. 27. The abundance of all of these taxa differed significantly between zones; *Rhodymenia* spp. and *Patiria miniata* were significantly more abundant in zone OA, whereas *Bryopsis hypnoides*, *Diopatra ornata*, and *Muricea californica* were significantly more abundant in zone 6. None of these taxa differed significantly among surveys.

A greater degree of similarity in both species composition and abundance was found within zones than between zones. Distribution of the anthozoan *Murica californica* and the rhodophyte *Prionitis* spp. contributed the greatest to the differences between zones OA and 6 in both years. Also in both 1975 and 1976, *M. californica* and the polychaete *Diopatra ornata* were significantly more abundant in zone 6. Species composition of the San Onofre Kelp Station was generally more similar to zone OA stations than to the other kelp bed stations; this is much the same as the 1975 survey data.

No significant differences existed between zones or kelp bed stations in the distribution of taxa among trophic levels during 1975 or 1976.

Aerial infrared kelp survey

An aerial infrared kelp survey revealed that both Barn and San Onofre kelp beds showed a slight increase in total area during 1975 (Fig. 2.10). All of the kelp beds increased in size between February and May 1976 (Fig. 2.10). During the period May to September 1976, Barn and San Onofre kelp beds underwent an 80 and 92% decrease respectively.[27] At the time of the November 1976 survey, Barn Kelp Bed had increased to 77% of the area it had covered during the May survey, whereas San Onofre Kelp Bed again underwent a slight decrease.[27] San Mateo Kelp Bed remained essentially the same. The same general trends were encountered during mapping of the kelp beds by electronic positioning during 1975 and 1976 as part of the construction surveillance program for SONGS 2 & 3.

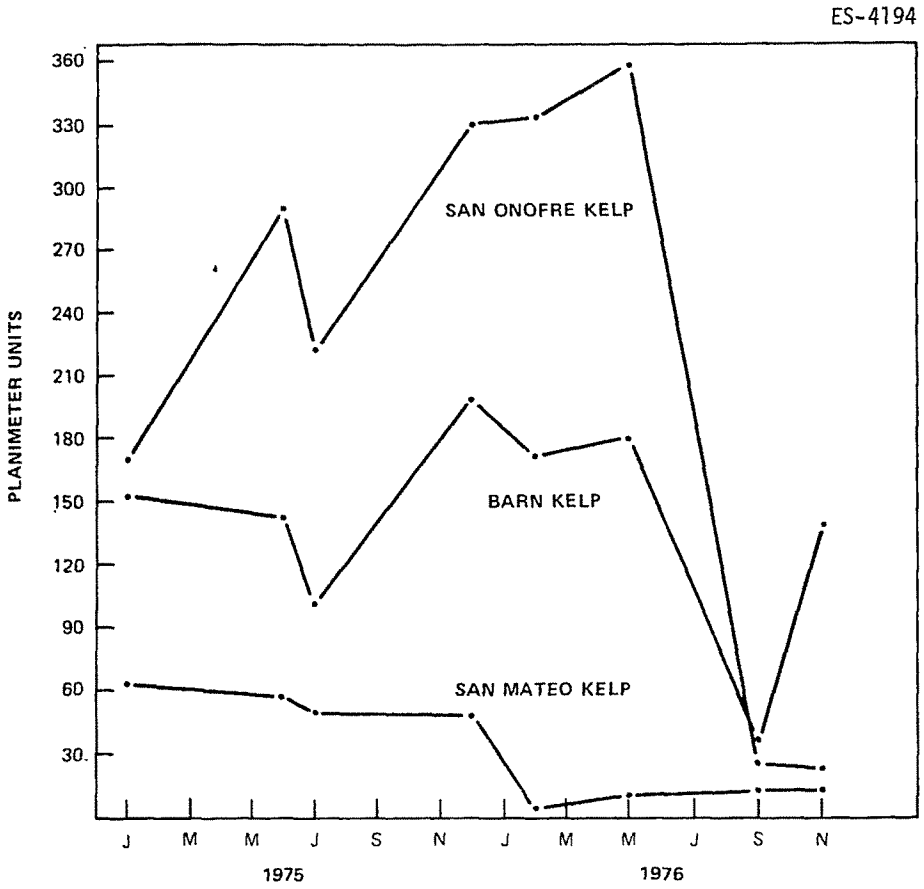

Fig. 2.10. Estimated relative total canopy area of San Mateo, San Onofre, and Barn kelp beds during 1975 and 1976, based on planimeter integration of aerial infrared photographs. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976*, June 1977.

Historical accounts of changes in kelp bed canopy areas throughout southern California have shown changes in magnitude equal to or much greater than those observed during this study, often over a short period of time.[27]

2.5.2.4 Intertidal community

1975 Data

During four intertidal surveys in 1975, 106 species or higher taxa representing 12 major taxonomic groups were observed at the five intertidal stations (Fig. 2.11).[25] These taxa are listed in Appendix XII, Tables 1 and 2, p. 246-52 of ref. 25. A comparison of the data collected in 1975 with historical data indicates that the fauna and flora encountered are typical inhabitants of this geographical area.[25] Phaeophytes, rhodophytes, and mollusks consistently exhibited the greatest number of taxa throughout the year at all stations. The distribution of five taxa were found to contribute significantly to the variability among stations: the rhodophytes *Corallina/Haliptylon, Pterocladia/Gelidium, Laurencia* spp.; the spermatophyte *Phyllospadix* spp.; and the anthozoan *Anthophleura* spp. Seventeen taxa, the majority of which were algae, were both common and abundant. The most abundant of these seventeen taxa were *Corallina/Haliptylon, Ulva* spp., and *Zonaria farolwii.*

Six predominant taxa exhibited distributions that varied significantly among stations, but no patterns that interrelated these differences were obvious. These six taxa were the anemone *Anthopleura* spp.; the rhodophytes *Corallina/Haliptylon, Lithothrix aspergillum, Pterocladia/Gelidium*; and the phaeophytes *Sargassum* spp. and *Zonaria farlowii.*

1976 Data

Quarterly intertidal sampling was also conducted in 1976. A taxonomic summary of these data by survey and station is presented in Table VI-1, pp. 35-38 of ref. 26.

Predominant taxa identified to at least the generic level were *Sargassum* spp., *Mitrella carinata, Macron lividus, Anthopleura elegantissima, Corallina/Haliptylon, Zonaria farlowii,* and *Dictyota/Pachydictyon.* The distribution of the abundance of these organisms for each station and for each survey is presented in Table VII-11, p. 104 of ref. 27. No significant differences were found in the abundance of *Dictyota/Pachydictyon, Macron lividus,* and *Mitrella carinata* among stations. The distribution of four taxa — *Corallina/Haliptylon, Zonaria farlowii, Sargassum* spp., and *Anthopleura elegantissima* — displayed statistically significant differences in abundance among stations. *Corallina/Haliptylon* was most abundant at station 5, *Zonaria farlowii* at stations 2 and 4, and *Sargassum* spp. was at station 3. The greatest number of *A. elegantissima* was observed at stations 1, 4, and 5.

The rhodophyte *Corallina/Haliptylon* contributed the most to the differences among stations during both 1975 and 1976 and was also predominant both years. During both years this taxon was more abundant at the station farthest downcoast of the SONGS 1 discharge and least abundant at the two stations upcoast of the discharge. Three other predominant taxa, *Sargassum* spp., *Zonaria farlowii,* and *Anthopleura elegantissima* exhibited statistically significant differences in abundance among stations during both 1975 and 1976. *Dictyota/Pachydictyon* exhibited no statistically significant differences in abundance among stations during either year.

No statistically significant difference in the distribution of taxa among trophic types existed among intertidal stations during either year. During both years, the intertidal communities of all stations were dominated by primary producers (algae).

The study area is accessible to considerable human intervention in the form of organism collecting in the tide pools, clam digging, surfing, and walking through intertidal cobble beds. Because of their accessibility via public roads, the stations nearest and upcoast of the generating station receive the heaviest use; the other stations receive less use because they are accessible only via hiking trail or the beach. Overall beach use in the study area is indicated by the San Onofre Beach State Park (which includes the study area) estimates of park use for 1976, which indicate that 378,483 people used the beach in the study area. The study area is also used heavily by clam diggers collecting littleneck clams, because this area is probably one of the most extensive and productive in the state. The large excavations and overturned cobble that result from clam digging may have considerable effect on the intertidal biota by disturbing habitats and interfering with mating activities.

Aerial infrared survey data on three occasions in 1976 revealed possible shore impingement of the 0.6°C (1°F) elevated temperature field at the four stations nearest the generating station. The 2°C (4°F) elevated field appeared to contact the shore immediately upcoast of the generating station but did not impinge on any intertidal cobble stations. Shore impingement of the elevated temperature field was not indicated in 1975.

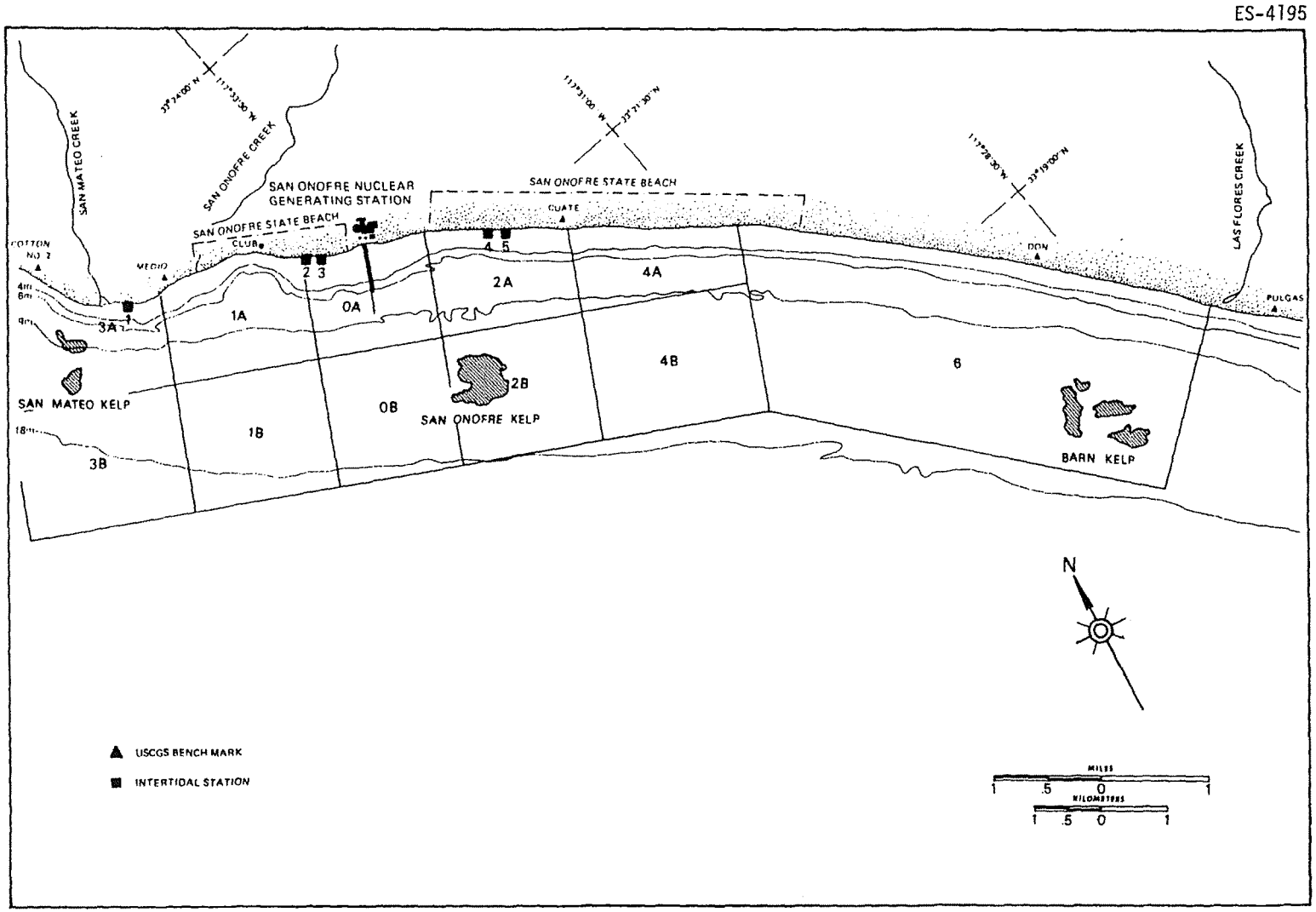

Fig. 2.11. Environmental Technical Specifications intertidal station locations and environmental surveillance zones, San Onofre Nuclear Generating Station Unit 1. Source: Lockheed Center for Marine Research, *San Onofre Nuclear Generating Station Unit 1, Environmental Technical Specifications, Annual Operating Report, Vol. IV, Biological Data Analysis — 1976*, June 1977.

Based on a comparison of the abundance of predominant taxa among stations and the similarity of stations during the study, the intertidal communities under study did not display a great deal of temporal variation during either 1975 or 1976. Minimal differences were detected among surveys with respect to the abundance of predominant taxa. These differences did not appear related to the offline condition of the generating station which occurred during two of four surveys.

2.6 BACKGROUND RADIOLOGICAL CHARACTERISTICS

The Environmental Protection Agency[29] has reported average background radiation dose equivalents for California as 96.6 millirems per person per year. The average background for San Diego is 104.6 millirems per person per year. (This is higher than the state average because of natural radioactivity in granitic rocks in the area.) Of the total for California, 42.2 millirems per person per year was attributed to cosmic radiation. Of this total external gamma radiation (primarily from K-40 and the decay products of the uranium and thorium series) was estimated at 36.4 millirems per person per year. The remainder of the whole body dose is due to internal radiation (mostly H-3, C-14, K-40, Ra-225, and Ra-228 and their decay products), which was estimated to average 18 millirems per person per year.

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**Available from NRC/GPO Sales Program, Washington, DC 20555 and the National Technical Information Service, Spingfield, VA 22161.
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3. THE PLANT

3.1 RESUME

The domestic water supply and service water system will now be supplied by the Tri-Cities Municipal Water District rather than obtained from flash boilers as previously contemplated (Sect. 3.2.1). The major design changes that have environmental effects relate to the heat dissipation system. The revised heat dissipation system is described in Sect. 3.2.2. These revisions and others result in a change in the chemical effluents and are discussed in Sect. 3.2.4.1. Changes in the radioactive waste treatment systems are described in Sect. 3.2.3. Significant changes have occurred in the transmission lines; the revised transmission line system is described in Sect. 3.2.5.

3.2 DESIGN AND OTHER SIGNIFICANT CHANGES

3.2.1 Plant water use

Both fresh water and seawater will be used at SONGS 2 & 3. About 0.05 m^3/sec (1.65 cfs) of fresh water will be supplied by the Tri-Cities Municipal Water District for the domestic water supply system and service water system. The major portion of the domestic water requirement will be used for landscaping and associated functions. The service water system will provide water to miscellaneous systems and equipment throughout the operating areas. A large amount of this fresh water will be used at the intake screenwell area for cooling of pump bearings.

The source of seawater is the Pacific Ocean. Cooling water will be withdrawn from the ocean at a rate of 53.5 m^3/sec (1887 cfs). This water will be used for turbine plant cooling, component cooling, main condenser cooling, and for the fish handling system. The turbine plant and component cooling water systems are closed-cycle systems. Heat is transferred to the seawater by heat exchangers.

Further details of the plant water use are given in Fig. 3.1.

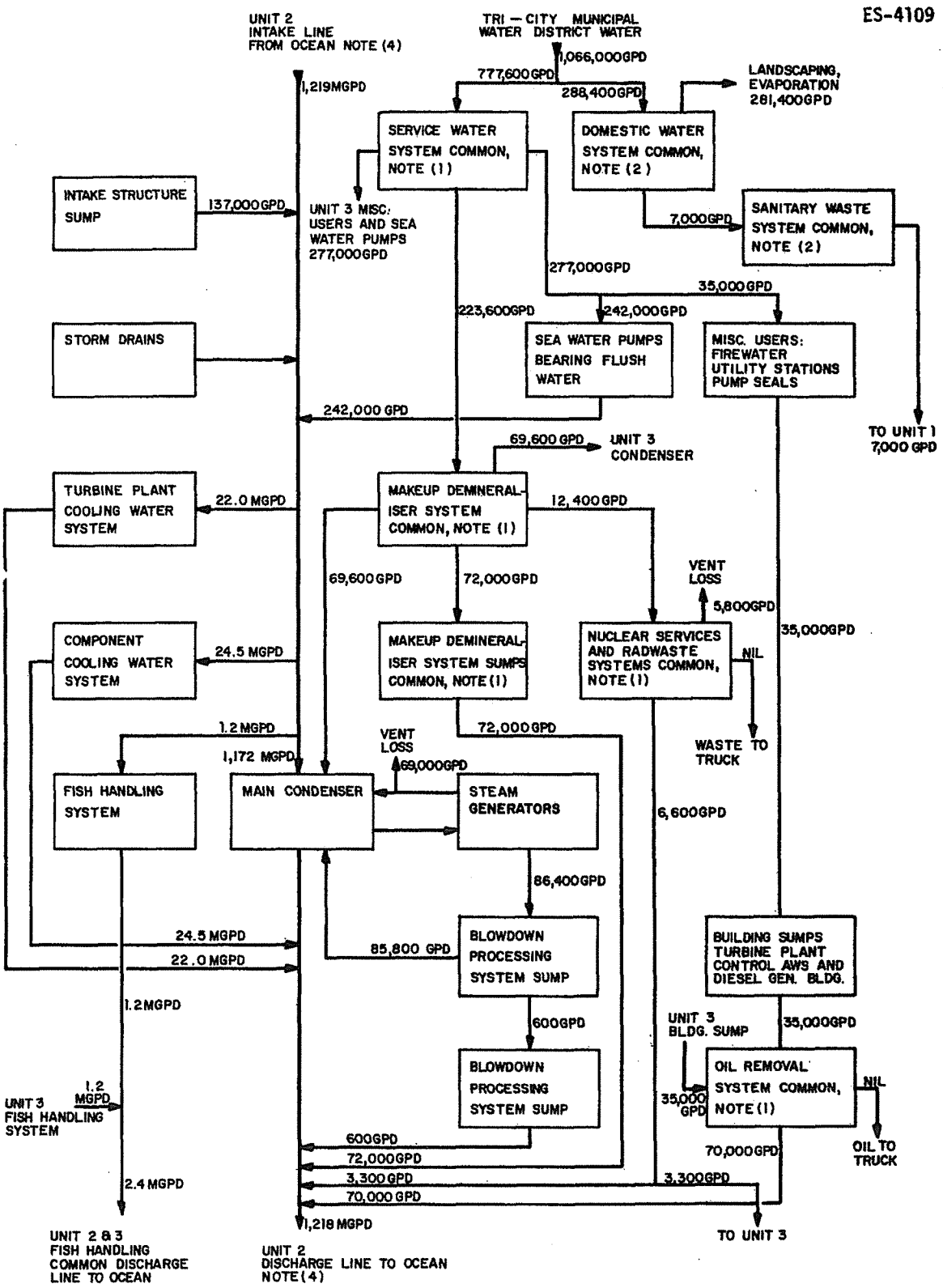
3.2.2 Heat dissipation system

Plant waste heat will be dissipated by means of a separate once-through cooling system for each unit. About 53.5 m^3/sec (1887 cfs) of seawater per unit is withdrawn from the ocean through a velocity-cap-type submerged intake, located about 975 m (3200 ft) from shore. The velocity cap is circular with a 15-m (50-ft) diameter. The lower lip of the cap is 2.7 m (9 ft) from the ocean bottom, and the interior separation of the upper and lower lip is 2.1 m (7 ft). The intake velocity will be about 0.5 m/sec (1.7 fps). The total water depth at the intake region is 9.1 m (30 ft). The intake structure is illustrated in Fig. 3.2.

Each unit has a Seismic Category I auxiliary intake structure to provide emergency core cooling. These structures are located approximately 32 m (100 ft) shoreward of the primary intake structures. Each structure has a 3.66 m (4-ft) ID vertical riser that extends upward from the intake conduit and is equipped with a velocity cap that is similar in design to that of the primary system. During normal operating conditions, water is estimated to enter the structure at 0.38 m/sec (1.3 fps). Details of these structures are shown in Fig. 3.2.

After passing through the intake, the cooling water for each unit will travel to the plant via a 5.5-m (18-ft) ID pipe that becomes a 4.9-m (16-ft) square box conduit at the shoreline. Here, water is delivered to a forebay leading to the intake structure screenwell. The water will then pass through a series of baffles as the channel widens to about 12.5 m (41 ft). At this point, the channel narrows and the main volume of water turns through an angle of 70°, where it passes through six adjacent sets of traveling bars and screens. A small volume of water does not turn towards these bars and screens but continues along the narrowing channel and enters the fish collection chamber.

Each screenwell is outfitted with traveling bar racks behind which are 1-cm (3/8-in.) mesh traveling screens. In the forebay behind the traveling screens are four 1/4-capacity vertical, wet pit,



Notes: (1)Common system, serves Units 2&3
(2)Common system, serves Units 2&3, AWS bldg
(3)MGPD, millions of gallons per day
(4)Unit 3 flows are same as Unit 2
(5)To convert GPD to liters per day, multiply by 3.7854

Fig. 3.1. Plant water use. Source: ER, Fig. 3.3-1.

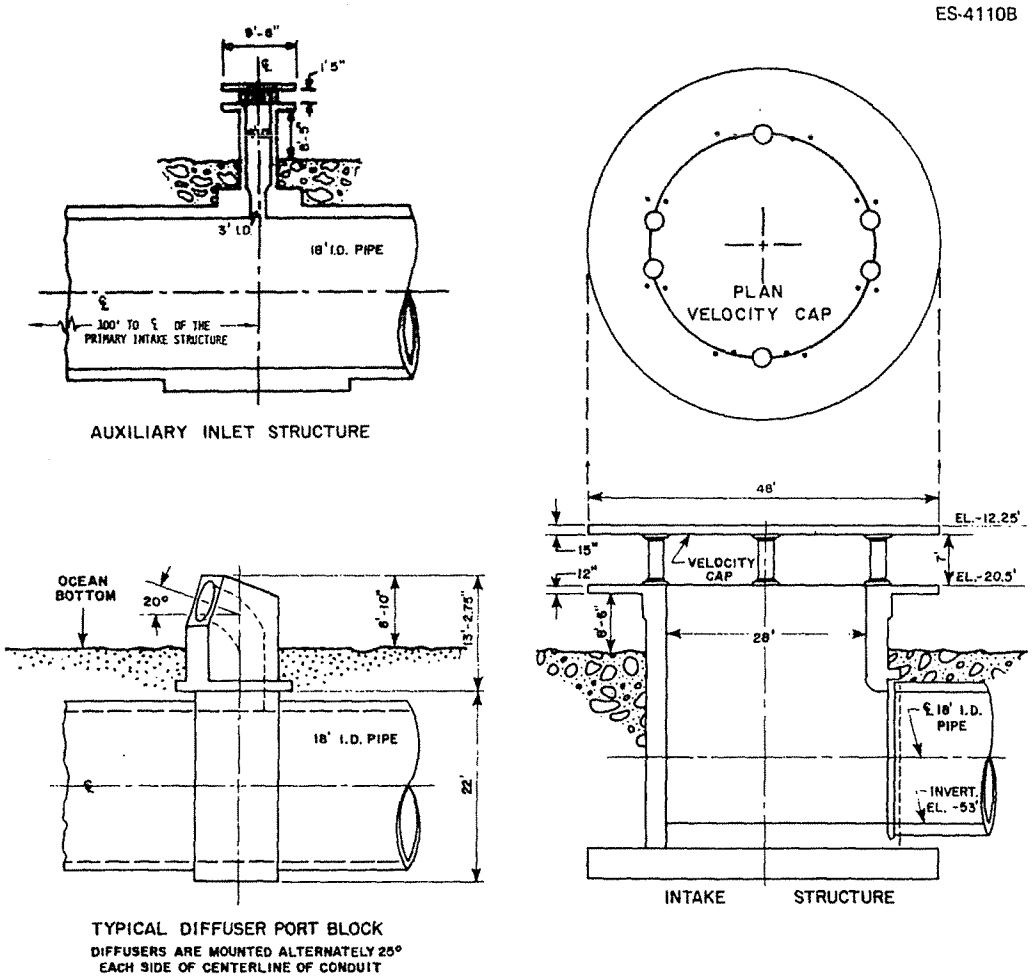


Fig. 3.2. Design details of the velocity-cap intake structure and typical diffuser port. Source: ER, Fig. 3.4-2.
(To convert ft to m, multiply by 0.3048.)

circulating water pumps. These pumps provide 50.3 m^3/sec (1775 cfs) of water to a two-shelled condenser. This water experiences an 11.1°C (20°F) temperature rise across the condenser. About 2.1 m^3/sec (75.8 cfs) of water is withdrawn prior to reaching the condenser for use in the turbine plant cooling loop and the fish return systems. Details of the intake screenwell structure are shown in Fig. 3.3.

After passing through the condenser, the heated water will pass through the Amertap strainer, which collects the Amertap balls used for cleaning the condenser tubes. Subsequently, this heated water is supplemented by 1.1 m^3/sec (37.9 cfs) of water from the turbine plant cooling system and screenwashing. The water then passes into a seal well weir chamber designed to ensure proper siphon flow through the condenser. This chamber terminates into a 4.9-m (16-ft) square box conduit to which 1.1 m^3/sec (37.9 cfs) of nuclear component cooling water flow is added. At the shoreline, this square conduit joins a 5.5-m (18-ft) ID buried pipe that conveys the heated water to the diffuser.

The diffuser for each unit is about 762 m (2500 ft) in length, and each diffuser has 63 ports spaced 12 m (40 ft) apart. Each port extends 1.8 m (6 ft) from the bottom and is oriented from the horizontal at an angle of 20°. The ports are alternately aligned at angles of ±25° from the offshore direction. The port throat diameter will vary from 56 cm (22 in.) to 61 cm (24 in.), and the maximum discharge velocity from any port will be 4 m/sec (13 fps). The Unit 3 diffuser begins about 1150 m (3800 ft) from shore, and the Unit 2 diffuser begins about 1950 m (6400 ft) from shore. The Unit 2 diffuser is located about 220 m (722 ft) upcoast of the Unit 3 diffuser.

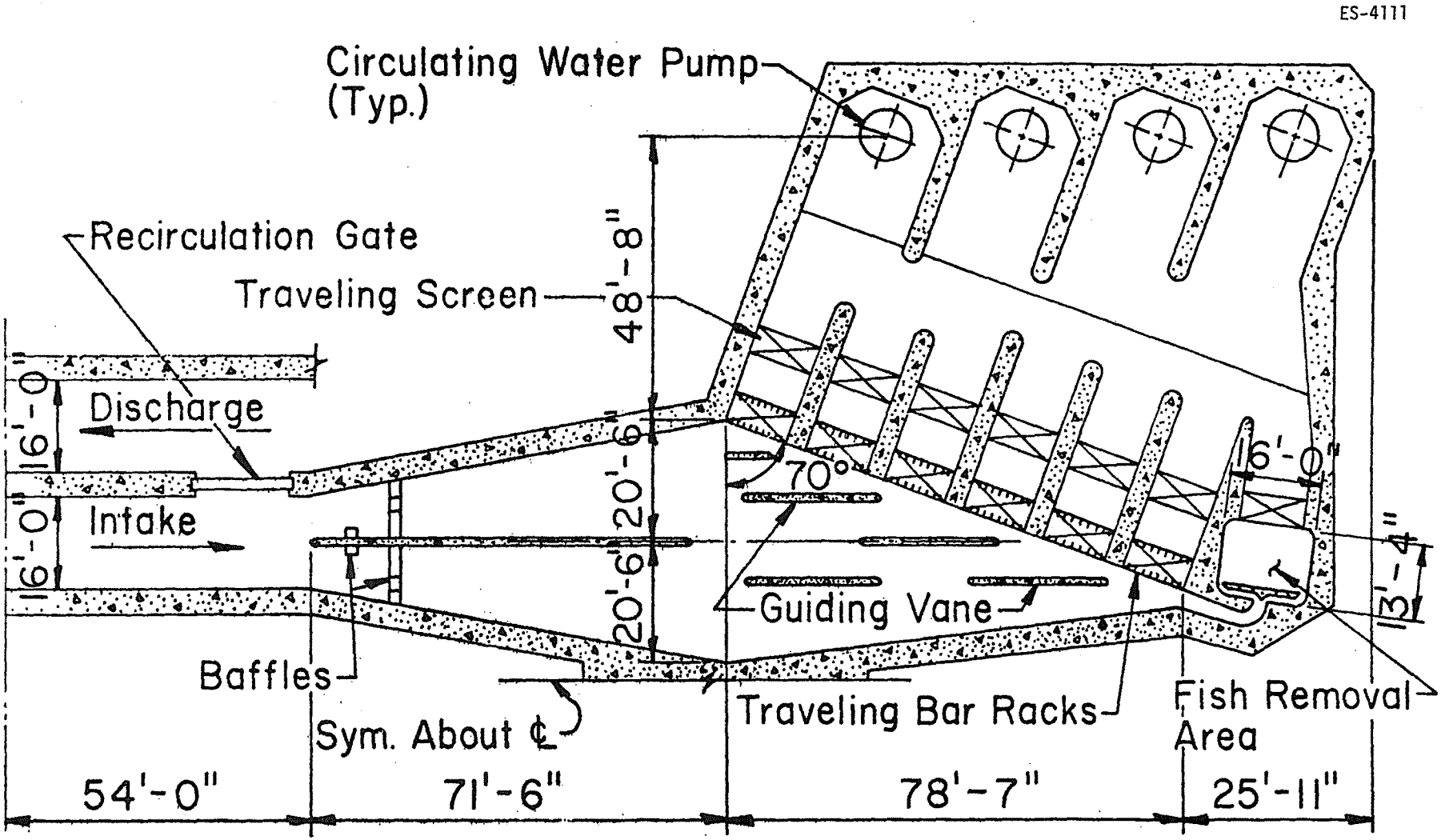


Fig. 3.3. Design details of the intake screenwell area. Source: ER, Fig. 3.4-3.
(To convert ft to m, multiply to 0.3048; to convert in. to mm, multiply by 25.4.)

To control biofouling, the circulating water system is designed to allow heated water to reach all portions of the system. To accomplish this, an intake/discharge crossover gate allows seawater to be drawn into the plant through the diffusers and the heated water to be discharged via the intake. To achieve the temperature required to control biofouling, each unit has a recirculation and crossover gate. This system allows the cooling water requirement to be reduced by recirculating a portion of the heated water through the condenser. The temperature rise will be proportional to the degree of recirculation. During diffuser heat treatment, the circulating water follows the normal path but with recirculation. Intake heat treatment is performed by opening the intake/discharge crossover gate to reverse the flow direction, as well as to allow recirculation. Circulating water flow paths for the various plant operations are shown in Fig. 3.4.

A fish return system minimizes the mortality of fish that have reached the intake screenwell area. The louvered bar racks are designed and oriented in such a way that the fish are encouraged to follow a narrowing channel terminating at a fish holding chamber. This chamber is equipped with a vertical elevator basket that periodically rises slowly from the bottom to capture the fish in the chamber. Subsequently, the fish are flushed from the basket with seawater into a 1.2-m (48-in.) diameter pipe, which returns them to the ocean via an offshore submarine outfall.

3.2.3 Radioactive waste systems

During the operation of SONGS 2 & 3 radioactive material will be produced by fission and by neutron activation of corrosion products in the reactor coolant system. From the radioactive material produced, small amounts of gaseous and liquid radioactive wastes will enter the waste streams. These streams will be processed and monitored within the station to minimize the quantity of radioactive nuclides ultimately released to the atmosphere and to the Pacific Ocean.

The waste handling and treatment systems to be installed at the station are discussed in the applicant's Final Safety Analysis Report (FSAR) and in the ER. Information submitted to meet the requirements of Appendix I to 10 CFR Part 50 is contained in both the FSAR and ER. In these documents, the applicant has presented an analysis of the radioactive waste treatment systems and has estimated the annual release of radioactive waste materials in liquid and gaseous effluents resulting from normal operation.

In the following paragraphs, the radioactive waste treatment systems are described, and an analysis is given based on the staff's model of the applicant's proposed radioactive waste treatment systems. The staff's model has been developed from a review of available data from operating nuclear power plants, adjusted to apply over a 30-year operating life. The reactor coolant activities and flow rates used in the staff's analyses are based on experience and data from operating reactors. As a result, the parameters used in the model and the calculated releases vary somewhat from those used in the applicant's evaluation.

On April 30, 1975, the NRC announced its decision in the rulemaking proceeding (RM 50-2) concerning numerical guides for design objectives and limiting conditions for operation to meet the criterion "as low as is reasonably achievable" for radioactive material in light-water-cooled nuclear power reactor effluents. This decision is implemented in the form of Appendix I to 10 CFR 50.[1] To effectively implement the requirements of Appendix I, the NRC staff has reassessed the parameters and mathematical models used in calculating releases of radioactive materials in liquid and gaseous effluents in order to comply with the Commission's guidance.

This guidance directed that current operating data, applicable to proposed radwaste treatment and effluent control systems for a facility, be considered in the assessment of the input parameters. These parameters, models, and their bases are given in NUREG-0017.[2]

By letter of February 25, 1976, the applicant was requested to submit additional information concerning the means proposed to keep levels of radioactive materials in effluents from SONGS 2 & 3 to unrestricted areas "as low as is reasonably achievable," in conformance with the requirements of Appendix I to 10 CFR 50. The applicant was also given the option of providing either a detailed cost benefit analysis or demonstrating conformance to the guidelines given in the September 4, 1975, Annex to Appendix I. The applicant chose to perform the cost-benefit analysis required by Sect. II.D of Appendix I to 10 CFR Part 50.

The staff performed an independent evaluation of the applicant's proposed methods to meet the requirements of Appendix I. The evaluation consisted of (1) a review of the information provided by the applicant, (2) a review of the applicant's proposed radwaste treatment and effluent control systems, (3) the calculation of new source terms based on models and parameters as given in NUREG-0017,[2] and (4) a cost-benefit analysis to determine the cost-effectiveness of proposed augments to the liquid and gaseous radwaste treatment systems.

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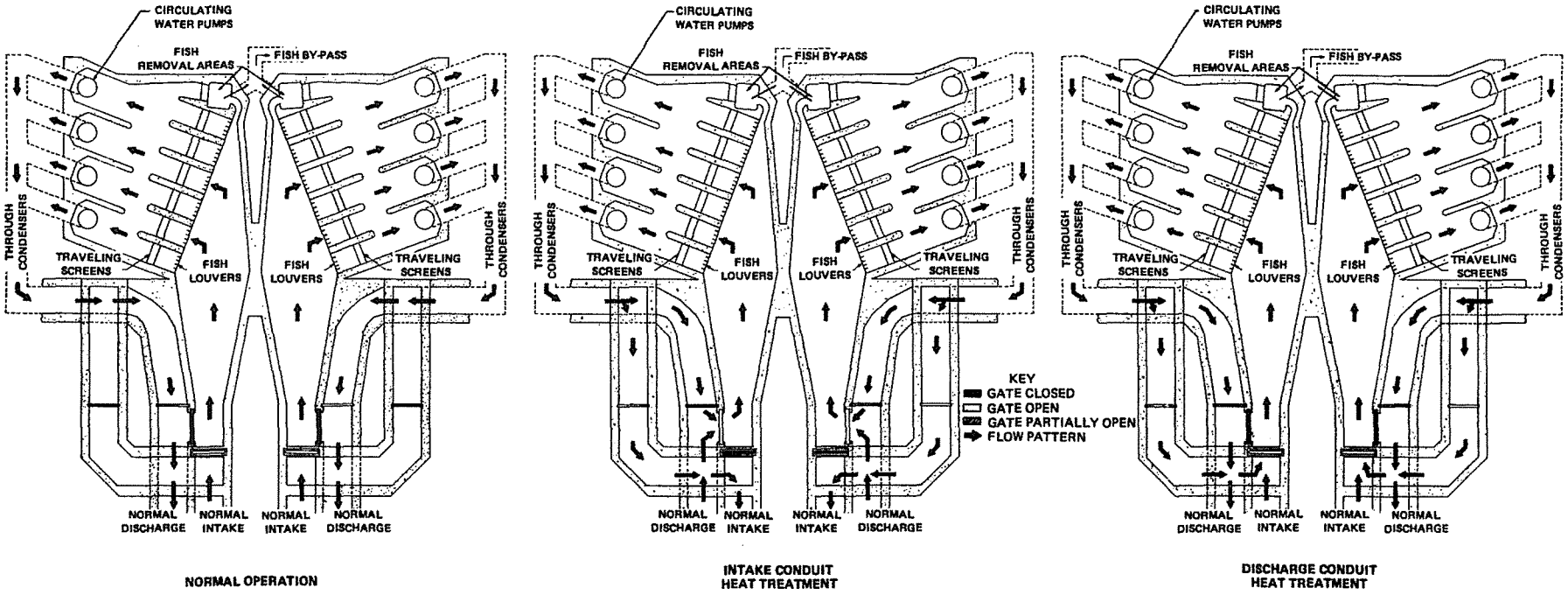

Fig. 3.4. Circulating water flow paths for normal plant operation, intake heat treatment, and discharge heat treatment. Source: Fig. 2-9 of *Thermal Effects Study Final Summary Report, San Onofre Generating Station Units 2 & 3 Volume I*; Environmental Quality Analysts and Marine Biological Consultants, September 1973.

On the basis of the following evaluation, the staff concludes that the liquid and gaseous radio-active waste treatment systems for SONGS 2 & 3 are capable of maintaining releases of radioactive materials in liquid and gaseous effluents to "as low as is reasonably achievable" levels in accordance with 10 CFR Part 50.34a, and meet the requirements of Sect. II.A, II.B, II.C, and II.D of Appendix I to 10 CFR Part 50.[1]

3.2.3.1 Liquid radioactive waste treatment system

The liquid radioactive waste treatment system, which is shared by Units 2 and 3, will consist of equipment and instrumentation necessary to collect, process, monitor, recycle, or dispose of potentially radioactive liquid wastes generated during normal operation including anticipated operational occurrences. Liquid radioactive waste will be processed on a batch basis to permit optimum control of releases. Prior to release, samples will be analyzed to determine the types and amounts of radioactivity present; on the basis of the results, the waste will be recycled for reuse in the plant, retained for further processing, or discharged under controlled conditions to the Pacific Ocean via the circulating water outfall. A radiation monitor will automatically terminate liquid waste discharge if radiation measurements exceed a predetermined level in the discharge line. A schematic diagram of the liquid radioactive waste treatment system is given in Fig. 3.5.

The liquid radioactive waste treatment system will consist of the coolant radwaste (boron recovery) system, the miscellaneous (aerated) waste system, and the chemical waste system. The plant does not have a separate laundry and hot shower system; this function is combined in the aerated waste system.

The coolant radwaste system is shared by Units 2 and 3 and will process shim bleed and equipment drain wastes collected inside the reactor containment. The principal system components will be a gas stripper, four primary coolant radwaste holdup tanks, two preholdup demineralizers, two intermediate holdup tanks, two evaporator feed demineralizers, one evaporator, two polishing demineralizers, and two makeup storage tanks.

The miscellaneous liquid waste system will process non-reactor-grade liquid wastes, including floor drains, equipment drains containing non-reactor-grade water, and building sumps. After treatment these wastes will be transferred to the waste monitor tanks for reuse in the plant or for discharge to the Pacific Ocean via the circulating water outfall. The principal miscellaneous liquid waste system components will consist of one collection tank, four demineralizers, an optional evaporator, and two recycle monitor tanks. The liquid process stream may be routed through the optional evaporator if additional treatment is indicated.

The chemical waste system will process non-reactor-grade liquid wastes with high chemical content, including demineralizer regenerant solutions and laboratory drains. After treatment, these wastes will be transferred to the waste monitor tanks for reuse in the plant or for discharge to the Pacific Ocean via the circulating water outfall. The principal chemical waste system components will consist of one collection tank, an evaporator, two demineralizers, and two recycle monitor tanks.

The steam generator blowdown will be processed continually through a flash tank, with the liquid being cooled in a heat exchanger before passing through a filter and two demineralizers in series. The processed liquid is piped to the main condenser. The flashed steam is routed to the third point heater. The processed water will be reused in the plant, but may be discharged to the circulating water outfall under certain circumstances provided that radioactivity concentrations are below predetermined values.

Coolant radwaste system

Primary coolant will be withdrawn from the reactor coolant system at about 151 liters/min (40 gpm) and processed through the chemical and volume control system (CVCS). The letdown stream will be cooled, reduced in pressure, filtered, and processed through one of two mixed bed demineralizers. At the end of core cycle life this letdown stream will be passed through an anion demineralizer to remove boron when the feed and bleed mode of operation is not practicable. Radionuclide removal by the CVCS was evaluated by assuming 151-liters/min (40-gpm) letdown flow at primary coolant activity (PCA) through one mixed bed demineralizer (Li_3BO_3 form), and a continuous 30-liters/min (8-gpm) flow through one mixed bed demineralizer (H_3BO_3 form) for lithium control. The CVSC will be used to control the primary coolant boron concentration by diverting a side stream of about 3,785 liters/day (1000 gpd) per reactor of the treated letdown stream to the shared coolant radwaste system as shim bleed.

The shim bleed from the letdown stream will be processed through two mixed bed demineralizers (Li_3BO_3 form) in series, through a gas stripper, and routed to one of four 227,124-liter (60,000-gal) radwaste primary holdup tanks. Valve leakoffs and equipment drain wastes in the

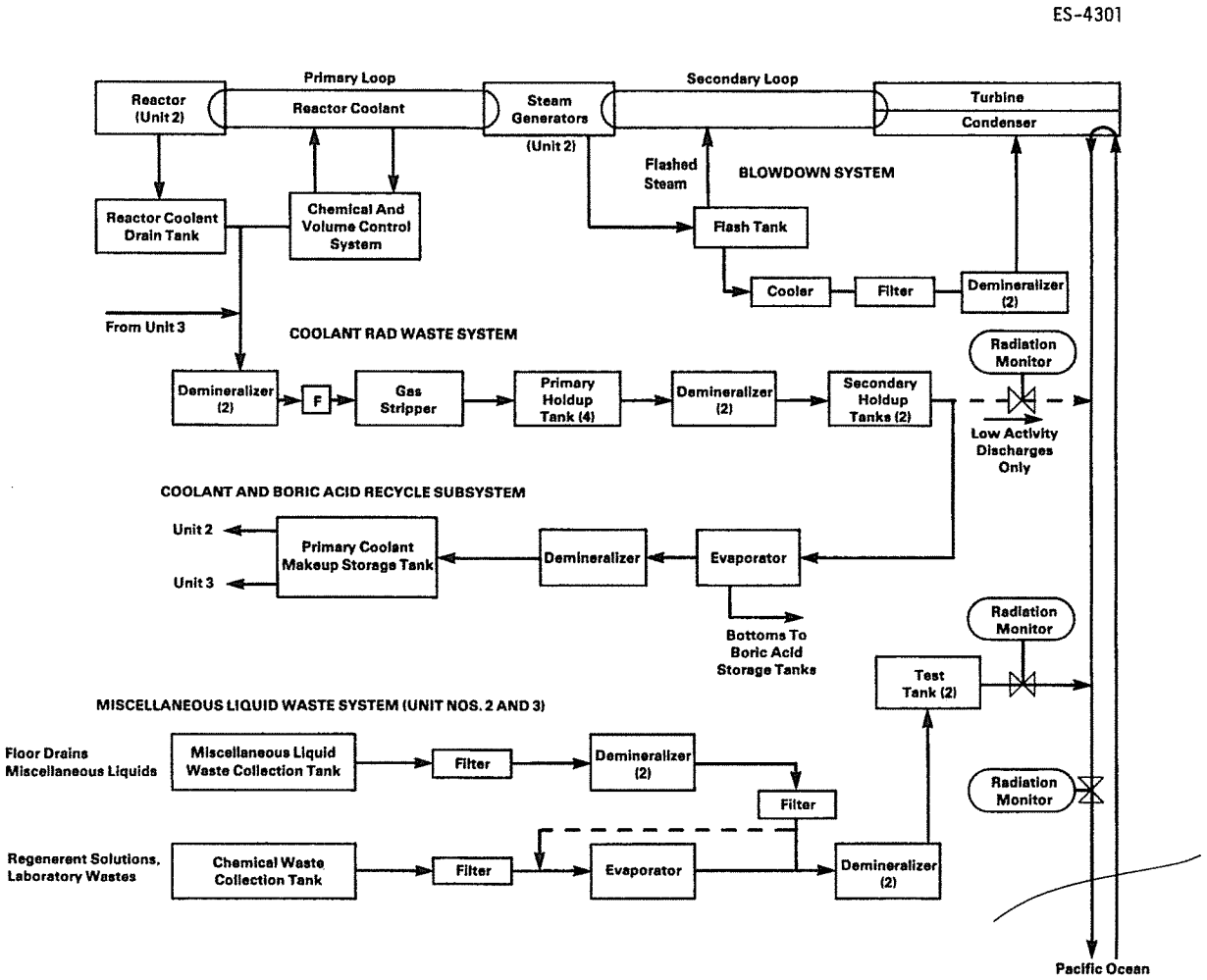

Fig. 3.5. SONGS 2 & 3 radioactive liquid waste treatment systems.

reactor containment, as well as excess spent fuel pit water, will be processed as above and will be transferred to the radwaste primary holdup tanks where it will be combined with the shim bleed. These streams will form the inputs to the coolant radwaste system and will be processed batchwise from the four radwaste primary holdup tanks. The combined streams are next processed batchwise through two mixed bed demineralizers (H_3BO_3 form) and routed to one of two 454,248-liter (120,000-gal) radwaste secondary holdup tanks. From the radwaste secondary holdup tanks, the processed liquid can be recycled to the reactor coolant makeup tank, can be discharged to the circulating water outfall if radioactivity concentrations are within established limits, or can be processed further through a boric acid evaporator and mixed bed deborating and polishing demineralizers.

In the latter mode of operation, the boric acid recovered in the evaporator bottoms can be recycled. Because the system is capable of continuously operating in the boron recovery mode with inputs from both Units 2 and 3, and because the staff's source term calculation assumes a failed fuel rate of 0.12%, the staff's evaluation was made on the basis of the system being operated in the boron recycle mode. The staff calculated the collection time in a radwaste secondary holdup tank to be about 38 days, based on a combined input flow rate of 9463 liters/day (2500 gpd) from Units 2 and 3. Based on an assumption of 80% tank capacity and process flow rate of 189 liter/min (50 gpm), the staff calculated the decay time during processing to be about 1.3 days. If the radioactivity is below predetermined value, the treated stream may be pumped to the waste monitor release tank and discharged. The staff assumed that 10% of the treated stream will be discharged to the circulating water outfall and to the Pacific Ocean because of anticipated operational occurrences and for tritium inventory control. The decontamination factors listed in Table 3.1 were applied for radionuclide removal in the coolant radwaste system. The concentrated bottoms from the evaporator and the spent resins from the demineralizers will be transferred to the radioactive solid waste system for disposal by burial offsite.

Miscellaneous liquid waste system

The miscellaneous liquid waste system of the liquid radioactive waste treatment system is designed to collect and treat non-reactor-grade water for reuse within the plant from auxiliary building sumps, the containment sumps, and other miscellaneous sources. These wastes will be collected in a shared 22,712-liters (6000-gal) waste holdup tank at an input flow rate of about 5300 liters/day (1400 gpd) per unit. The staff calculated the collection time to be about 1.7 days. The wastes will be processed through four series connected mixed bed demineralizers and collected in a 94,635-liter (25,000-gal) test tank. The staff calculated the decay time during processing to be about 0.03 days. If necessary, the stream can be diverted to the evaporator in the chemical waste system for additional treatment.

The decontamination factors listed in Table 3.1 were applied for radionuclide removal in the miscellaneous liquid waste system of the liquid waste treatment system. The contents of the treated stream will be sampled periodically, recycled for further treatment, recycled for in-plant use, or discharged. The staff assumed that 100% of the treated stream will be released to the Pacific Ocean.

Evaporator bottoms and spent resins will be transferred to the radioactive solid waste system for disposal by burial offsite.

Chemical waste system

The chemical waste system of the liquid radioactive waste treatment system is designed to collect and treat non-reactor-grade liquid wastes from laboratory drains and from the regeneration of demineralizers. These wastes will be collected in a shared 94,635-liter (25,000-gal) chemical waste tank and sampled and analyzed. The wastes will be treated through the chemical waste system evaporator and two series connected mixed bed demineralizers prior to entering the waste monitor tanks. The staff calculated the collection time to be about 25 days, based on an input flow of about 1514 liters/day (400 gpd) per unit, and a decay time during processing of about 0.1 day.

Turbine building drain

The turbine building drains will be released through a radiation monitor to the Pacific Ocean via the circulating water outfall without treatment. The monitor will automatically terminate liquid discharge if radioactivity exceeds a predetermined level. The staff assumed a release of 27,255 liters/day (7200 gpd) per reactor and that the wastes will be discharged without processing.

Table 3.1. Principal parameters and conditions used in calculating releases of radioactive material in liquid and gaseous effluents from SONGS 2 & 3

Reactor power level, MWt	3600
Plant capacity factor	0.80
Failed fuel, percent	0.12[a]
Primary system:	
Mass of coolant, lb	5.6×10^5
Letdown rate, gpm	40
Shim bleed rate, gpd	1×10^3
Leakage to secondary system, lb/day	100
Leakage to containment building	*b*
Leakage to auxiliary building, lb/day	160
Frequency of degassing for cold shutdowns, per year	2
Secondary system	
Steam flow rate, lb/hr	1.5×10^7
Mass of liquid steam generator, lb	1.7×10^5
Mass of steam/steam generator, lb	1.2×10^4
Secondary coolant mass, lb	2.2×10^6
Rate of steam leakage to turbine building, lb/hr	1.7×10^3
Containment building volume, ft^3	2×10^6
Annual frequency of containment purges, shutdown	4
Containment low volume purge rate (cfm)	2000
Iodine partition factors, gas/liquid	
Leakage to auxiliary building	0.0075
Leakage to turbine building	1.0
Main condenser/air ejector, volatile species	0.15

Liquid radwaste system decontamination factors (DF)

	Coolant radwaste system (CRS)	Miscellaneous liquid-waste system	Chemical-waste system
I	1×10^5	1×10^3	1×10^4
Cs, Rb	2×10^5	2×10^1	1×10^5
Others	1×10^6	1×10^3	1×10^5

	All nuclides except iodine	Iodine
Radwaste evaporator DF	10^4	10^3
Coolant radwaste system evaporator DF	10^3	10^2

	Anions	Cs, Rb	Other nuclides
Boron recycle feed demineralizer DF, H_3BO_3	10	2	10
Primary coolant letdown demineralizer DF, Li_3BO_3	10	2	10
Evaporator condensate polishing demineralizer, H^+OH^-	10	10	10
Mixed-bed radwaste demineralizer	10^2(10)	2(10)	10^2(10)
Steam generator blowdown demineralizer	10^2(10)	10(10)	10^2(10)
Containment building internal recirculation system charcoal filter DF, iodine removal			10
Main condenser air-removal system charcoal bed DF, iodine removal			10

[a] This value is constant and corresponds to 0.12% of the operating power fission product source term as given in NUREG-0017 (April 1976).

[b] One percent per day of the primary coolant noble gas inventory and 0.001% per day of the primary coolant iodine inventory.

(To convert lb to kg, multiply by 0.4536; to convert gals to liters, multiply by 3.7854; to convert ft^3 to m^3, multiply by 0.0283.)

Steam generator blowdown

The steam generator blowdown system for Units 2 and 3 will continuously process steam generator blowdown at an average flow rate of 325,545 liters/day (86,000 gpd) per reactor (design flow rate is 1136 liters/min (300 gpm)). The blowdown from the two steam generators for each unit will be directed to a common flash tank. The liquid will be cooled, filtered, and treated through two series connected demineralizers before being returned to the main condenser. The flashed steam will be condensed in the main condenser hotwell. The staff did not consider any direct releases from this system to the environment.

Liquid waste summary

Based on the staff's evaluation of the radioactive liquid waste treatment systems and the parameters listed in Table 3.1, the staff calculated the release of radioactive materials in liquid waste effluent to be about 1.1 Ci per year per reactor, excluding tritium and dissolved gases. The staff estimates that about 300 Ci per year per reactor of tritium will be released to the Pacific Ocean. In comparison, the applicant estimated a release of radioactive material in liquid effluent, exclusive of tritium, to be about 0.67 Ci per year per reactor and a tritium release of 710 Ci per year per reactor. The differences between the staff's values and those of the applicant lie principally in assumptions as to the parameters used for each radwaste system component and the distribution of tritium between gaseous and liquid releases. The staff's calculations of the radionuclides expected to be released annually from SONGS 2 & 3 are given in Table 3.2.

On the basis of the calculated releases of radioactive materials in liquid effluents given in Table 3.2, the staff calculated the annual dose or dose commitment to the total body or to any organ of an individual in an unrestricted area, as shown in Table 5.3, to be less than 3 millirem per reactor and 10 millirem per reactor, respectively, in conformance with Sect. II.A of Appendix I to 10 CFR Part 50.

Cost-benefit analysis of liquid radwaste system augments

The staff evaluated potential liquid radwaste system augments based on a study of the applicant's system designs, the population dose information provided in Table 5.3 of this statement, a value of $1000 per total body man-rem and $1000 per man-thyroid-rem for reductions in dose by the application of augments, and the methodology presented in Regulatory Guide 1.110.[3]

The principal parameters used in this cost-benefit analysis are: (1) labor cost correction factor, FPC Region VIII, 1.2 (Regulatory Guide 1.110[3]); (2) indirect cost factor, 1.75 (Regulatory Guide 1.110[3]); (3) cost of money, 15%; and (4) capital recovery factor, 0.0806 (Regulatory Guide 1.110[3]).

The calculated total body and thyroid doses from liquid releases to the projected population within a 80 km (50-mile) radius of the station, when multiplied by $1000 per total body man-rem and $1000 per man-thyroid-rem, resulted in cost-assessment values of $170 per year per unit and $140 per year per unit respectively. Potential radwaste system augments were selected from the list given in Regulatory Guide 1.110.[3] The most effective augment was the optional use of an existing 0.189 liters/min (50-gpm) evaporator in the miscellaneous liquid waste system; however, the calculated total annualized cost of $80,000 for operation and maintenance of the augment exceeded the cost-assessment values of $170 per unit for the total body man-rem dose and $140 per unit for the man-thyroid-rem dose. The staff concludes, therefore, that there are no cost-effective augments to reduce the cumulative population dose at a favorable cost-benefit ratio, and that the proposed liquid waste management system meets the requirements of Sect. II.D of Appendix I to 10 CFR Part 50.

3.2.3.2 Gaseous radioactive waste treatment system

The gaseous radioactive waste treatement and building ventilation exhaust systems will be designed to collect, store, process, monitor, recycle, and/or discharge potentially radioactive gaseous wastes that will be generated during normal operation including anticipated operational occurrences. The system will consist of equipment and instrumentation necessary to reduce releases of radioactive gases and particulates to the environment.

The principal source of radioactive gaseous wastes are the gaseous waste processing system, condenser vacuum pump, and ventilation exhausts from the auxiliary, radwaste, fuel handling, containment, and turbine buildings. The principal system for treating gaseous wastes stripped from the primary coolant will be the gaseous waste processing system (GWPS). The GWPS will be a once-through nitrogen system containing a surge tank, two compressors, and six pressurized storage tanks. The off-gas from the main condenser air ejector will be processed through HEPA

Table 3.2. Calculated releases of radioactive materials in liquid effluents from SONGS 2 & 3

Nuclide	Curies per year per unit
Corrosion and activation products	
Cr-51	5.6(−4)
Mn-54	9(−5)
Fe-55	4.9(−4)
Fe-59	3(−4)
Co-58	4.8(−3)
Co-60	6.1(−4)
Np-239	2.5(−5)
Fission products	
Br-83	7(−5)
Rb-86	1.1(−3)
Rb-88	1.4(−2)
Sr-89	1(−4)
Sr-91	4(−5)
Y-91m	3(−5)
Y-91	2(−5)
Zr-95	2(−5)
Nb-95	1(−5)
Mo-99	1.9(−2)
Tc-99m	1.5(−2)
Ru-103	1(−5)
Rh-103m	1(−5)
Te-127m	8(−5)
Te-127	1.1(−4)
Te-129m	4.1(−4)
Te-129	2.8(−4)
I-130	1.9(−4)
Te-131m	4(−4)
Te-131	7(−5)
I-131	8.1(−2)
Te-132	6.2(−3)
I-132	7.8(−3)
I-133	5.3(−2)
I-134	2.3(−4)
Cs-134	3.5(−1)
I-135	9.5(−3)
Cs-136	1.7(−1)
Cs-137	2.5(−1)
Ba-137m	1.6(−1)
Ba-140	6(−5)
La-140	4(−5)
Ce-141	2(−5)
Pr-143	1(−5)
All others	5(−5)
Total, except H-3	1.1
H-3	300

filters and charcoal absorbers prior to release to the environment. The containment building atmosphere will be recirculated through HEPA filters and charcoal absorbers prior to release to the environment. Ventilation exhaust air from the auxiliary building and the fuel handling area will not be processed prior to release to the environment. The turbine building ventilation exhaust air will be released to the environment without treatment. The gaseous waste and ventilation treatment systems are shown schematically in Fig. 3.6.

Gaseous waste processing system (GWPS)

The GWPS will be designed to collect and process gases stripped from the primary coolant in the CVCS, coolant radwaste system, and miscellaneous tank cover gases. The GWPS is shared between Units 2 and 3. The GWPS will contain an inventory of nitrogen and hydrogen which will act as a carrier gas to transport radioactive gases removed from the primary coolant. Hydrogen and nitrogen cover gases from the volume control and reactor coolant drain tanks, and gases stripped in the coolant radwaste system degasifier will be collected, compressed, and stored in one of six pressurized storage tanks. The storage tanks will collect and store gases to allow short-lived radionuclide decay. After holdup, the gases will be discharged to the environment.

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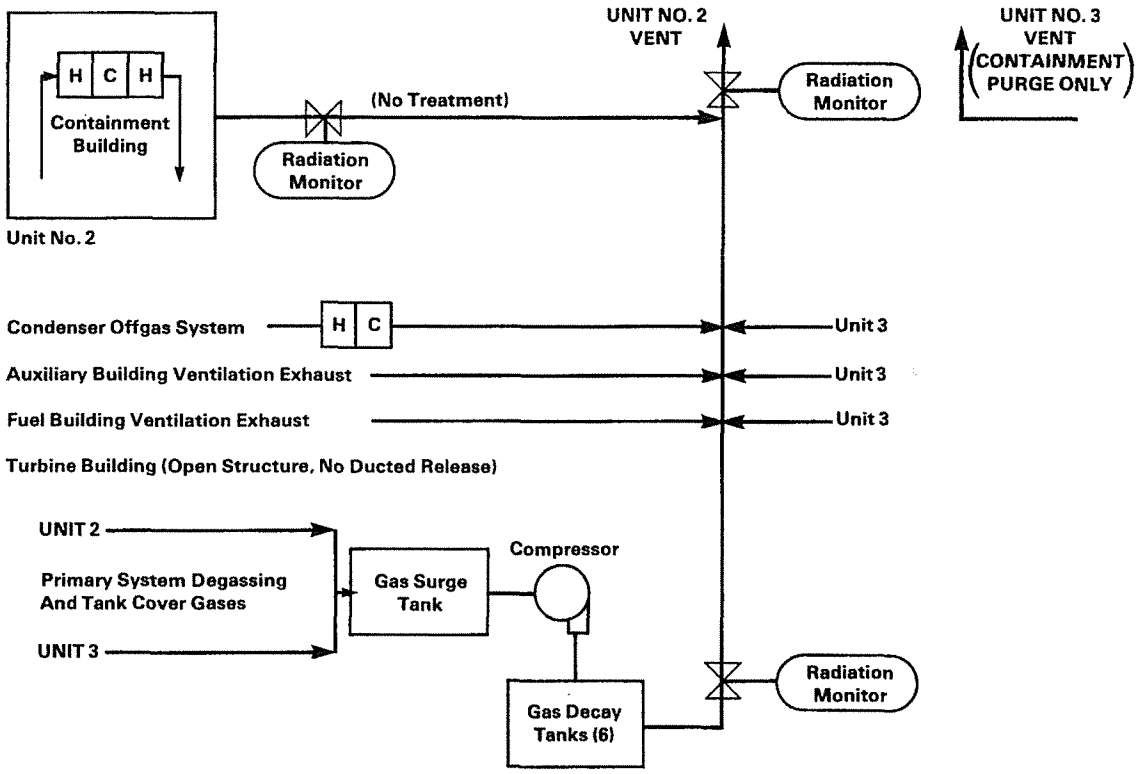

Fig. 3.6. SONGS 2 & 3 radioactive gaseous waste treatment systems.

In its evaluation, the staff assumed three tanks for storage, with two tanks held in reserve for back-to-back shutdowns, and one tank in the process of filling. Each tank has a volume of 14.16 m^3 (500 ft^3) and operates at 300 psig. On this basis, the staff calculated a holdup time of 90 days prior to discharge of gases to the environment.

Containment ventilation system

Radioactive material will be released inside the containment when primary system leakage occurs. The staff assumed on the basis of system parameters that the containment will be purged continuously during power operations at 56.6 m^3/min (2000 cfm) and in addition will have four high volume shutdown purges per year at 1132 m^2/min (40,000 cfm). Prior to purging, the containment atmosphere will be recirculated through HEPA filters and charcoal absorbers. The staff assumed radionuclide removal during the recirculation phase to be based on a flow rate of 453 m^3/min (16,000 cfm), system operation for 16 hr, a mixing efficiency of 70%, a particulate decontamination factor of 100 for HEPA filters, and an iodine decontamination factor of 10 for charcoal absorbers. The purge exhaust gases are released without filtration or other treatment.

Ventilation releases from other buildings

Radioactive materials will be released into the plant atmosphere due to leakage from equipment transporting or handling radioactive materials. Ventilation air from the auxiliary building and fuel building is not processed prior to release. The staff estimated that 72.58 kg (160 lb) of primary coolant per day will leak to the auxiliary building with an iodine partition factor of 0.0075. Small quantities of radionuclides will be released to the open turbine building, based on an estimated 771 kg/hr (1700 lb/hr) of steam leakage. The open turbine building releases will be released directly to the environment.

Main condenser air ejector

Off-gas from the main condenser air ejectors will contain radioactive gases as a result of primary to secondary leakage. In its evaluation, the staff assumed a primary to secondary leak rate of 45 kg/day (100 lb/day). Noble gases and iodine will be contained in steam generator leakage and released to the environment through the main condenser air ejectors in accordance with the partition factors listed in Table 3.1. The air ejector exhaust will be released to the environment through HEPA filters and charocal absorbers.

Gaseous waste summary

Based on the staff's evaluation of the gaseous radioactive waste treatment and building ventilation systems and the parameters listed in Table 3.1, the staff calculated the release of radioactive materials in gaseous effluents to be about 15,000 Ci per year per unit for noble gases and 0.44 Ci per year per unit for iodine-131. In comparison, the applicant estimated a release of 8600 Ci per year per unit for noble gases and 0.096 Ci per year per unit for iodine-131. The staff estimated a release of 0.39 Ci per year per unit of particulates and 1100 Ci per year per unit of tritium. The applicant estimated a release of 0.2 Ci per year per unit of particulates and 710 Ci per year per unit of tritium.

The staff's calculated annual releases of radioactive materials in gaseous effluents from radionuclides expected to be released annually from SONGS 2 & 3 are given in Table 3.3. Based on the calculated releases of radioactive materials in gaseous effluents given in Table 3.3, the staff calculated the annual air in an unrestricted area, as shown in Table 5.3. to be less than 10 millirads per reactor for gamma radiation or 20 millrads per reactor for beta radiation and the annual external doses to the total body and skin of an individual in an unrestricted area to be less than 5 millirems and 15 millirems, respectively, and an organ dose of less than 15 millirems per reactor for radioiodine and radioactive particulates in conformance with Sect. II.B and II.C of Appendix I to 10 CFR 50.

Table 3.3. Calculated releases of radioactive materials in gaseous effluents from SONGS 2 & 3 (Curies per year per unit)

Nuclide	Decay tanks	Reactor building	Auxiliary building	Turbine building	Air ejector	Total
Kr-83m	*a*	2	*a*	*a*	*a*	2
Kr-85m	*a*	24	2	*a*	2	28
Kr-85	430	170	5	*a*	3	610
Kr-87	*a*	5	1	*a*	*a*	6
Kr-88	*a*	30	4	*a*	3	37
Kr-89	*a*	*a*	*a*	*a*	*a*	*a*
Xe-131m	*a*	90	3	*a*	2	95
Xe-133m	*a*	140	5	*a*	3	150
Xe-133	*a*	13,000	410	*a*	260	14,000
Xe-135m	*a*	*a*	*a*	*a*	*a*	*a*
Xe-135	*a*	120	8	*a*	5	130
Xe-137	*a*	*a*	*a*	*a*	*a*	*a*
Xe-138	*a*	*a*	*a*	*a*	*a*	*a*
Total noble gases						15,000
I-131	*a*	0.35	0.08	0.0042	0.005	0.44
I-133	*a*	0.27	0.09	0.0033	0.0056	0.37
Mn-54	4.5(−3)[b]	2.2(−2)	1.8(−2)	*c*	*c*	4.4(−2)
Fe-59	1.5(−3)	7.4(−3)	6(−3)	*c*	*c*	1.5(−3)
Co-58	1.5(−2)	7.4(−2)	6(−2)	*c*	*c*	1.5(−2)
Co-60	7(−3)	3.3(−2)	2.7(−2)	*c*	*c*	6.7(−2)
Sr-89	3.3(−4)	1.7(−3)	1.3(−3)	*c*	*c*	3.3(−3)
Sr-90	6(−5)	2.9(−4)	2.4(−4)	*c*	*c*	5.9(−4)
Cs-134	4.5(−3)	2.2(−2)	1.8(−2)	*c*	*c*	4.4(−2)
Cs-137	7.5(−3)	3.7(−2)	3(−2)	*c*	*c*	7.4(−2)
Total particulates						1.2
H-3						1,100
C-14	7	1	*a*	*a*	*a*	8
Ar-41	*a*	25	*a*	*a*	*a*	25

[a] Less than 1 Ci/year for noble gases and carbon-14, less than 10^{-4} Ci/year for iodine.
[b] Exponential notation: 4.5(−3) = 4.5 X 10^{-3}.
[c] Less than 1% of total for this nuclide.

Cost-benefit analysis of gaseous radwaste system augments

The staff has evaluated potential gaseous radwaste system augments based on a study of the applicant's system designs, the population dose information provided in Table 5.3 of this statement, a value of $1000 per total body man-rem and $1000 per man-thyroid-rem for reductions in dose by the application of augments, and the methodology presented in Regulatory Guide 1.110.[3]

The calculated total body and thyroid doses from gaseous releases to the population within a 80 km (50-mile) radius of the station, when multiplied by $1000 per total body man-rem and $1000 per man-thyroid-rem, resulted in cost-assessment values of $21,000 per year per unit and $46,000 per year per unit respectively. Potential radwaste system augments were selected from the list given in Regulatory Guide 1.110. The most effective augment considered was the installation of charcoal adsorbers and HEPA filters on the containment mini-purge ventilation exhaust. The addition of this augment would result in a dose reduction of approximately 6.3 total-body man-rem and 23.8 thyroid man-rem with corresponding cost assessment values of $6,300 and $23,800, respectively. The calculated total annualized cost of $26,500 for the augment is more than the annual cost assessment values of $6,300 and $23,800 given above. The staff concludes, therefore, that there are no cost-effective augments to reduce the cumulative population dose at a favorable cost-benefit ratio, and the proposed gaseous waste treatment and ventilation systems meet the requirements of Sect II.D of Appendix I to 10 CFR Part 50.[1]

The staff concludes that the gaseous radwaste system for Units 2 and 3 is capable of maintaining releases of radioactive materials in gaseous effluents to "as low as is reasonably achievable" levels in accordance with 10 CFR Part 50.34a and meets the requirements of Appendix I to 10 CFR Part 50. The staff, therefore, concludes that the proposed system is acceptable.

3.2.3.3 Solid wastes

The solid waste system will be designed to process two general types of solid wastes: "wet" solid wastes which require solidification prior to shipment, and "dry" solid wastes which require packaging and, in some cases, compaction prior to shipment to a licensed burial facility. "Wet" solid wastes will consist mainly of spent filter cartridges, demineralizer resins, and evaporator bottoms which contain radioactive materials removed from liquid streams during processing. "Dry" solid wastes will consist mainly of low-activity ventilation air filters, contaminated clothing, paper, and miscellaneous items such as laboratory glassware and tools. Spent resins from the demineralizers will be collected in the spent resin storage tank. When the resin is to be packaged, it will be sluiced to a disposable liner and dewatered before solidification. The resin beads are solidified by filling the void spaces with urea formaldehyde and catalyst. A disposable paddle is used to agitate the mixture in the liner during the solidification process. Concentrated evaporator wastes will be collected in an evaporator bottoms tank, and then pumped batchwise through an inline mixer where they are blended with a urea formaldehyde solution. From the inline mixer, the mixture is sprayed into a disposal liner while a liquid catalyst is simultaneously sprayed into the liner by a separate nozzle to assure intimate mixing of the waste-urea formaldehyde solution and the catalyst.

On the basis of its evaluation and on recent data from operating plants, the staff has determined that about 425 m^3 (15,000 ft^3) per unit of "wet" solid wastes, containing about 1060 Ci of activity, will be shipped offsite annually. The principal radionuclides in the solid wastes will be long-lived fission and corrosion products, mainly Cs-134, Cs-137, Co-58, Co-60 and Fe-55. The applicant estimated the combined production of solid wastes from Units 2 and 3 to be 283 m^3/yr (10,000 ft^3/ year) of solidified wastes. The applicant calculated the total curie content of these solid wastes to be about 6500 Ci. The waste containers will be stored in a shielded area, as required, to reduce contact radiation levels.

Dry solid wastes will be packaged in cardboard boxes, wooden boxes, and special DOT-approved containers. Compressible wastes such as clothing and rags will be compressed prior to packaging. The staff estimates the dry solid wastes to total 283 m^3 (10,000 ft^3) per unit per year with a total activity content of less than 5 Ci. The applicant estimates the combined production of dry wastes from Units 2 and 3 to be 207 m^3/yr (7300 ft^3/year) with a calculated total curie content of about 21 Ci.

3.2.4 Chemical, sanitary, and other waste effluents

3.2.4.1 Chemical effluents

Several design changes have had significant impacts on chemical discharges. The condenser tubes are made of titanium (ER, Table 3.4-1) rather than of a copper-nickel alloy; this should eliminate the small amounts of copper and nickel in the discharge as described previously

(FES-CP, Sect. 3.5.1). An Amertap condenser tube cleaning system has been installed (ER, Sect. 3.4.4). In this system, sponge rubber balls are injected into the inlet piping of the condenser and are forced through the condenser tubes to scrape them clean. The balls are collected in the circulating water discharge conduit and are recirculated. This change helps to control fouling within the circulating water system and should reduce the frequency of chlorination necessary to maintain a clean condenser system. A makeup demineralizer system will replace the flash evaporators. Chemicals originally indicated as being discharged from the flash evaporators (FES-CP, Table 3.9) will not be discharged. A cellulose sealant for the circulating water system (FES-CP, Sect. 3.5.1) will not be used. Steam generator blowdown will be treated by filtration and demineralization and will be recycled to the condenser. Phosphates will not be added to the blowdown (FES-CP, Sect. 3.5.2), and the discharge of salts and heavy metal ions will be eliminated.

The only significant chemical discharge results from the use of sodium hypochlorite as a biocide. The chlorination system is common to both Units 2 and 3. The two units will not be treated at the same time. Hypochlorite solution will be injected into the circulating water pump discharge headers three times each day. Each injection will last about 15 min but will not exceed 90 min per unit per day. The chlorine residual in the circulating water discharge line is monitored by amperometric titration, and the addition of hypochlorite is adjusted to maintain a 0.5-mg/liter (1.89 grains/gal) maximum concentration of free available chlorine. The applicant estimates that this will result in a maximum free available chlorine concentration of 0.1 mg/liter (0.38 grains/gal) in the immediate vicinity of the discharge.

Other chemicals may be discharged at certain times. These chemicals generally will be discharged at low concentrations and, when mixed with the circulating water flow, represent a negligible concentration at the discharge to the ocean. During restarts the discharge of condensate from the hotwell may contain concentrations of several milligrams per liter of iron and copper. These substances will be reduced to negligible concentrations in the circulating water discharge. The discharge from the regeneration of demineralizers will contain sodium and sulfate ions; the concentrations at the discharge to the ocean will be less than 10 mg/liter (38 grains/gal) – negligible concentrations as compared to the natural concentrations in seawater. Small amounts of oil, not to exceed 5 mg/liter (19 grains/gal), will be discharged from the oil removal system and diluted to negligible concentration in the circulating water discharge. Various closed-loop cooling systems will be treated with potassium chromate to inhibit corrosion.

Offsite rainfall runoff from the coastal hills and from Interstate Highway 5 (I-5) is collected by the storm runoff drainage system for the highway. Part of this drainage is discharged directly to the ocean and part is discharged with the onsite plant drainage. Onsite plant drainage is collected in catch basins and is discharged with the circulating water discharge. Drainage collected in areas in which significant quantities of oil or grease might be present are routed through the oil removal system.

A National Pollutant Discharge Elimination System (NPDES) permit for SONGS 2 & 3 was issued on June 14, 1976, by the California Regional Water Quality Control Board, San Diego Region. The chemical effluent limitations for the combined discharges (cooling water, low-volume wastes, and storm drains) are: (1) the monthly average free available chlorine discharged shall not exceed 0.2 mg/liter (0.757 grains/gal), and the daily maximum shall not exceed 0.5 mg/liter (1.89 grains/gal); (2) discharge of free available chlorine or total residual chlorine from any plant unit for more than 2 hr in any one day or for more than one unit in the plant at any one time is prohibited; (3) the pH of the effluent shall be within the range of 6.0 to 9.0; and (4) after July 1, 1976, the discharge shall not exceed the limits given in Table 3.4. The permit prohibits the discharge of any chemicals or pollutants from the fish handling system. The low-volume waste discharge shall not exceed the following limits: (1) a monthly average of 30 mg/liter (113.6 grains/gal) and a daily maximum of 100 mg/liter (378.6 grains/gal) for total suspended solids and (2) a monthly average of 15 mg/liter (56.78 grains/gal) and a daily maximum of 20 mg/liter (75.7 grains/gal) for oil and grease. The discharge from the storm drains shall not exceed a monthly average of 10 mg/liter (38 grains/gal) and a daily maximum of 15 mg/liter (56.78 grains/gal) for oil and grease.

3.2.4.2 Sanitary and other waste effluents

Sanitary wastes from Units 2 and 3 will receive secondary level treatment in the sewage treatment plant located at Unit 1, which will serve all three units. The treated wastes will have the following water quality characteristics (average daily concentration): suspended solids, 30 mg/liter (113.6 grains/gal); biological oxygen demand, 30 mg/liter(413.6 grains/gal); coliform, mean probable number of 200 per 100 ml (59 per ounce); pH, 7.0 to 8.5; and total residual chlorine, 2.0 mg/liter (7.57 grains/gal) (ER, Table 5.4-1). The treated wastes will be discharged into the Unit 1 circulating water discharge at an average rate of about 0.02 m^3/min (5 gpm). Because the circulating water discharge at Unit 1 is about 1200 m^3/min (320,000 gpm), the sanitary waste effluents will be reduced to negligible concentrations at the point of discharge to the ocean. The sanitary waste effluents for all three units will be within the

Table 3.4. NPDES chemical effluent limitations

Constituent	Concentration (mg/liter) not to be exceeded more than	
	50% of time	10% of time
Arsenic	0.01	0.02
Cadmium	0.02	0.03
Total chromium	0.005	0.01
Copper	0.2	0.3
Lead	0.1	0.2
Mercury	0.001	0.002
Nickel	0.1	0.2
Silver	0.02	0.04
Zinc	0.3	0.5
Cyanide	0.1	0.2
Phenolic compounds	0.5	1.0
Total chlorine residual	1.0	2.0
Ammonia (as N)	40	60
Total identifiable chlorinated hydrocarbons	0.002	0.004
Toxicity concentration	1.5[a]	2.0[a]

[a] Toxicity units.
Source: ER, Appendix 12C.

(To convert mg/liter to grains/gal, multiply by 3.785.)

limitations established for Unit 1 by the California Regional Water Quality Board and the Environmental Protection Agency.

Some gaseous wastes from the operation of diesel generators and the auxiliary boiler will be discharged intermittently. Four diesel generators will serve Units 2 and 3, and it is anticipated that these will operate for about 2 hr once per month. The estimated hourly full-load emission in kilograms (pounds) from each generator is nitrogen oxides, 84 (185); sulfur dioxide, 11 (25); particulates, 0.9 (2); hydrocarbons, 3.9 (8.5); and carbon monoxide, 9.5 (21) (ER, Sect. 3.7.4.1). A single auxiliary boiler will be used for both Units 2 and 3. This boiler will be operated for varying time periods throughout the life of the plant (ER, Sect. 3.7.4.2). The maximum annual use is expected to be 1250 hr at full load and 3130 hr at half load. Under these conditions, the anticipated annual emissions in tonnes (tons) are nitrogen oxides, 44 (49); sulfur dioxide, 98 (108); and particulates, 34 (38).

Trash from screens for the circulating water system for Units 2 and 3 will be taken to the Bonsall Sanitary Landfill near the city of Vista, California. This landfill is used for the disposal of trash from Unit 1.

3.2.5 Transmission lines

Much of the description of the transmission lines presented in Sect. 3.7 of the FES-CP is no longer valid. Construction of SCE's transmission line from SONGS to Santiago Substation will be completed only up to Santiago Tap, thereby deleting that portion between Santiago Tap and Santiago Substation. SDG&E's line from Telega Substation to Escondido Substation has also been deleted. SCE will retrofit transmission lines from SONGS to Santiago Tap, Santiago Tap to Santiago Substation, and Santiago Tap to Black Star Canyon Tap. SDG&E will add a line from SONGS to Mission Substation. SDG&E's lines from SONGS to Telega Substation and SONGS to Encina Substation will still be constructed but the staff has received additional information with regard to these lines since issuance of the FES-CP. Therefore, these lines will be further discussed in Sect. 3.2.5.2. All transmission lines for operation of SONGS Units 2 and 3 are illustrated in Figs. 3.7 and 3.8. Generally, the lines are coastal, using existing rights-of-way traversing northward from SONGS to Talega Substation, Santiago Tap, Santiago Substation, and Black Star Canyon Tap, and southeast to Encina and Mission Substations. A total of about 159.1 km (98.9 miles) will be crossed by the transmission lines. No new rights-of-way, however, will be required.

The SCE and SDG&E transmission lines will each be supported by two steel horizontal portal structures (Fig. 3.9) for the initial 0.6 km (0.4 mile) of right-of-way northeast of the SONGS switchyard. These structures will replace the steel lattice towers now supporting the existing circuits in this area. No additional land for tower bases or access roads will be required.

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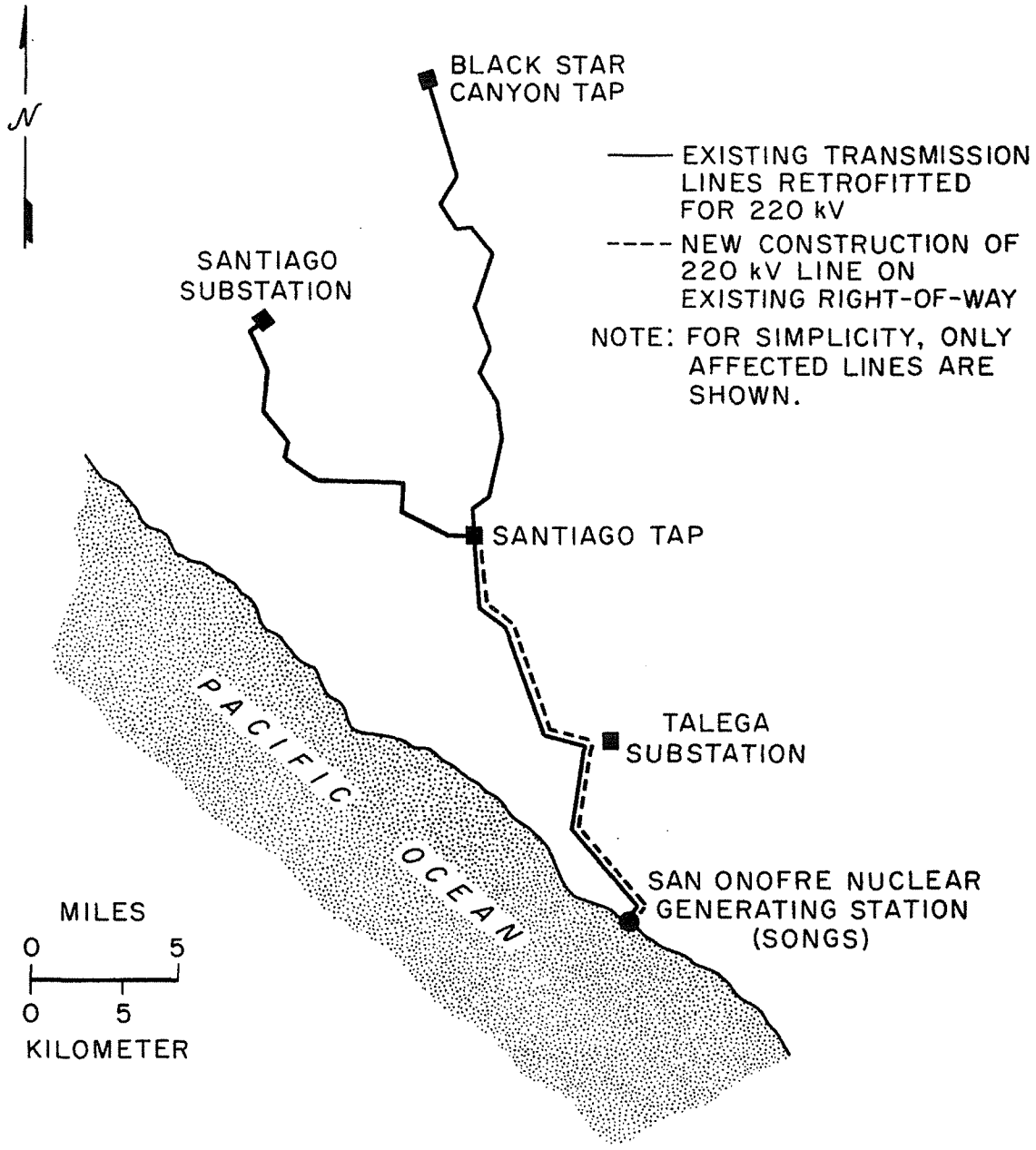

Fig. 3.7. Schematic diagram of proposed Southern California Edison Company transmission lines for SONGS 2 & 3.

3.2.5.1 SCE transmission lines

A double circuit 220-kV transmission line will be constructed between SONGS and Santiago Tap, an approximate distance of 24.3 km (15.1 miles) (Fig. 3.7). About 73 steel lattice towers (Fig. 3.10) will be required for this line, with an average span of about 335 m (1100 ft) between towers. The average tower height is estimated to be 39.6 m (130 ft). The new tower bases will require 2.44 ha (6.03 acres), and access road extensions are expected to require 1.32 ha (3.25 acres) of land (ER, Suppl. 2, Item 36). Additional transmission lines required by SCE that were not discussed in the FES-CP are those from SONGS to Santiago Tap, Santiago Tap to Santiago Substation, and Santiago Tap to Black Star Canyon Tap. These lines, totaling

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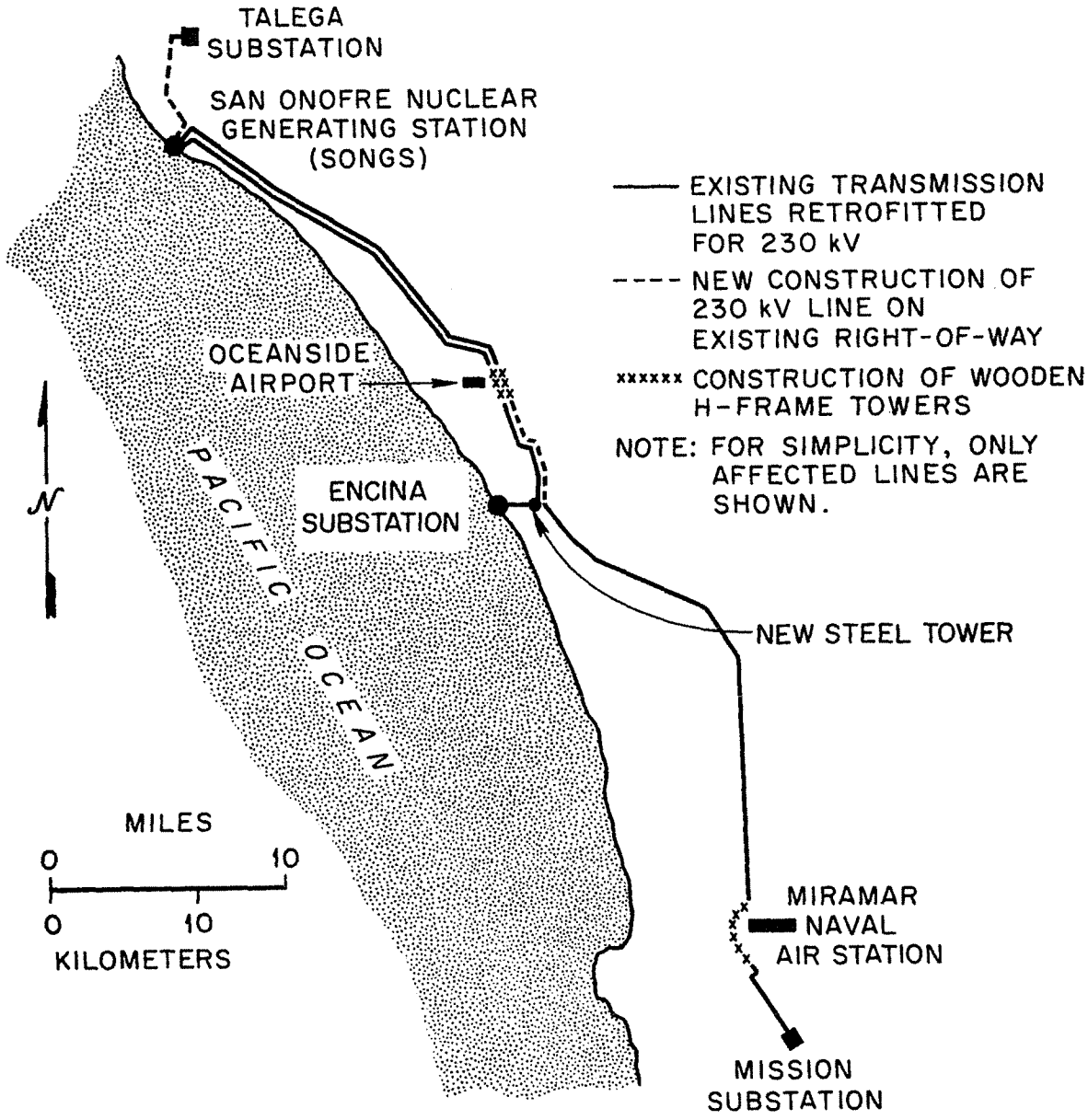
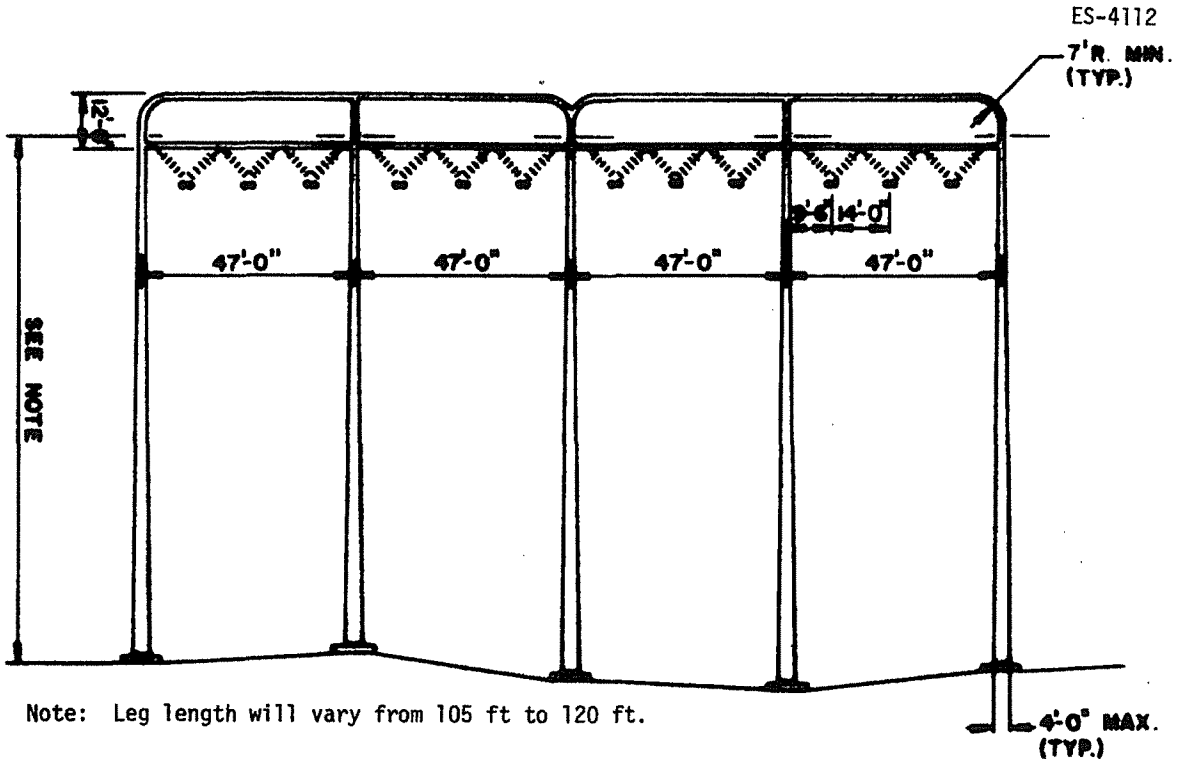


Fig. 3.8. Schematic diagram of proposed San Diego Gas and Electric Company transmission lines for SONGS 2 & 3.

71.7 km (44.2 miles) will be retrofitted to operate at 220 kV. Retrofitting will involve the replacement of existing conductors with larger ones (on existing towers) and the construction of four additional towers between Santiago Tap and Black Star Canyon Tap.[4] These towers are required to provide adequate ground clearance in some spans where the wire tension will have to be reduced from its present value (ER, Sect. 3.9.1.1). This additional construction is expected to require 0.13 ha (0.33 acres) of land for new tower bases and 0.52 ha (1.3 acres) for access road extensions (ER, Suppl. 2, Item 36).

The material storage yard for SCE transmission lines will be located about 1.6 km (1 mile) north of the San Onofre Nuclear Generating Station within Camp Pendleton Marine Base. The area involved will be about 2.2 ha (5.5 acres) and will not require any clearing or opening of new roads (ER, Suppl. 2, Item 30).



Note: Leg length will vary from 105 ft to 120 ft.

Fig. 3.9. Four-circuit steel horizontal portal structures used by Southern California Edison Company; San Diego Gas and Electric Company will use a similar structure with five circuits. Source: ER, Fig. 3.9-2.
(To convert ft to m, multiply by 0.3048.)

3.2.5.2 SDG&E transmission lines

The only transmission line required by SDG&E that was not discussed in the FES-CP will run between SONGS and Mission Substation, a distance of 85 km (53 miles) (Fig. 3.8). This line will be installed by adding a 230 kV circuit to the vacant position on existing double circuit towers;[1] some of the existing towers will be replaced. A total of about 36 wooden H-frame towers (Fig. 3.11) will be constructed along a 1.6-km (1-mile) segment east of Oceanside Airport and a 6.8-km (4.2-mile) segment opposite Miramar Naval Air Station to accommodate FAA regulations.[1] About 9 km (5.6 miles) of existing 138 kV wood structures south of the Oceanside Airport will be replaced by approximately 32 double circuit steel lattice towers (Fig. 3.12). The construction of the new towers for this line will not require any additional land for tower bases or access roads (ER, Suppl. 2, Item 36). Subsequent to issuance to the FES-CP, additional information was supplied by the applicant regarding the line from SONGS to Encina Substation and SONGS to Talega Substation. The line from SONGS to Encina Substation, 40 km (25 miles), will be formed by adding a 230 kV circuit to the vacant position on existing double circuit towers.[1] In addition, approximately four wooden H-frame towers (Fig. 3.11) will be constructed along a 1-km (0.6 mile) segment east of Oceanside Airport to accommodate FAA regulations. To facilitate arrangement of the new conductors, a single steel tower will also be installed east of Encina Substation. All new structures will be constructed within existing rights-of-way and will not require any additional land for tower bases or access roads (ER, Suppl. 2, Item 36). The line from SONGS to Talega Substation traverses about 11.3 km (7 miles) and will require construction of about 32 steel lattice towers (Fig. 3.12). The new tower bases will require about 0.23 ha (0.58 acre), and access road extensions are expected to require 0.53 ha (1.3 acres) of land (ER, Suppl. 2, Item 36). Because SDG&E's original plan assumed that the Talega Substation would be constructed and in operation prior to completion of SONGS 2 & 3 (ER, Suppl. 2, Item 25), this facility was discussed in the FES-CP as if it were already in existence. Construction, however, was delayed. The proposed Talega Substation is expected to cover 2 ha (5 acres) of land; an additional 2 ha (5 acres) around the substation will also require grading.

The material storage yard for SDG&E transmission lines will be located in existing substations with the following exceptions: (1) fencing a level area of about 0.09 ha (0.23 acre) adjacent

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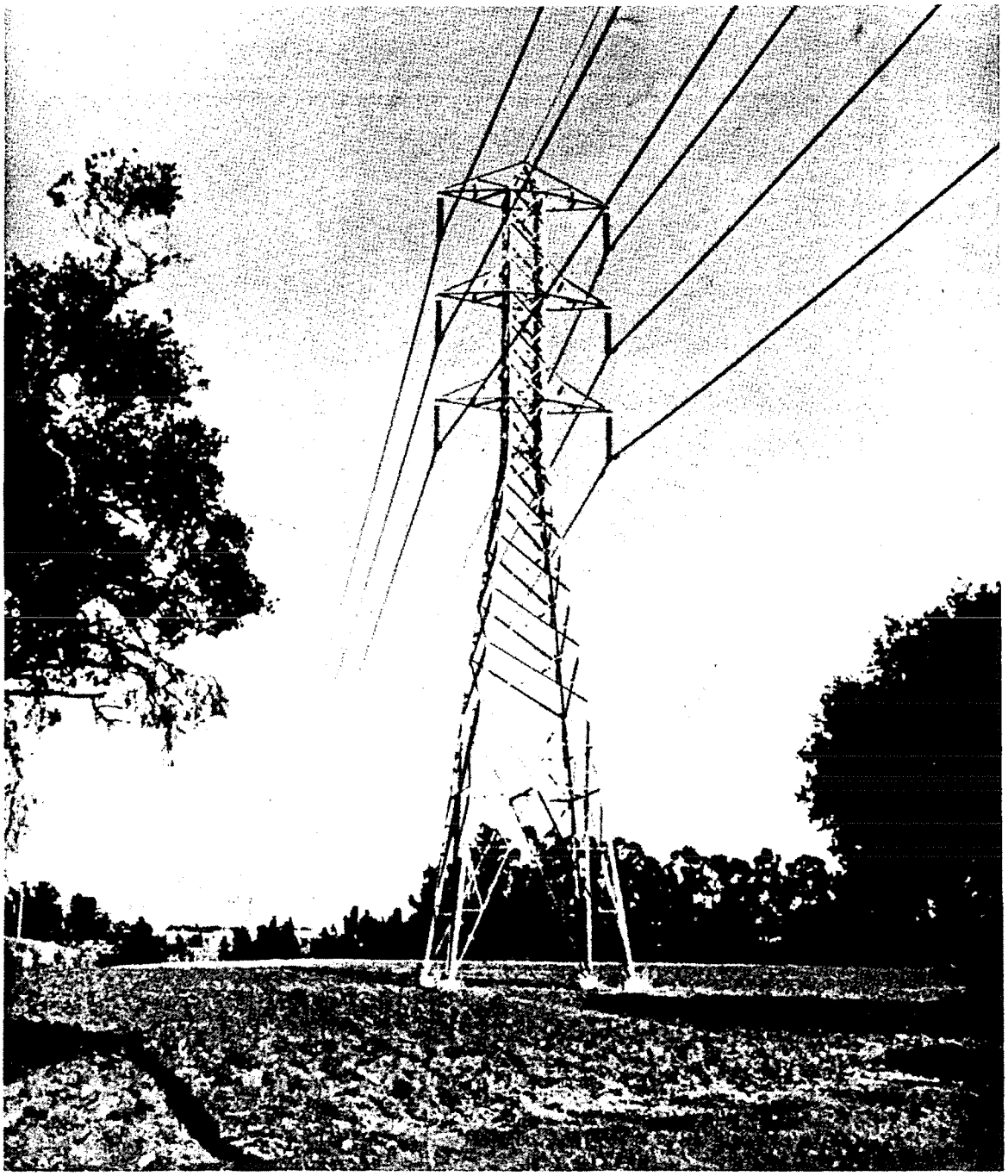

Fig. 3.10. Typical steel lattice tower design used by Southern California Edison Company. Source: ER, Fig. 3.9-3.

to the existing Pulgas Substation and (2) fencing a level area of about 0.09 ha (0.23 acre) adjacent to the Japanese Mesa Substation. No grading, clearing, or additional access roads are anticipated for this project (ER, Suppl. 2, Item 30).

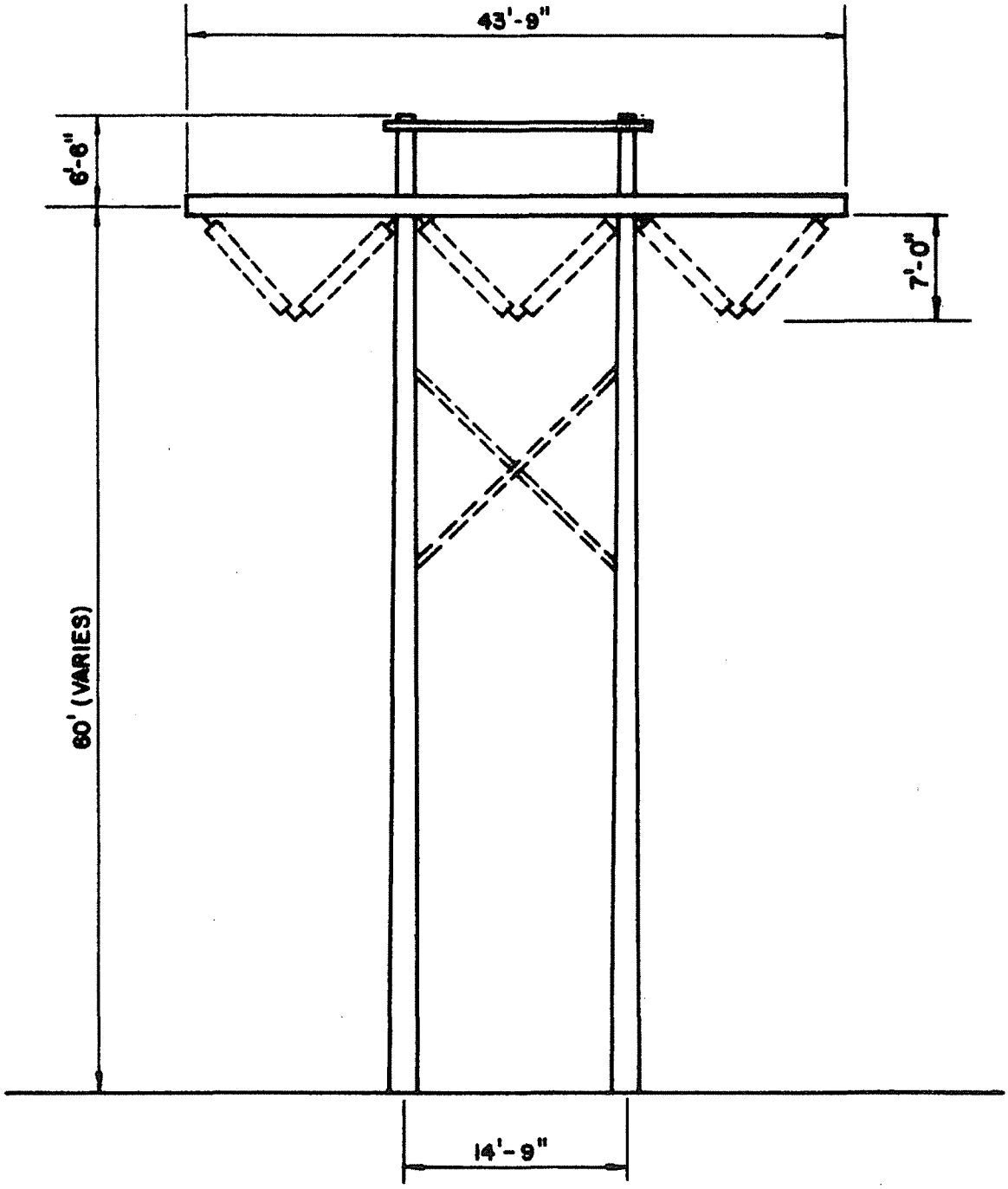

Fig. 3.11. Wooden H-frame tower used by San Diego Gas and Electric Company. Source: ER, Fig. 3.9-9.(To convert ft to m, multiply by 0.3048; to convert in. to mm, multiply by 25.4.)

3.2.6 Probable maximum flood berm

3.2.6.1 Description of structure and existing environment

Subsequent to issuance of the FES-CP the applicant was required to construct an earthern berm to protect the Station form the probable maximum flood (PMF). Construction of this structure

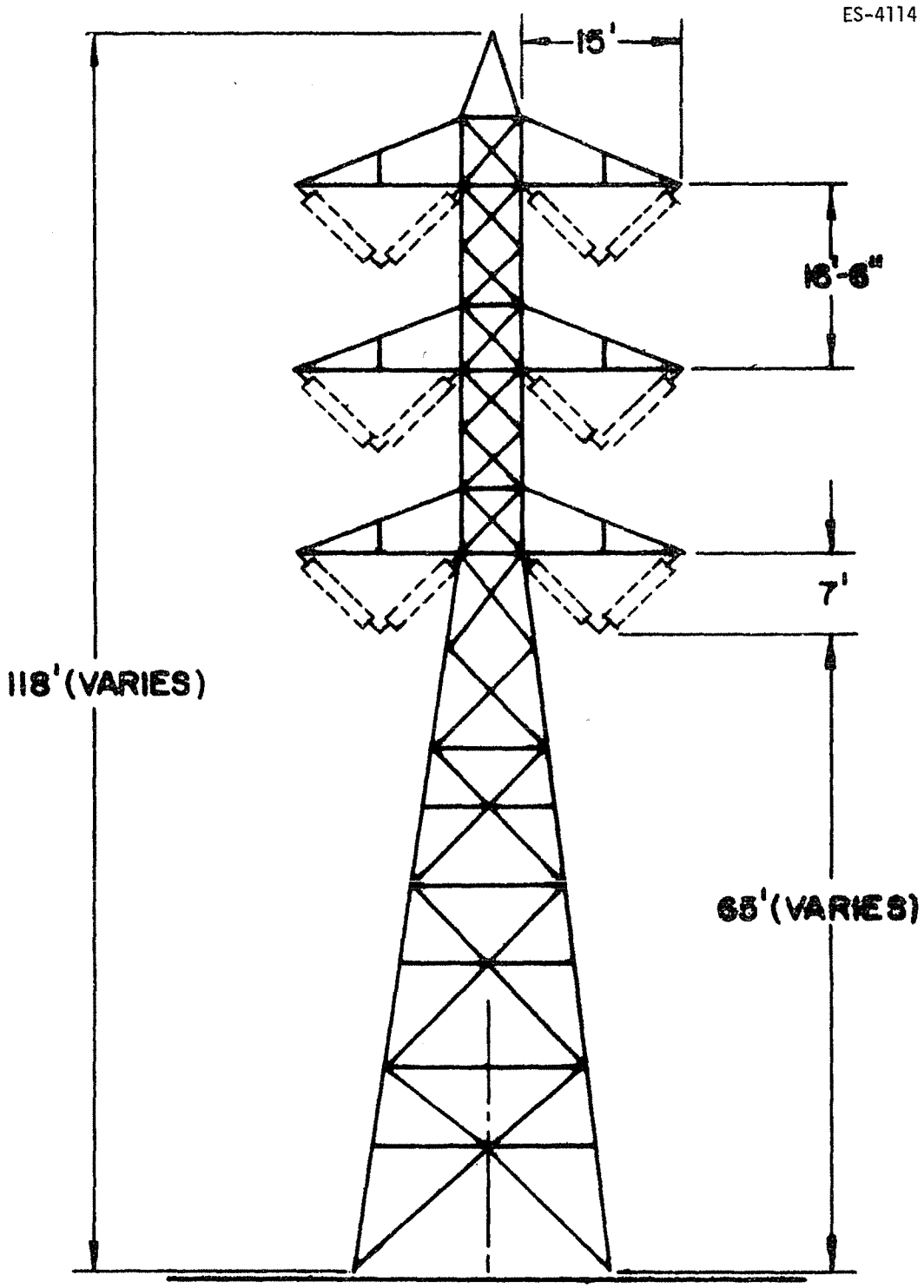

Fig. 3.12. Typical steel lattice tower design used by San Diego Gas and Electric Company. Source: ER, Fig. 3.9-8.(To change ft to m, multiply by 0.3048.)

and associated environmental impacts are presented by the applicant in a letter to the NRC[5] and in the applicant's final safety analysis report (FSAR).

The San Onofre site is located on a coastal plain at the base of the western foothills of the Santa Margarita Mountain Range. Elevation in this area rises sharply from sea level to a fairly level terrace formation 30 to 61 m (100 to 200 feet) above sea level. About 450 m (1500 feet) inland the foothills begin, rising with moderate slopes to an elevation of about 900 m (3000 ft) above sea level. Natural plant cover in the coastal plain typically consists of coastal chaparral and grassland, while in the foothills it is composed primarily of chaparral and open woodland.

There are no perennial streams in the general vicinity of the plant site. However, ephemeral streams and water courses do exist. The major streams are San Mateo Creek, located about 3.2 km (2 miles) to the northwest and San Onofre Creek located approximately 1.6 km (1 mile) to the northwest. The drainage divide separating San Mateo and San Onofre Creeks precludes the plant site from being influenced by San Mateo Creek. The applicant's results of the probable maximum flood (PMF) analysis concluded that the San Onofre Creek Basin exhibits no flooding potential to the site (FSAR, Sect. 2.4.2.2). Topographical features of the basin would contain the maximum flood stage and thereby preclude flooding of the site by this source. The foothill drainage basin, however, does contribute to the hydrologic factors influencing the plant site. The basin totals 2.2 km^2 (0.86 mi^2). There are no gaging stations located within the basin and, consequently, stream flow records are not available.

The entire watershed of the foothill drainage basin lies within the boundaries of the Marine Corps Base, Camp Pendleton. Elevation of the basin varies between 30 to 365 m (100 to 1200 feet) above sea level. Ground slope varies from 8 to 22%. Ground cover is moderate, consisting mainly of chaparral and grassland.

Water control structures at the foot of this basin consist of the 107- and 183-cm (42- and 72-in.) diameter concrete culverts under I-5. The capacity of these culverts is 5.1 and 14.7 m^3/sec (180 and 520 ft^3/sec), respectively. In addition to the two culverts, an earthern channel traverses the basin along the east side of I-5 diverting runoff to San Onofre Creek. The capacity of the channel is 52.4 m^3/sec (1850 ft^3/sec).

The applicant's analysis of the flooding potential of the foothill drainage area indicated that the plant site could be subjected to flooding during the occurrence of the PMF. In order to preclude flooding of the site by this source a diversion structure routes the surface runoff from the foothill drainage area to the San Onofre Creek Basin. This PMF structure will be an earthern berm, having an isoceles trapezoid cross section that is 2.4 m (8 feet) high and 12.8 m (42 feet) wide at its base, with 2:1 side slopes. The berm will parallel I-5 and will be 2.7 km (1.68 miles) long. The existing channel which parallels the proposed berm will be widened where necessary and will vary from 7.6 to 30.5 m (25 to 100 ft) in width. The berm will cover a portion of an existing road, El Camino Real Road, requiring the construction of a new road. The relocated road will run approximately parallel to and east of the proposed PMF berm.

Relocation of the road will require about 1.4 ha (3.5 acres) of land, the berm will cover approximately 3.5 ha (8.6 acres), and the channel (assuming a 30 m (96 ft) width) will require about 8.3 ha (20.6 acres) for a total land area requirement of 13.2 ha (32.7 acres). The existing channel and El Camino Real Road are included in this acreage.

A terrestrial biological survey of the site was conducted on October 25 and 31, 1977. Vegetation on the site is basically a southern coastal sage scrub community, being influenced by the coastal marine climatic conditions. However, nearly half of the site (northern portion) has been previously disturbed as evidenced by the presence of many non-native "weedy" species including saltbush (Atriplex semibaccata), Russian thistle (Salsola kali), mustard (Brassica geniculata) tree tobacco (Nicotiana glauca), and sow thistle (Sonchus oleraceus). Native species on this area include California sagebrush (Artemesia californica), California buckwheat (Eriogonum fascilculatum), and coyote brush (Baccharis pilularis). The southern half of the site is primarily vegetated with native species of the coastal sage scrub plant community including the native species listed above. The land on which the El Camino Real Road will be relocated contains many of the same species that occur at the berm site, but with a higher degree of cover.

Fauna surveys of the site and vicinity demonstrated that the majority of the species present were birds (24 species). Red-tailed hawks (Buteo jamaicensis) were prevalent in the vicinity using wooden posts, telephone and power poles as perches and a SCE lattice transmission tower for nesting. Although only 2 species of reptiles and 2 species of mammals were observed, others are likely to occur in the vicinity.

No threatened or endangered flora or fauna were observed on the proposed PMF Berm site, the area to be cut, or on the area where the El Camino Real Road is to be relocated.[5]

On November 14, 1977, an onsite inspection of the alignments of both the proposed berm and access road was conducted to determine the presence or absence of surficial paleontologic

values.[5] Although the survey did not result in locating any fossils, a review of the literature revealed that all sedimentary formations in the vicinity contain fossils. No localities in the immediate area have been placed on the National Registry of Natural Landmarks.

The site was surveyed for archaeological resources on December 8, 15, and 16, 1977 (ref. 5). The northern third of the berm was not surveyed because it had previously been studied; some portions of the berm also were not adequately surveyed because of dense vegetation.[5] In one area, eight pieces of marine shell were observed. The shells, however, were weathered and worn and gave the appearance of paleontological specimens, rather than archaeological remains.[5] An archaeological map and literature search revealed four recorded archaeological sites within 1.6 km (1 mile) of the proposed project, but none were located within the project area.[5]

3.2.6.2 Impacts of PMF berm

The berm will be built on top of an existing asphalt road. Consequently disruption of this area will have no significant biological impact. Widening the existing channel which parallels the proposed berm will require loss of about 8.5 ha (21 acres), and an additional 1.4 ha (3.5 acres) of habitat will be lost due to relocation of El Camino Real Road. Because these habitats do not represent unique communities, loss of this relatively small acreage should have no significant impact to biological resources of the area. To minimize the impact to raptors nesting in the vicinity the applicants will attempt to avoid construction activity during the period of March and April.[5]

The construction of the PMF berm might physically destroy fossils and/or relationships between fossils, or the environmental context of original deposition, that could provide significant paleontological data. In addition, the berm and new road may cover deposits containing significant paleontological data thereby making such data unreachable. To mitigate these potential impacts the applicants will conduct a paleontological survey prior to construction and monitor the excavation as it proceeds.[5] This will allow fossils to be salvaged as they are unearthed. Construction should be phased so that equipment could be shifted to other areas if fossils were located. Sufficient time should be allowed to uncover, record, and remove the fossils. If excavation were initiated in areas of highest paleontological potential, equipment could be moved to areas of low potential if paleontological values were encountered. This would provide a maximum amount of construction time and a maximum amount of time for paleontologic resource recovery.

Construction of the proposed PMF berm should not cause any direct or indirect adverse impact to known archaeological resources. However, the site would have been a favorable area for aboriginal habitation; i.e., an area of relatively flat topography with abundant fresh water and food resources.[5] The probability exists that buried resources may be in the area, especially where dense vegetation obscures the surface. Consequently, a trained archaeologist will monitor the construction activity and take appropriate conservation measures if necessary.[5]

No significant commitments of resources will result from construction and maintenance of the PMF Berm. The possibility exists that potential archaeological or palcontological resources would be destroyed during the excavation activity required for construction of the berm. However, if the proper mitigation measures are performed (monitoring, analysing, interpretating, preserving, and reporting), then these resources would not be irretrievable.

3.2.6.3 Floodplain management

The objective of Executive Order 11988, "Floodplain Management," is ". . . to avoid to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development whenever there is a practicable alternative." The Construction Permit was issued and the majority of construction completed prior to issuance of the Executive Order. Thus we conclude that no practicable alternative locations exist. The following is a discussion of floodplain conditions prior to construction of the plant and alterations made to these floodplains as a result of construction of San Onofre Units 2 and 3.

The San Onofre Units 2 and 3 are bounded on the east by Interstate Highway 5, the Atchison Topeka and Santa Fe Railroad and Highway 101. Interstate Highway 5 was constructed in 1968 prior to San Onofre Units 2 and 3. As part of the I-5 construction, a drainage channel designed for 100-year storm runoff was constructed parallel to and east of I-5. This channel intercepted tributary rainfall runoff from the foothills east of I-5 and transported it to the north away from the plant. The channel then merged with San Onofre Creek which in turn flowed to the Pacific Ocean.

The plant site which is bounded on the west by the Pacific Ocean was originally on a high coastal bench approximately 100 feet above sea level. Located at this elevation, the site was protected from severe flooding events and thus was not in the 100-year ocean floodplain.

The existing drainage channel which is west of and parallel to I-5, is being enlarged to contain floods and debris. The design capacity of the channel enlargement and extension is the Probable Maximum Flood, an event which is greater than the one-percent chance flood. The improvement will not induce higher flood stages.

The San Onofre plant grade is lower than the original coastal bench. However, construction of a seawall on the seaward side of the plant and east of the original bluff line provides protection from events larger than the one percent chance flood.

The plant, including the intake structure and seawall, is not built in the 100-year floodplain and will not be flooded by any 100-year flood levels. The intake crib and intake and discharge conduits are submerged on the ocean floor. The channel improvement east of Interstate Highway 5 will not increase flood levels. Therefore, the construction and operation of the San Onofre Unit 2 and 3 Nuclear Generating Station will comply with the intent of Executive Order 11988.

3.2.7 Emergency facilities

Emergency plans for San Onofre Units 2 and 3 call for an onsite Technical Support Center adjacent to the control room and an interim onsite Operational Support Center in the lunch room of the administration, warehouse, and shop building. Neither requires changes in the structural design or layout of the facility. An offsite Emergency Operations Facility is tentatively planned to be constructed on Japanese Mesa, east of Interstate 5, within the Camp Pendleton Reservation. This area was used for disposal of excavated material during construction. The structures must be designed to accommodate a minimum of 35 people.

REFERENCES

1. U.S. Nuclear Regulatory Commission, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as Practicable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," May 5, 1975, and as amended Sept. 4, 1975, and Dec. 17, 1975, in Title 10, "Code of Federal Regulations," Part 50, Appendix I.

2. U.S. Nuclear Regulatory Commission, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-GALE Code)," NUREG-0017, April 1976.**

3. U.S. Nuclear Regulatory Commission, "Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors," in Regulatory Guide 1.110, March 1976.**

4. Letter from Ira Thierer, Southern California Edison Co., to Dr. Knox Mellon, State Historic Preservation Officer, June 2, 1978.*

5. Letter from J. G. Haynes, Southern California Edison Co., to W. H. Regan, Jr., USNRC, undated, docketed on February 18, 1978.*

*Available for inspection and copying for a fee in the NRC Public Document Room, 1717 H St., N.W. Washington, DC 20555.

**Available from the NRC/GPO Sales Programs, Washington, DC 20555 and from the National Technical Information Service, Springfield, VA 22161.

4. STATUS OF SITE PREPARATION AND CONSTRUCTION

4.1 RESUME AND STATUS OF CONSTRUCTION

As of December 1980, the construction of SONGS Unit 2 was 97% complete, and SONGS Unit 3 was 68% complete. Figure 4.1 is a recent photograph of the site.

Impacts of construction have been identified in the FES-CP. The major terrestrial impact has been the excavation of about 16.4 ha (40.5 acres) of the San Onofre Bluffs, which resulted in the loss of a small amount of wildlife habitat. No rare or endangered animal species in the vicinity of the site have been or are expected to be adversely affected by construction activities.

The environmental impacts associated with changes in the routing of transmission lines subsequent to issuance of the FES-CP have been evaluated by the staff in its environmental impact appraisal regarding extension of the earliest and latest construction completion dates.

4.2 Offsite Emergency Operations Facility

An offsite Emergency Operations Facility is tentatively planned to be constructed on Japanese Mesa, east of Interstate 5, within the Camp Pendleton Reservation. This area was used for disposal of excavated material during construction. The structure must be designed to accommodate a minimum of 35 people. Construction of the Emergency Operations Facility on Japanese Mesa will not significantly disturb the area relative to previous disturbances.

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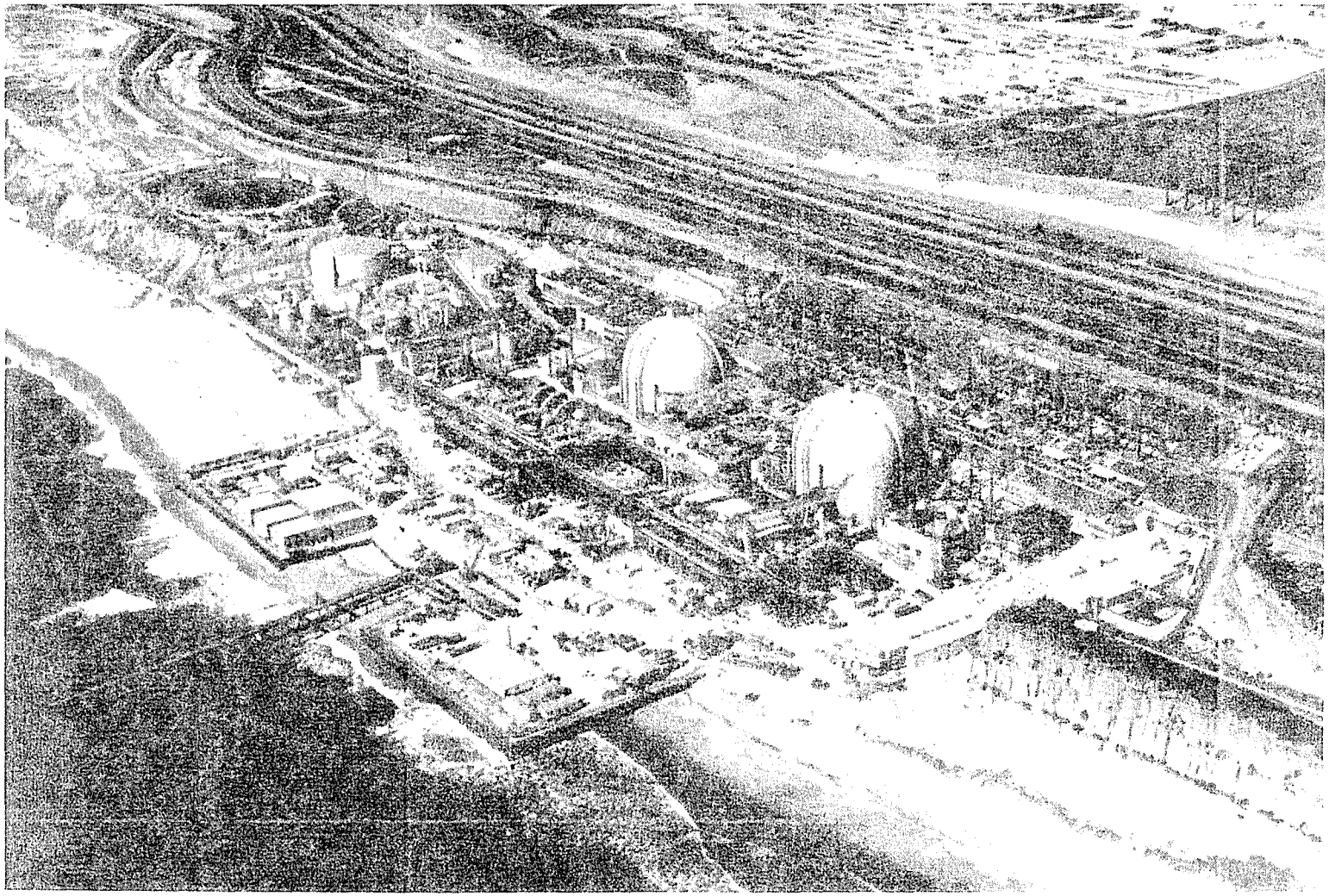

Fig. 4.1. Photograph of San Onofre Nuclear Generating Station taken in October 1980.

5. ENVIRONMENTAL EFFECTS OF STATION OPERATION

5.1 RESUME

The major design changes that have environmental effects involve the heat dissipation system. A more thorough analysis by the staff of the thermal plume is described in Sect. 5.3.1.2. The effects of the revised thermal-plume analysis on aquatic biota are discussed in Sect. 5.4.2.1. Changes in the effects of chemical effluents are discussed in Sects. 5.3.2 and 5.4.2.2. A revised discussion of radiological impacts is given in Sect. 5.5. Sect. 5.6 contains a revised assessment of the socioeconomic impacts.

5.2 IMPACTS ON LAND USE

Although the transmission line routes have been modified since the issuance of the construction permit (Sect. 3.2.5), the analysis of projected impacts as set forth in the FES-CP (Sect. 5.1) remains valid. All new transmission lines will be constructed on existing rights-of-way; a total of 5.2 ha (12.8 acres) of land will be required for access road extensions and for new tower bases.

The operation of SONGS 2 & 3 is not expected to affect any existing or proposed areas of the National Park System nor any existing or known potential sites to be listed as national landmarks.[1] In 1980, the applicant conducted a National Register assessment program of the 230 kV transmission right-of-way from San Onofre Nuclear Station to Black Star Canyon and Santiago Substation and to Encina and Mission Valley Substation and evaluated 41 previously identified archaeological sites. As a result of this effort, the NRC, in consultation with the State Historic Preservation officer, is seeking a determination of eligibility for inclusion in the National Register of Historic Places for 23 sites (see Appendix D, letter from Dr. Knox Mellon, State Historic Preservation officer, to D. C. Scaletti, USNRC, dated December 18, 1980). The staff agrees with the conclusions of the December 18, 1980, letter and will seek concurrence of determinations of effect from the Advisory Council on Historic Preservation.

5.3 IMPACTS ON WATER USE

5.3.1 Thermal discharges

5.3.1.1 Applicant's thermal analysis

The applicant retained the California Institute of Technology to perform a thermal analysis for the purpose of modifying the diffuser design in order to ensure compliance with state thermal standards. To accomplish this, a physical hydraulic model study was carried out at the W. M. Keck Laboratory of Hydraulics and Water Resources. The culmination of this effort was the diffuser design and configuration described in Section 3.2.2.

The physical model simulation was performed in a basin having horizontal dimensions of 11 m (36 ft) by 6 m (20 ft) which represents a prototype modeled region of about 8500 m (28,000 ft) by 4900 m (16,000 ft). The location and orientation of the Units 2 and 3 model intakes and diffusers within the basin are illustrated in Fig. 5.1. The bottom of the basin was filled with sand which was shaped to produce a simplified representation of the San Onofre bathymetry. The resulting bottom geometry was uniform in the longshore direction and varied as a composite of linear slopes in the offshore direction, as shown in Fig. 5.2. In order to satisfy scaling laws, the number of ports per laboratory diffuser was 16.

To perform simulations, the basin was filled with water at a constant temperature, then water at a temperature 16.67°C (30°F) higher was discharged through the diffusers. This excess temperature was required to maintain proper similitude and represents a 11.1°C (20°F) prototype excess temperature. Water was withdrawn from the basin through the intakes; however, this water was not recirculated. The model basin had the capability to simulate a variety of longshore current regimes, and among those investigated were no crossflow, crossflows of various amplitudes, reversing flows of various amplitudes, and special currents. The results of the simulations are summarized in the ER, Table 5.1-1. Among

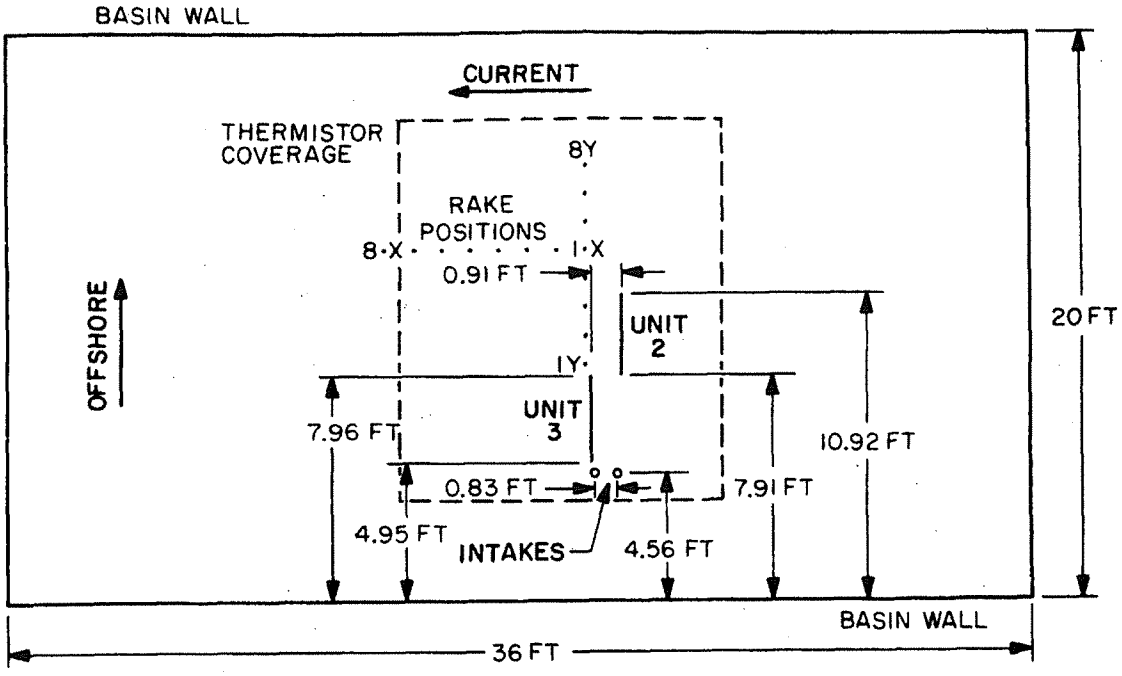

Fig. 5.1. Layout of basin used for the physical model study. Source: R. C. Y. Koh, N. H. Brooks, E. J. List, and E. J. Wolanski, *Hydraulic Modeling of Thermal Outfall Diffusers for the San Onofre Nuclear Power Plant*, W. M. Keck Laboratory of Hydraulics and Water Resources, California Institute of Technology, Report KH-R-30, January 1974, Fig. 6.1.
(To change ft to m, multiply by 0.3048.)

these simulations, the worst case was that of zero crossflow. A plot of surface isotherms produced by the model for this case is given in Fig. 5.3. Further details of the physical-model study can be found in ref. 2. There are, however, certain physical conditions and mechanisms that could not be properly modeled in the laboratory. In an effort to account for this limitation on modeling, the modelers associated a probable temperature excess with each uncertainty. The total of these individual uncertainties was 0.83°C (1.5°F). It was therefore reasoned that state thermal standards should be met if the laboratory results satisfied these standards for 1.39°C (2.5°F), with the 0.83°C (1.5°F) margin of error, rather than 2.2°C (4.0°F).

It is evident from Fig. 5.3 that this case satisfies the state thermal standards. The applicant suggests that this is the worst case and, therefore, concludes that SONGS 2 and 3 will, under all conditions, comply with California State thermal standards.

The staff has reviewed the applicant's thermal analysis and believes that the physical model does not adequately represent certain hydrodynamic mechanisms and certain physical features of the prototype. The most significant of these is the duration of the physical model simulation. The staff believes that the physical model simulation, which yielded the result given in Fig. 5.3, has not reached thermal equilibrium. This is apparent in the applicant's results for surface excess temperature versus time given in Fig. 5.4. The upper curve represents the maximum surface temperature as a function of time anywhere in the basin, while the lower curve represents the maximum surface temperature as a function of time beyond 305 m (1000 ft) from the discharge point. The time scale for thermal equilibrium in the upper curve is a function of the time required for the heated water from the discharge to reach the surface and, therefore, should be relatively short. The staff has substantiated this by performing a least-squares curve fit on the data shown in the upper curve. The results show that the maximum surface excess temperature anywhere in the basin is increasing less than 0.028°C (0.05°F) per day. This is small compared with the standard deviation of the curve fit and, therefore, thermal equilibrium can justifiably be assumed. Beyond 305 m (1000 ft) from the discharge, the thermal equilibrium time scale will be a function of the rate of transport of heated water by densimetric effects and diffuser momentum away from the discharge point. This time scale should be longer than that for thermal equilibrium near the discharge. A similar curve fit performed on the lower plot reveals that the excess surface temperature beyond 305 m (1000 ft) from the discharge is increasing by approximately 0.16°C (0.29°F) per day. The staff believes that such a time-rate-of-change of temperature does not represent thermal equilibrium. Using a mathematic model, the staff has qualitatively reproduced the applicant's results. However, this mathematical simulation demonstrates that for increased

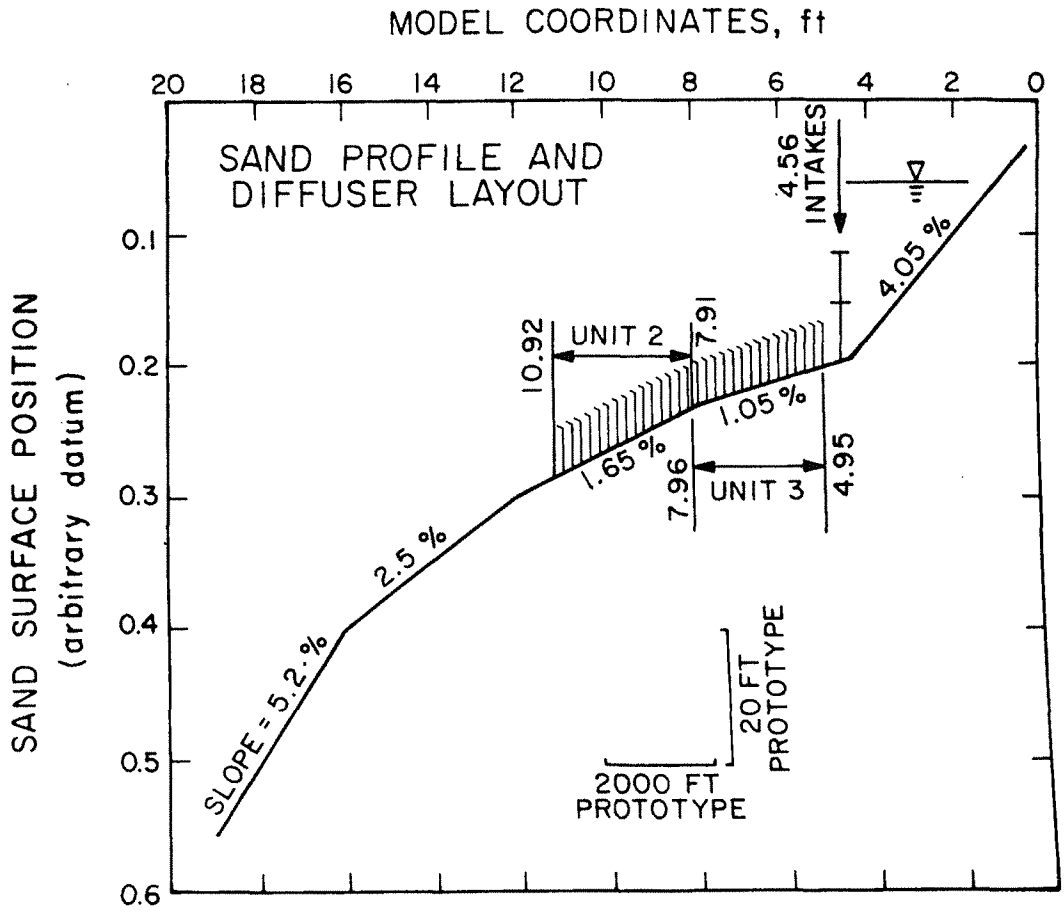

Fig. 5.2. Bottom profile used for the physical model study. Source: R. C. Y. Koh, N. H. Brooks, E. J. List, and E. J. Wolanski, "Hydraulic Modeling of Thermal Outfall Diffusers for the San Onofre Nuclear Power Plant," W. M. Keck Laboratory of Hydraulics and Water Resources, California Institute of Technology, Report KH-R-30, January 1974, Fig. 6.2. (To change ft to m, multiply by 0.3048)

duration of the simulation, there is a substantial increase in the predicted excess temperatures. In fact, for the conditions represented in Fig. 5.3, an increase in simulation time would likely have resulted in predicted excess temperatures that violate state thermal standards. However, such a prediction is unimportant because the particular simulation then represents conditions so unrealistic that the results become irrelevant.

Although the problem of underprediction is inherent in all the applicant's results, it is less significant for the realistic cases. For conditions more realistic than those in Fig. 5.3, the predicted excess temperatures are sufficiently low so that no violations of thermal standards would be expected as a result of increases of simulation duration in the physical model. This expectation is confirmed by the staff's mathematical model study.

5.3.1.2 Staff's thermal analysis

The staff has performed an independent thermal analysis for the proposed operation of the once-through cooling system. Depth-averaged numerical models from the Unified Transport Approach[3] were used to simulate plant-induced flows, natural flow, and water temperatures. Predictions have been made for conditions typical of mid-July, since this is the time of year when thermal impacts should be the most severe. The modeled region is a rectangle measuring approximately 24,000 m (80,000 ft) in the longshore direction and approximately 12,000 m (40,000 ft) in the offshore direction. This region with the numerical grid system superimposed is shown in Fig. 5.5.

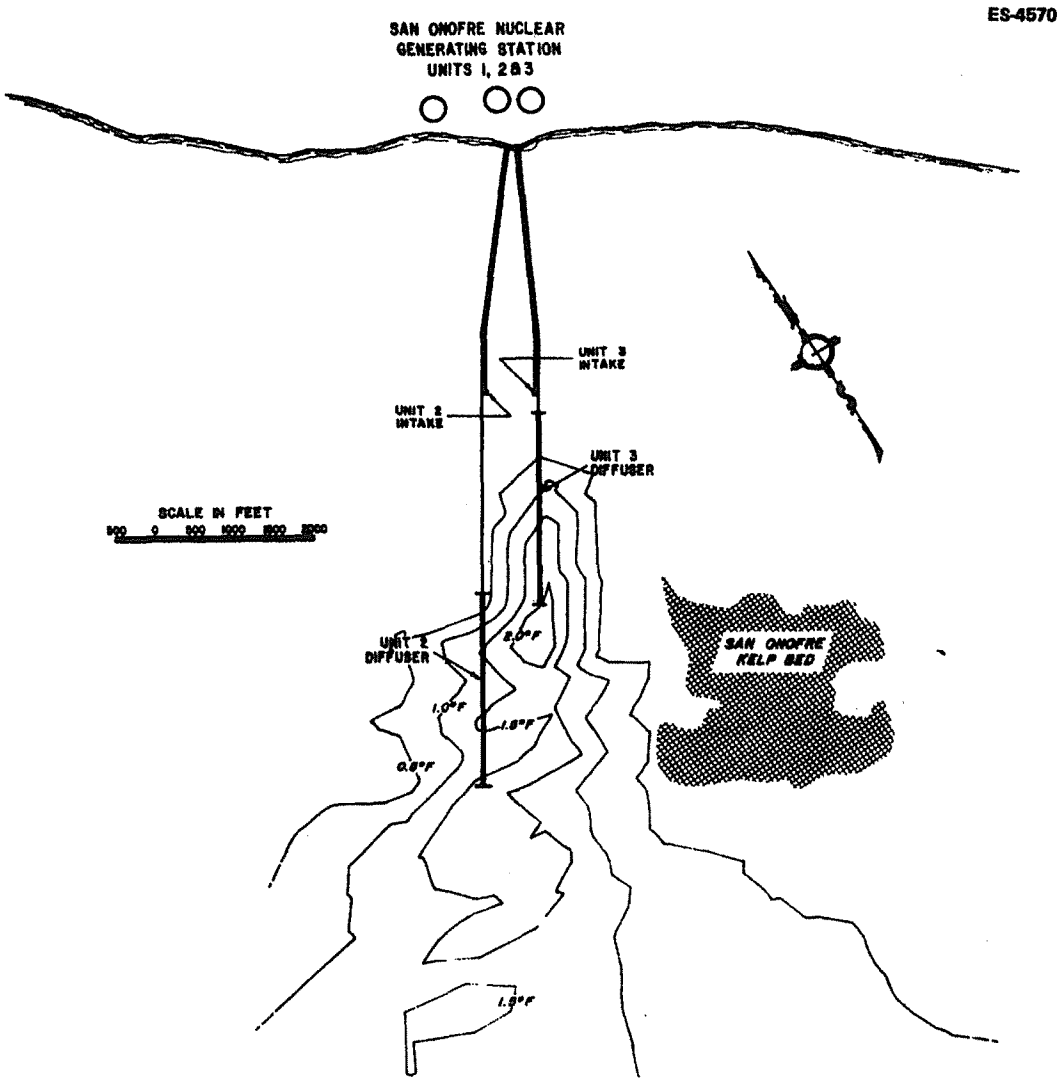

Fig. 5.3 Excess temperature at the surface predicted in the physical model study, for the case of no ambient flow. Source: ER Fig. 5.1-1. (To change ft to m, multiply by 0.3048; to change F° to C°, divide by 1.8.)

One numerical model was used to generate the induced flow from intakes and discharges from all three units. In this model, the intakes are represented as point sinks and the Unit 1 discharge is represented as a point source. The diffusers for Units 2 and 3 are each represented as a superposition of five jets. The hydrodynamics of each jet is modeled using a uniformly valid singular-perturbation theory, numerically corrected for bathymetry. The individual flows from the three intakes and discharges were summed to generate a total plant-induced flow field, as shown in Fig. 5.6.

A quasi-potential hydrodynamic model was used to generate the magnitude and direction of the natural currents and free surface displacement resulting from two tidal components and a net downcoast drift, at each grid element. The open-water boundary conditions were adjusted to produce flows which are consistent with observed data[4-7] from current meters and drogues. Three individual runs were executed, one for each of the two tidal harmonics (a 12.4 hr period and a 24.8 hr period), and a third to generate the drift current. These three flow components were combined, with the appropriate phase relationships, to produce a simulation of the natural flow field during mid-July conditions.

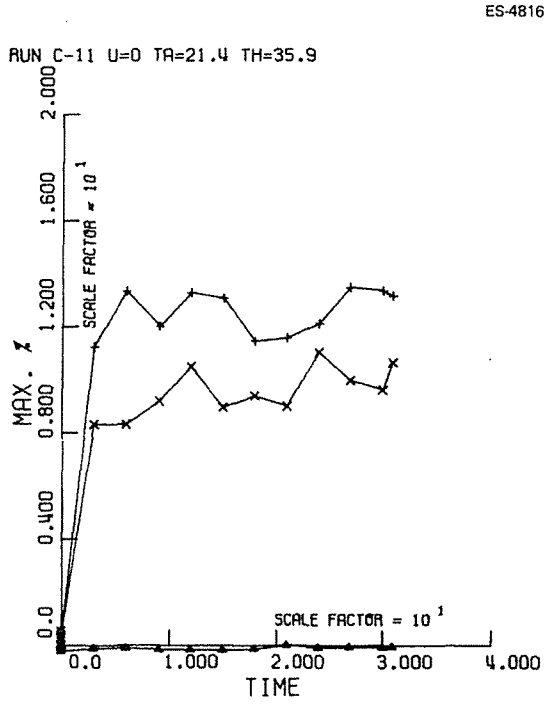

Fig. 5.4. Summary of maximum temperature excesses (in percent of source temperature excess) measured anywhere in basin (+), beyond 305 m (1000 ft) of diffusers (x), and ambient temperature (Δ) (Run C-11, u = 0.0 knot).

Water temperatures were computed using a depth-averaged thermal model. Inputs to this model were the calculated natural and plant-induced flows, along with meteorological parameters used for surface heat transfer calculations. The required meteorological variables are incoming solar radiation, cloud cover, air temperature, wind speed, and relative humidity. The incoming solar radiation is the mid-day value, which the code automatically adjusts for the time of day, from sunrise to sunset. The remaining parameters are taken to vary sinusoidally over one day and, therefore, require as input the daily average, the amplitude of the daily variation, and the time of maximum value. Typical values for these parameters during mid-July were used and are shown plotted as a function of time in Fig. 5.7.

This thermal model was first run without thermal output or flow from any of the units to produce a five-day simulation of ambient ocean temperatures. Subsequently, the calculation was repeated, with all three units operating at full capacity, to predict the total temperature field. These two results were then subtracted to generate excess temperature plots. Figures 5.8 through 5.15 show ambient flow and excess temperature plots at 6 hr intervals during the fifth day of the simulation at 2:00 am, 8:00 am, 2:00 pm, and 8:00 pm respectively. Isotherms are plotted in increments of 0.28°C (0.5°F) from 0.28°C (0.5°F) to 2.8°C (5.0°F). In general, the hottest spots occur directly above the discharge for each unit, with Unit 1 being consistently hotter than Unit 2 or 3. In addition, during the part of the tidal cycle when the natural flow is downcoast, there is a secondary warm spot approximately 3000 m (10,000 ft) downcoast of the discharges. This apparently is a result of the influence of the shape of the shoreline on the flow which, in turn, causes the plume from Units 2 and 3 to intersect the plume from Unit 1 at this point downcoast.

California thermal standards require that the 2.2°C (4°F) excess temperature isotherm never reach the shoreline or bottom, and that the 2.2°C (4°F) surface isotherm must be within 305 m (1000 ft) of the discharge point during at least one-half of the tidal cycle. Although the thermal model is depth averaged, it is still possible to address the state standards with the model results because the ambient crossflow has a destabilizing effect upon the discharge buoyancy. During portions of the tidal cycle, the ambient crossflow is of sufficient magnitude to dominate the stable stratification, resulting in mixing of the plume to the ocean bottom in the neighborhood of the diffuser. Recent work by Almquist[8] provides the basis for determination of conditions for vertical mixing. According to Almquist, the warm plume will mix to the bottom when the ratio of the ambient crossflow velocity to the cube root of the buoyancy flux per unit length of diffuser is greater than one. Figure 5.16 (a) is a plot of this stability parameter versus time for one tidal cycle based on the staff's ambient flow predictions. The shaded area shows the period during the tidal cycle when instability will occur and the water column will be vertically homogeneous.

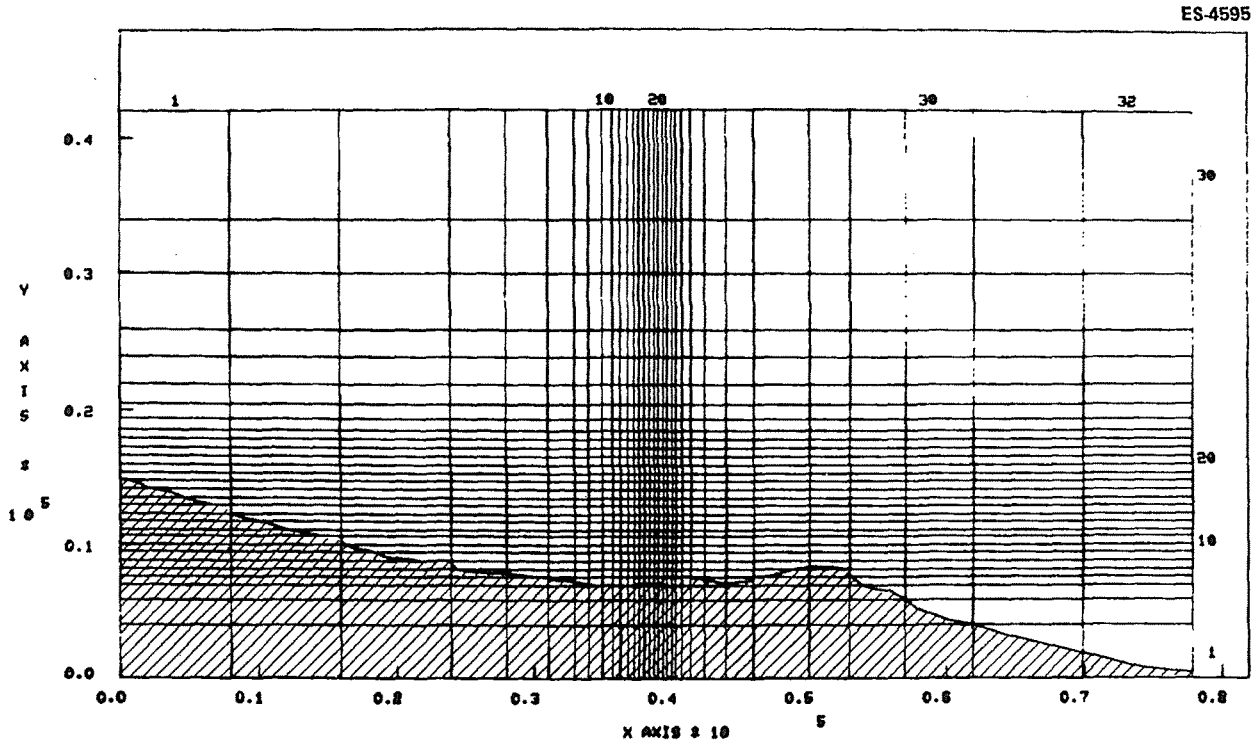

Fig. 5.5. Plot of region and grid system used for the mathematical model applications.

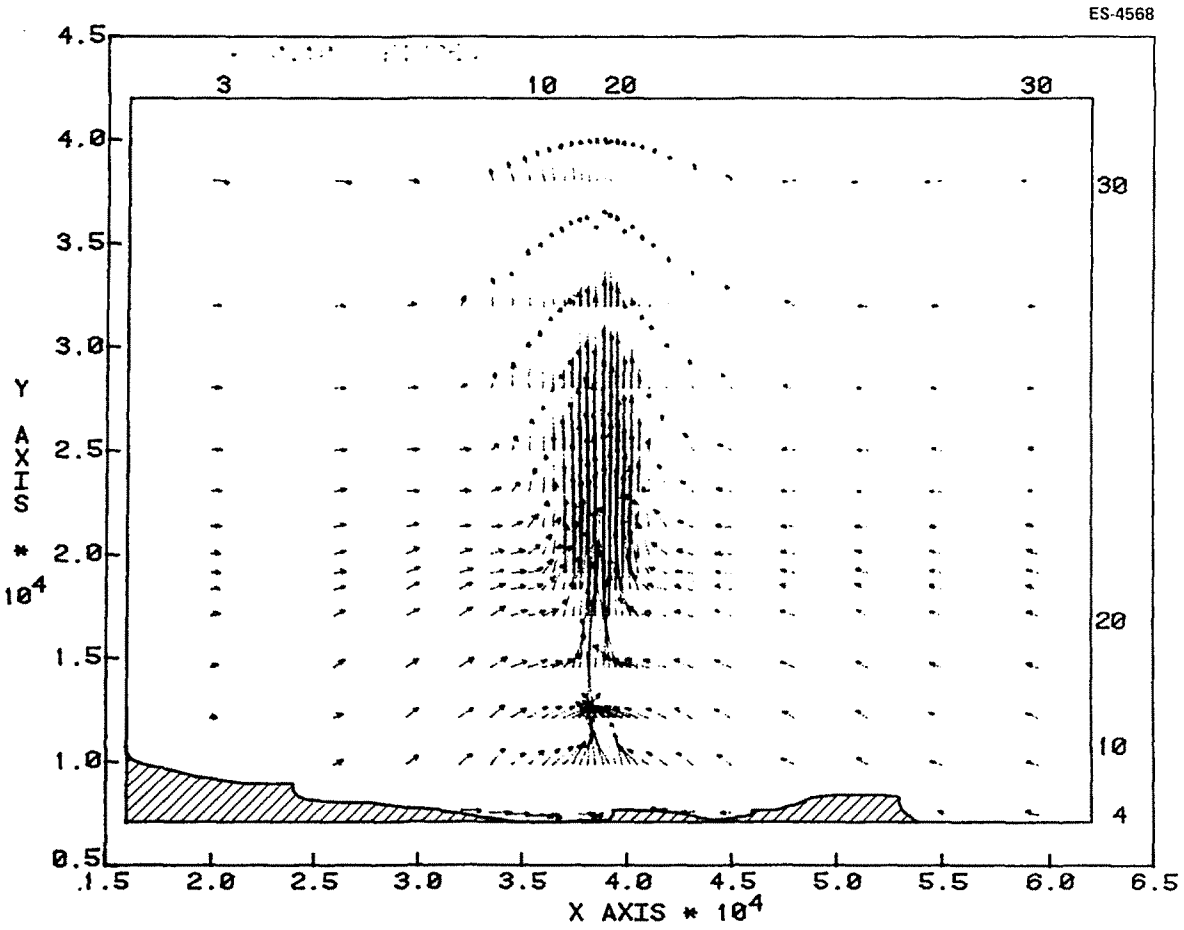

Fig. 5.6. Predicted, depth-averaged, plant-induced flow field for Units 1, 2, and 3.

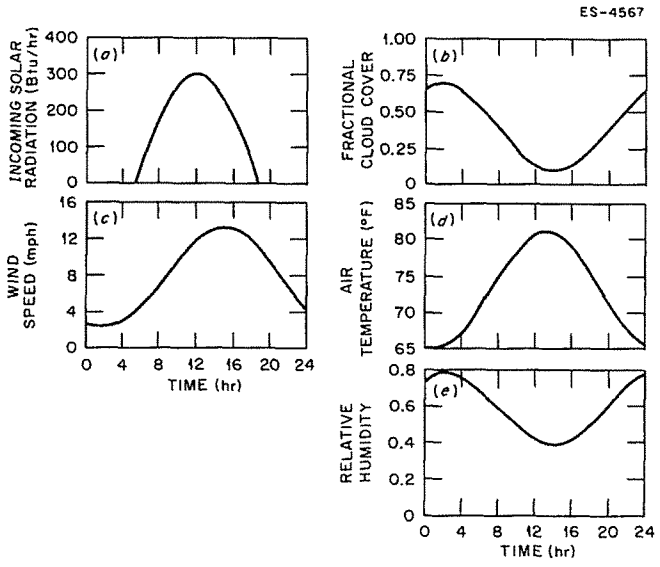

Fig. 5.7. Plots of meteorological variables as a function of time use in the thermal model. (To convert mi to km, multiply by 1.6; to convert °F to °C, subtract 32 and divide by 1.8.)

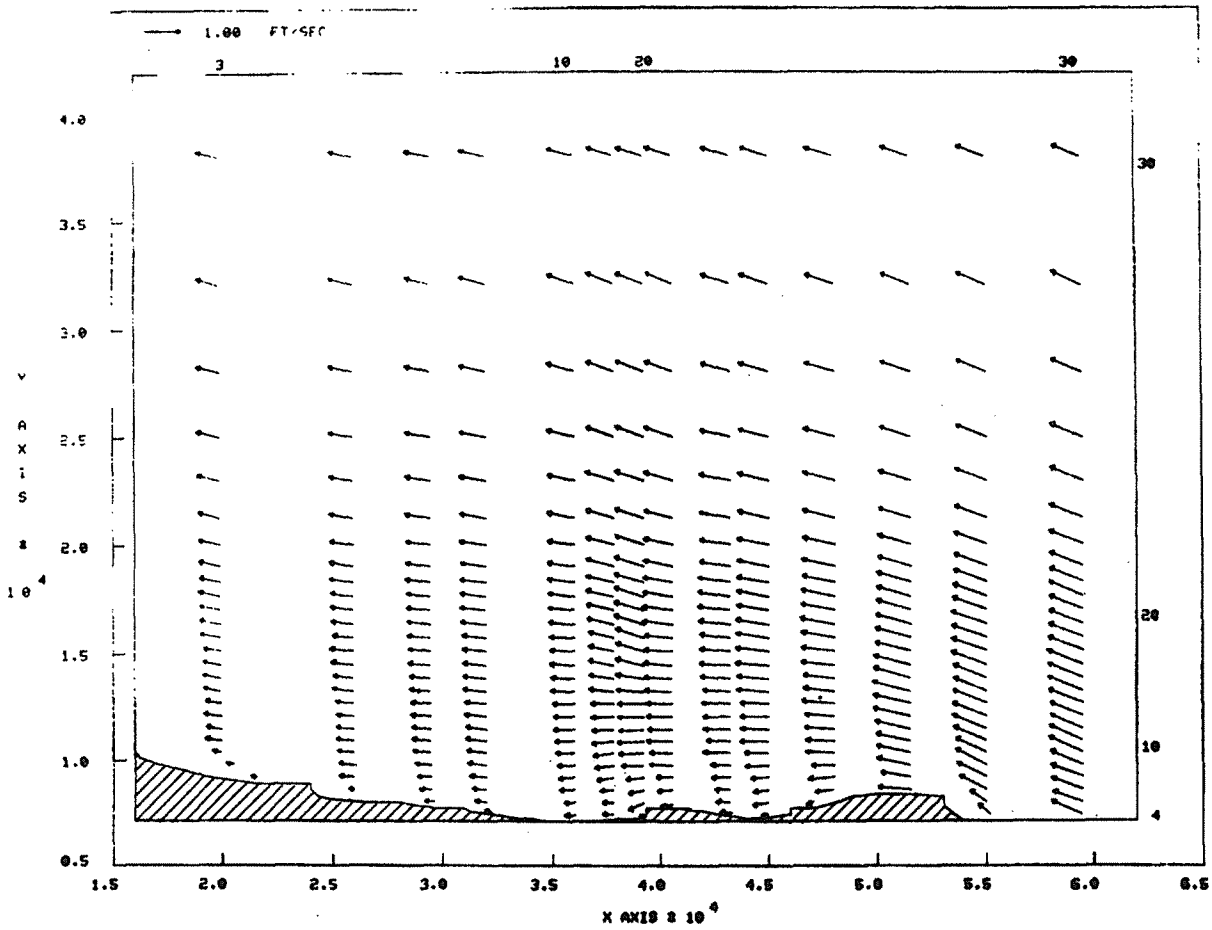

Fig. 5.8 Predicted natural flow field in the San Onofre region at 2:00 a.m. on the fifth day. (To change ft to m, multiply 0.3048; to change °F to °C, subtract 32 and divide by 1.8.)

Figure 5.16 (b) is a plot of the maximum excess temperature in the vicinity of the diffuser as a function of time for one tidal cycle. The shaded portion of this curve represents the period during the tidal cycle when the excess temperature is greater than or equal to 2.2°C (4.0°F) and the plume is vertically well mixed. In other words, the shaded area in this figure reflects the portion of the tidal cycle that will violate state thermal standards as applied to excess bottom temperature. It is clear from this figure that bottom excess temperatures greater than 2.2°C (4.0°F) are predicted to occur for two hours during the tidal cycle. Because, however, this prediction, based on a low ambient drift current, is conservative, excessive incremental bottom temperatures should not occur during each tidal cycle but rather during periods of worst case conditions.

With an assumed persistent drift, the data shown in Figs. 5.8 through 5.15 indicate that the constraints on the surface and shoreline excess temperature will be satisfied. The model is inadequate for addressing the issue of bottom temperature. However, at worst, the 2.2°C (4°F) excess temperature should only touch the bottom over a very limited area in the vicinity of the Unit 2 and 3 diffusers. On the basis of these results, the staff believes that violations of the state thermal standards are unlikely.

Heat treatment

Heat treatment will be necessary to control biological growth in the discharge conduits, intake conduits, and screenwells. Heat treatment consists of decreasing the flow rate through the heat-dissipation system while maintaining a constant waste-heat rejection rate. The result is an increased temperature rise across the condensers.

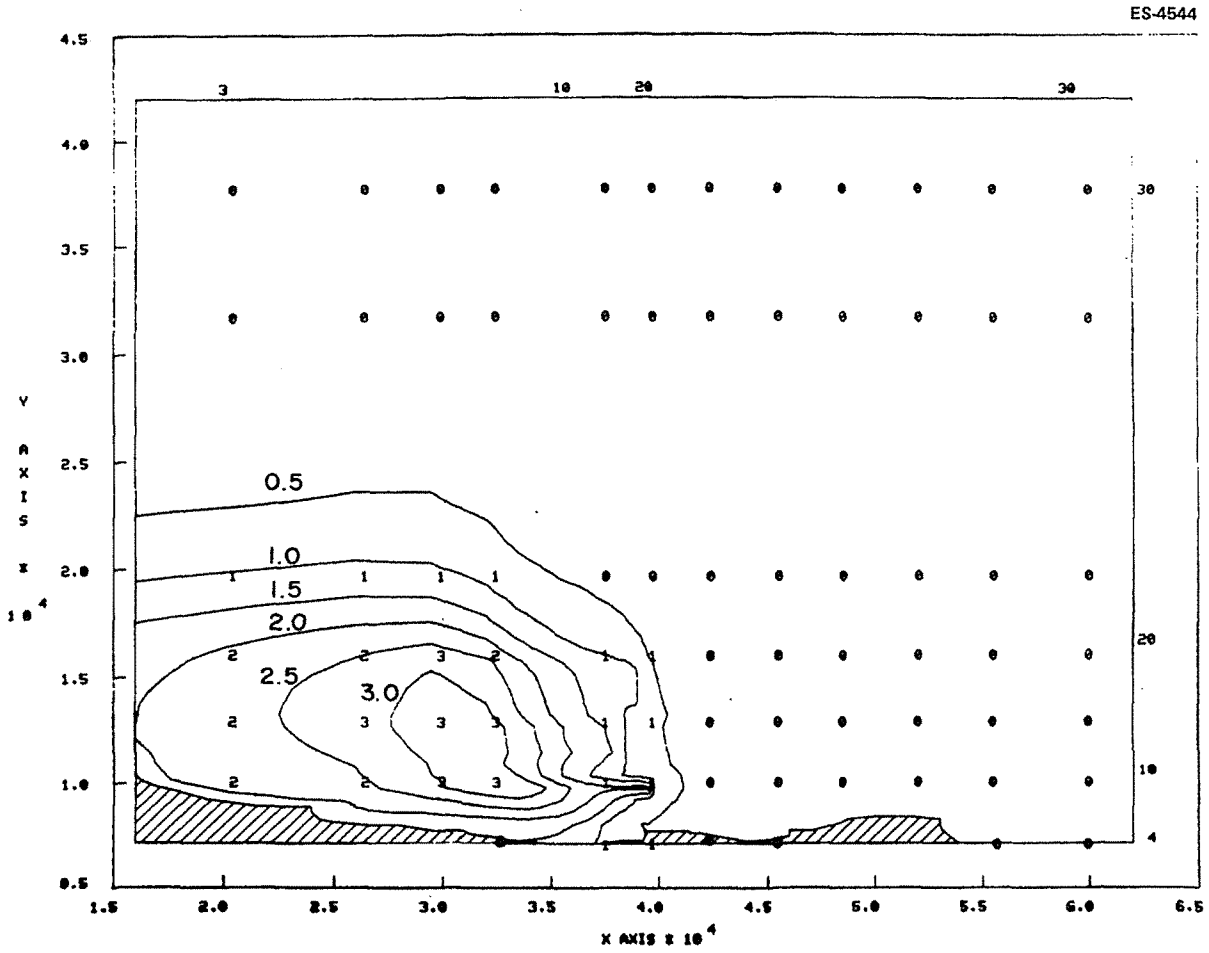

Fig. 5.9. Predicted excess temperatures in the San Onofre region at 2:00 a.m. on the fifth day. Isotherms are plotted in increments of 0.28°C (0.5°F) beginning with the 0.2°C (0.5°F) isotherm. (To change F° to C°, divide by 1.8.)

Discharge heat treatment will be required only when none of the following conditions are met:

1. discharge temperatures exceed 26.7°C (80°F) for a minimum of 1000 hrs,

2. discharge temperatures exceed 29.4°C (85°F) for 150 hrs, or

3. discharge temperatures exceed 32.2°C (90°F) for 31 hrs.

On the basis of these conditions it is expected that discharge heat treatment will be required only infrequently and usually during the winter. When discharge heat treatment is required, it will be performed at a discharge temperature of 40.6°C (105°F) for a duration of 1.1 hrs for Unit 2 and 0.9 hrs for Unit 3. During discharge heat treatment, discharge flow rates will be reduced and discharge temperatures will be increased. The discharge excess temperature will be the difference between the ambient water temperature and 40.6°C (105°F.) The reduction in the discharge flow rate will be proportional to the increase in the discharge excess temperature.

Although the exact nature of the thermal plume resulting from discharge heat treatment will be dependent upon the ambient conditions at the time of heat treatment, the thermal plume will be qualitatively similar to the plume resulting from normal operation as shown in Figs. 5.9, 5.11, 5.13, and 5.15. However, the flow is reduced and the temperature increased, so that the plume will be somewhat warmer and smaller in spatial extent than that from normal operation. The greatest plume temperatures will occur if Units 2 and 3 are heat treated simultaneously. A warmer plume will persist the longest when the heat treatment for these units are sequenced.

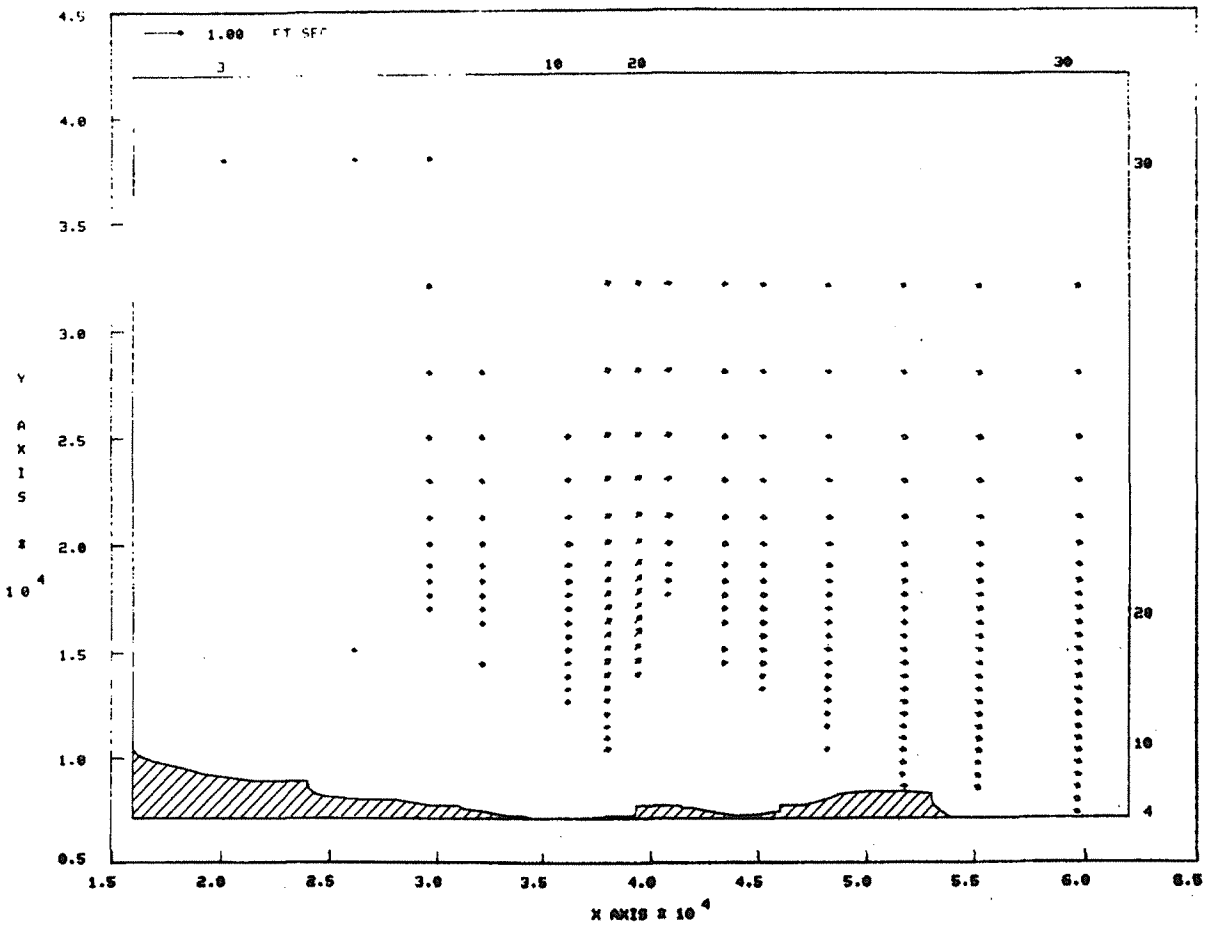

Fig. 5.10. Predicted natural flow field in the San Onofre region at 8:00 a.m. on the fifth day. (To change ft to m, multiply by 0.3048; to change F° to C°, divide by 1.8.)

During the summer months, discharge heat treatment should increase far-field plume temperatures by no more than 25% if both units are heat treated simultaneously (an unlikely event due to the increased probability of a reactor scram) and by no more than 15% if the units are heat treated sequentially. Plume temperatures at this extreme would persist for several hours, and plume temperatures would return to normal within several tidal cycles.

During the winter, the thermal plume should exhibit temperature distributions no greater that those predicted during the summer (Figs. 5.9, 5.11, 5.13, and 5.15). Excess temperatures during winter heat treatment will be greater than during the summer since a greater condenser temperature rise will be required to meet the design discharge temperature of 40.6°C (105°F). For an ambient water temperature of 10°C (50°F) (typical of winter) excess temperature at the San Onofre kelp bed would be approximately 4°C (7.2°F) if the Units 2 and 3 discharges are heat treated simultaneously and 2 to 3°C (3.6 to 4.8°F) if the discharges are heat treated sequentially.

Intake conduit and screenwell heat treatment will be performed by reducing the flow rate through the heat-dissipation system, thereby increasing the temperature rise across the condensers, and by reversing the flow direction so that ambient water is withdrawn through the diffuser and heated water is discharged from the velocity cap intake. The duration of this heat treatment will be 2.1 hr at an anticipated maximum temperature of 37.8°C (100°F). The plume produced by discharge through the velocity caps will resemble the thermal plume from Unit 1. Since this discharge does not induce the dilution produced by diffusers, the heat-treatment plume will be considerably hotter, though much smaller, than the plume resulting from normal plant operation. Plume temperatures will decrease approximately as the square of the distance from the intakes. Heat treatment on either the Unit 2 or the Unit 3 intake will have an indirect impact on the thermal plume of the unit operating normally. If, for example, the Unit 2 intake is heat treated while Unit 3 is operating normally, the Unit 2 heat treatment plume could be advected during certain times in the

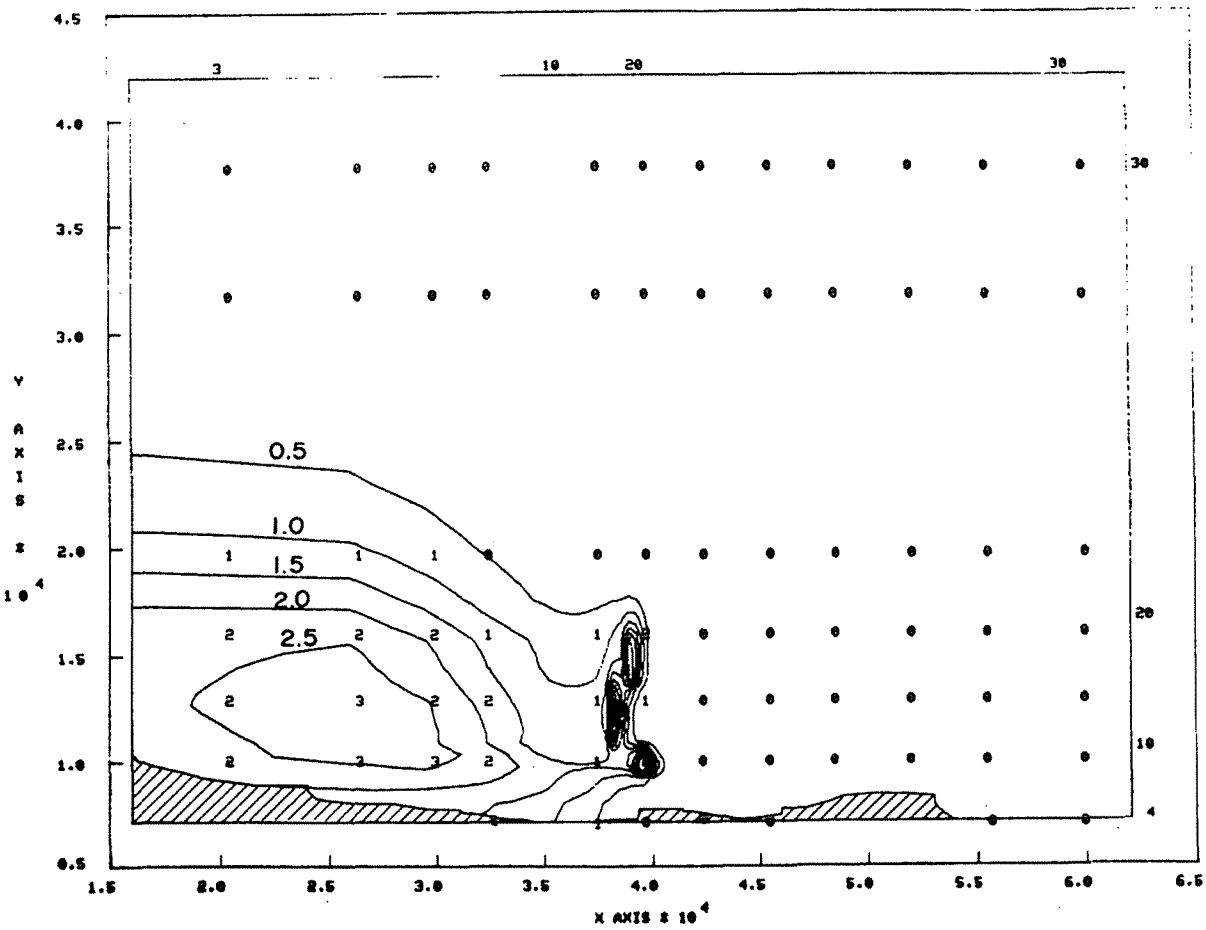

Fig. 5.11. Predicted excess temperatures in the San Onofre region at 8:00 a.m. on the fifth day. Isotherms are plotted in increments of 0.5°F beginning with the 0.5°F isotherm. (To change F° to C°, divide by 1.8.)

tidal cycle towards the Unit 3 intake. As a result, water at temperaures above the ambient could be drawn into the Unit 3 intake, resulting in a temperature rise in the Unit 3 discharge plume. Similarly, Unit 3 intake heat treatment could affect the plume from Unit 2. This recirculation phenomenon will be offset by virtue of the fact that only one unit will be discharging through the diffuser. Therefore, far-field diffuser plume temperatures will likely be less during intake heat treatment than during normal plant operations.

Both discharge and intake heat treatment will produce plumes showing temperatures greater than plume temperatures expected during normal operations. These increased temperatures will be greatest near the point of discharge, and will be of short duration returning to normal within several tidal cycles after completion of heat treatment.

Should it be determined that heat treatment results in significant excess temperatures at biologically sensitive areas, impacts could be mitigated by scheduling heat treatments during phases of the tidal cycle (such as periods when the tidal flow will transport the thermal plume away from areas of concern) that will minimize excess temperatures occurring in such areas.

5.3.2 Chemical discharges

The assessment of the effect of chemical discharges on water use contained in the FES-CP (5.2) is still, for the most part, valid. The discussion of the impacts of copper and nickel discharges has been altered by the change to titanium condenser tubes (3.2.4.1), and these discharges should not affect water use since the tubes no longer contain copper or nickel.

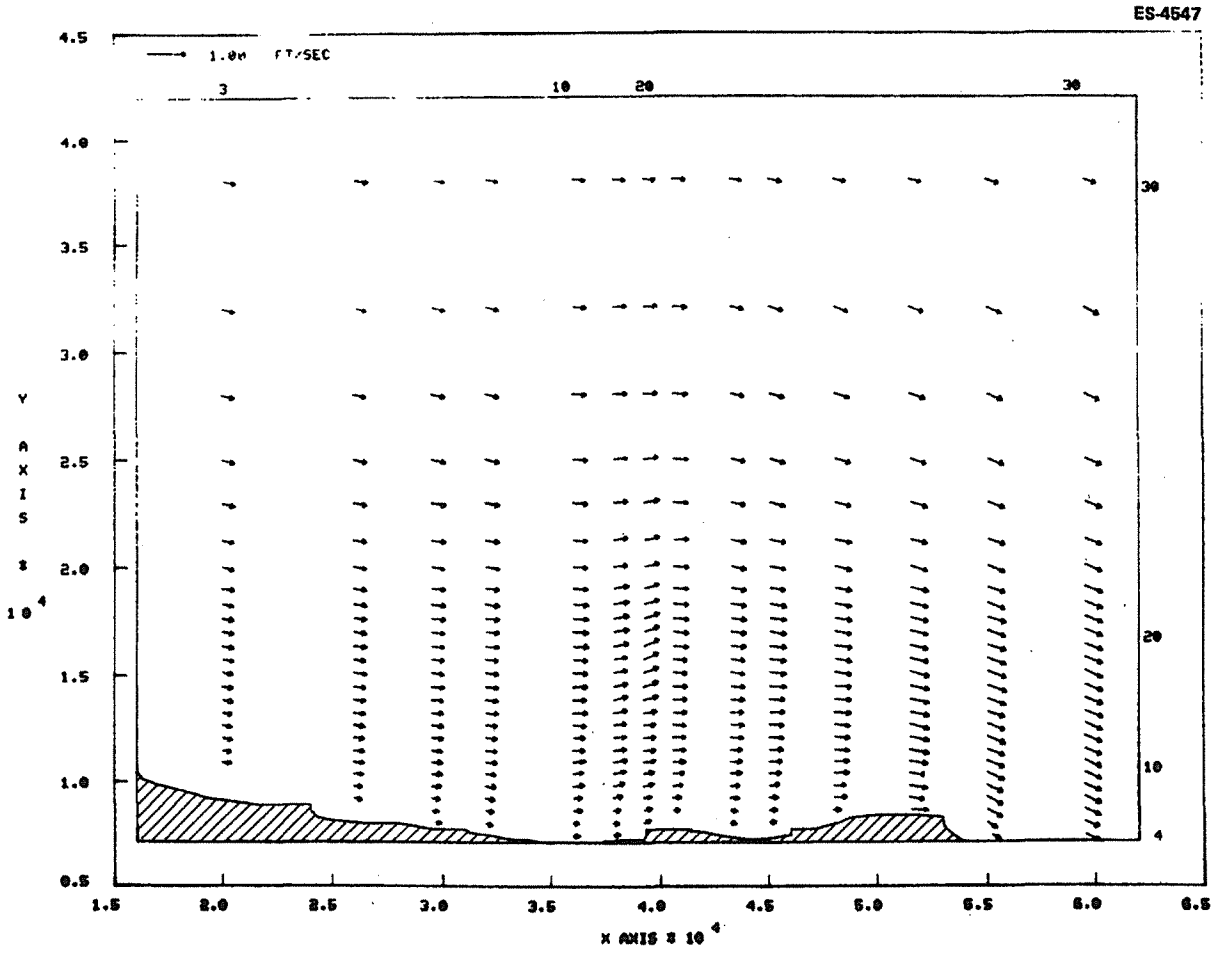

Fig. 5.12. Predicted natural flow field in the San Onofre region at 2:00 p.m. on the fifth day.

A National Pollutant Discharge Elimination System Permit for SONGS 2 & 3 was issued on June 4, 1976, by the California Regional Water Quality Control Board, San Diego Region. The chemical effluent limitations imposed by this permit are given in Sect. 3.2.4.1.

5.4 ENVIRONMENTAL IMPACTS

5.4.1 Terrestrial environment

Generally, operation of SONGS 2 and 3 and associated transmission lines should have no significant impact on the terrestrial ecological characteristics of the area. Although the transmission line routes have been modified since the issuance of the construction permit (3.2.5), the analysis of projected impacts as set forth in the FES-CP (5.3.1) remains the same. All new transmission lines will be constructed on existing rights-of-way; a total of 5.2 ha (12.8 acres) of land will be required for access road extensions and for new tower bases. The fire break which was bulldozed adjacent to the transmission line on Camp Pendleton Marine Base is expected to be maintained by periodic blading. Impacts associated with this operation should be minimal.

Other potential terrestrial impacts associated with operation of SONGS 2 and 3 which were not addressed in FES-CP are as follows. Some audible noise will be generated from the operation of the transmission lines. Noise levels, however, will be well within the urban evening levels accepted by the public (ER, Section 5.5.1). The transmission lines will be designed to minimize any affects on radio and television reception (ER, Section 5.5.1). Maintenance of the transmission lines (washing and repair work) requires that the access

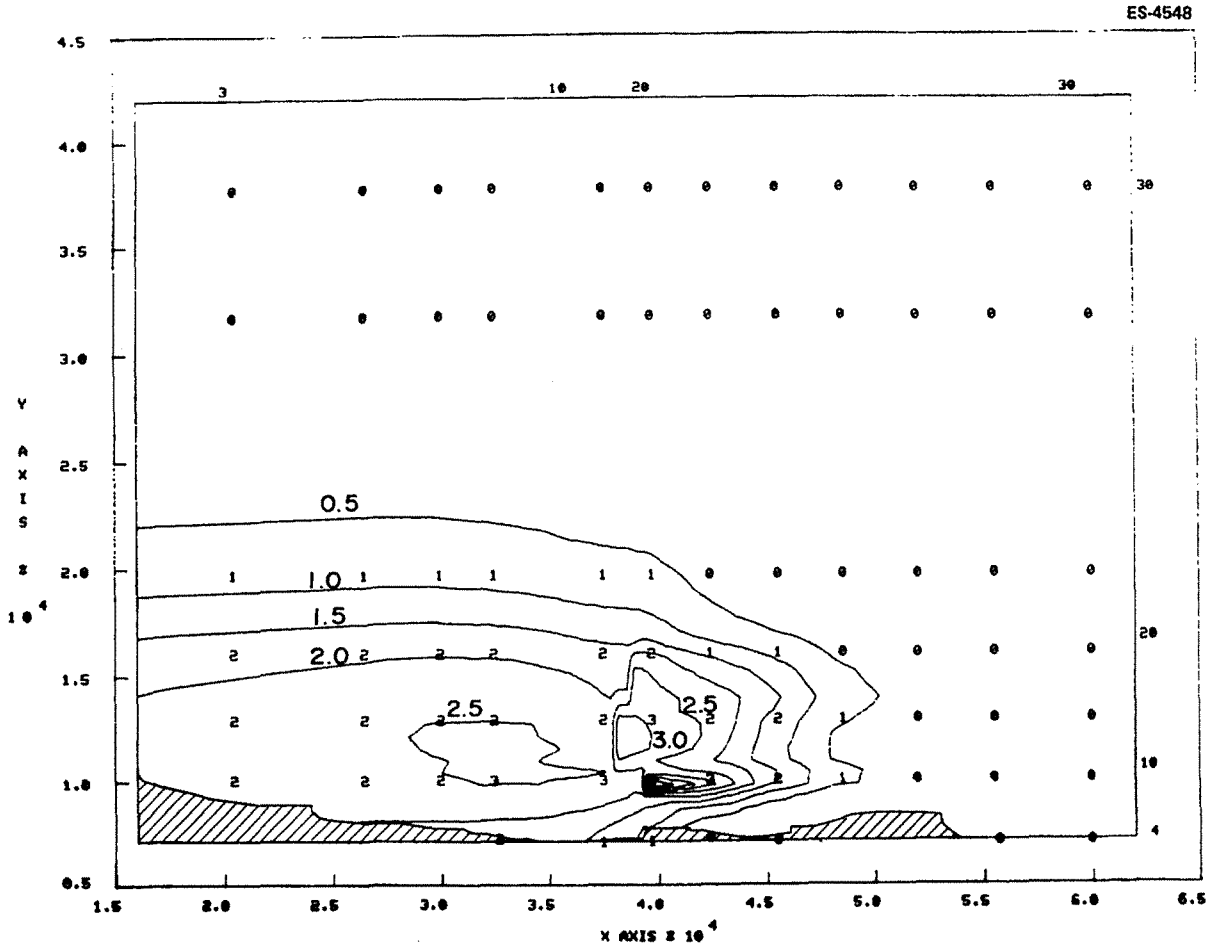

Fig. 5.13 Predicted excess temperatures in the San Onofre region at 2:00 p.m. on the fifth day. Isotherms are plotted in increments of 0.5°F beginning with the 0.5°F isotherm. (To change F° to C°, divide by 1.8.)

roads be kept in good condition by blading (ER, Suppl. 1, Item 21); associated impacts should be minimal. Maximum ground-level field gradients for all transmission lines will not exceed 7.5 kV/m (ER, Suppl. 1, Item 20). Generally, no harmful effects occur from the electrical fields associated with lines operating at 230 kV and below.[9]

5.4.2 Impacts on the aquatic environment

5.4.2.1 Effects of the heat dissipation system

A description of the heat dissipation system to be employed at SONGS 2 and 3 is found in Sect. 3.3 of the FES-CP. Design changes that have occurred since then are discussed in 3.2.2 of this statement. The only changes of potential significance for the assessment of biological effects involve the final specifications for the fish return system, the biocide use program, and the composition of the condenser tubing. Assessments of most major potential impacts also have been reevaluated in light of additional data obtained during technical specifications monitoring programs for SONGS 1 and from construction and preoperation monitoring programs for SONGS 2 and 3 (Section 2.5.2). Except as noted, the reassessments have resulted in the same conclusions that were reached in the FES-CP.

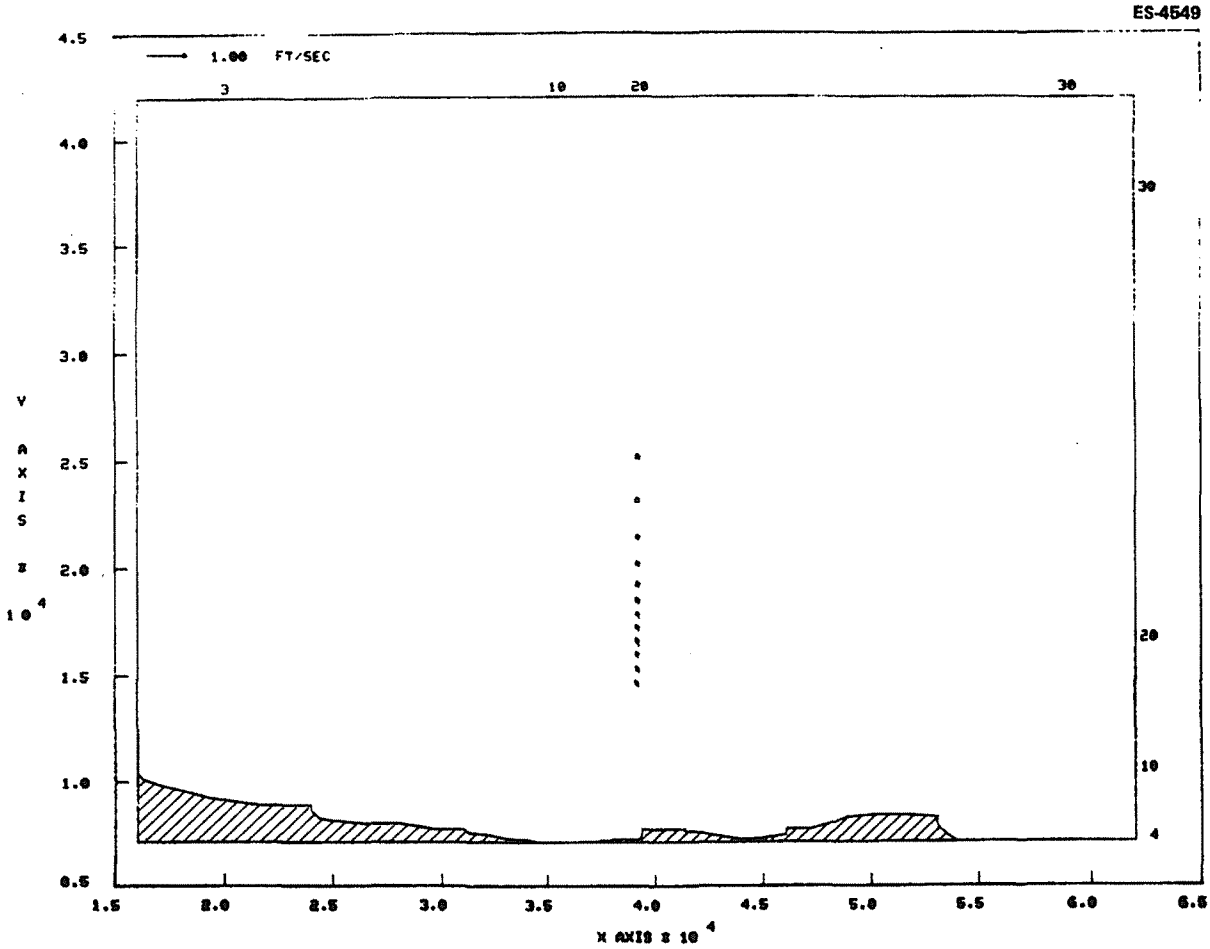

Fig. 5.14. Predicted natural flow field in the San Onofre region at 8:00 pm on the fifth day.

Thermal effects

The discharges from SONGS 2 & 3 must conform to regulations of the California State Water Resources Control Board, the Environmental Protection Agency (with regard to thermal discharges), and the California Regional Water Quality Board, San Diego Region, (under the auspices of the EPA) with regard to NPDES permit considerations (primarily chemical effluent limitations). The regulatory restrictions on thermal discharges are found in Sect. 5.1.1 of the ER; the NPDES permit, as amended, is found in Appendix 12C of the ER.

The results of thermal models used to evaluate temperature increases attributable to SONGS 2 & 3 (and incremental to SONGS 1) are discussed in Sect. 5.3.1. These data indicate that the thermal plume characteristics will be different from those estimated in the FES-CP and in the ER. Since the area to be affected by thermal discharges is now estimated to be greater than previously thought and since areas of substantial biological importance potentially will be affected (e.g., kelp beds), a reassessment is necessary.

Plankton. More planktonic organisms will be affected by thermal discharges than estimated in the FES-CP because the plume will cover greater area. The types of impact will, however, be the same (e.g., species compositon changes, greater respiration rates), and significant changes should be localized. The staff believes that changes which are produced in plankton communities will not threaten the ecological integrity of the near-shore region surrounding the facility (see pp. 5-26 to 5-32 of the FES-CP for a description of the anticipated effects).

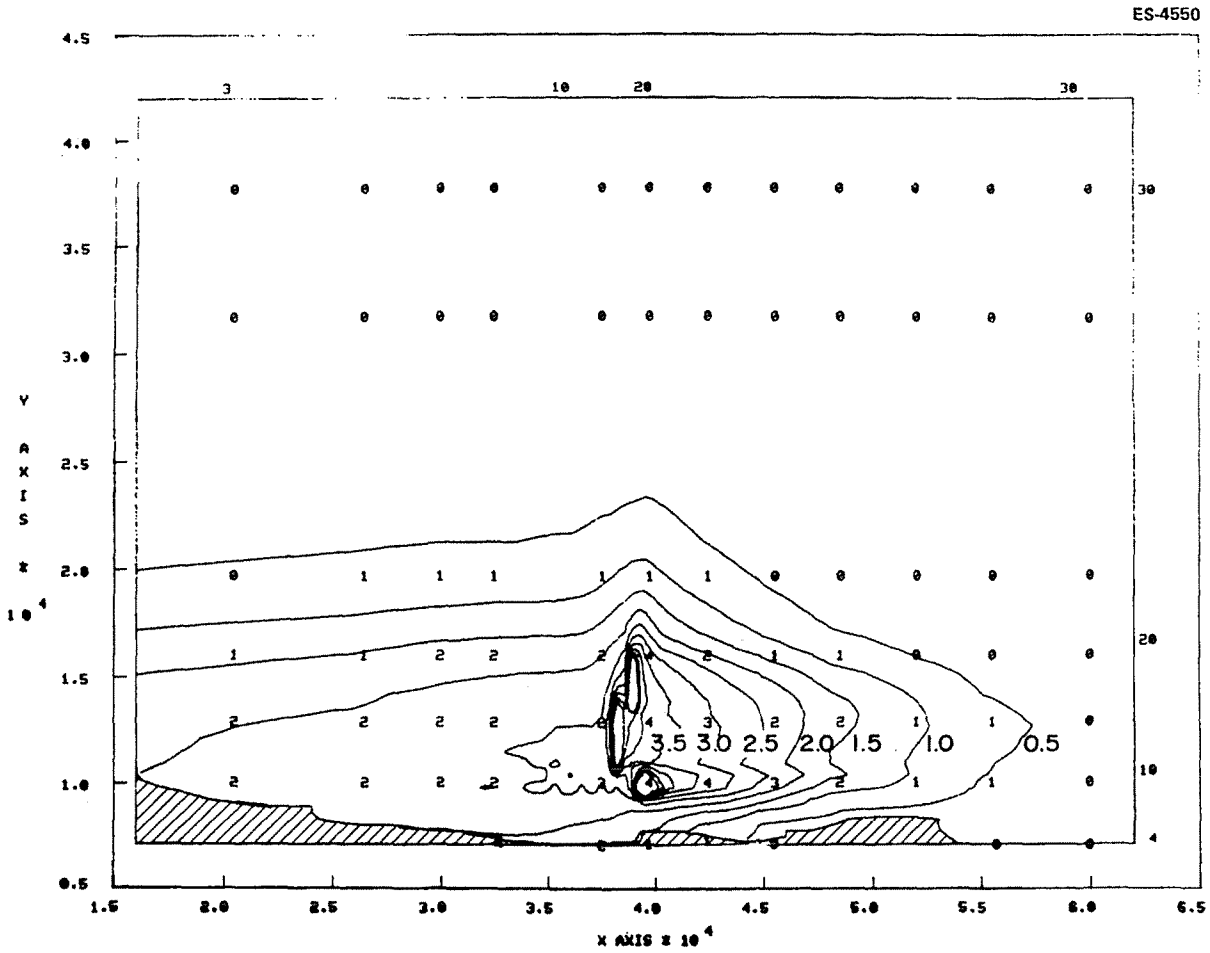

Fig. 5.15. Predicted excess temperatures in the San Onofre region at 8:00 p.m. on the fifth day. Isotherms are plotted in increments of 0.5°F beginning with the 0.5°F isotherm. (To change F° to C°, divide by 1.8)

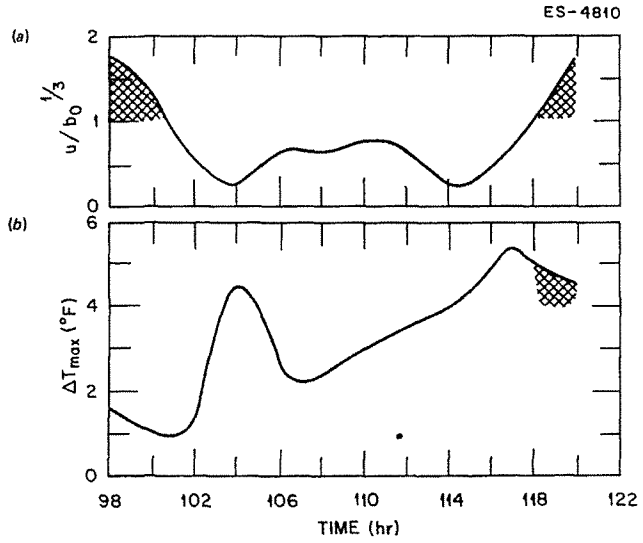

Fig. 5.16. (a) Plot of stability parameter versus time. The shaded area represents periods of vertical mixing. (b) Plot of maximum excess temperature versus time. The shaded area represents the period during which excess bottom temperatures are predicted to be greater than 4°F. (To change F° to C°, divide by 1.8.)

Fish. The types of impact on fish to be expected as the result of thermal discharges are the same as those discussed in the FES-CP. However, with more area to be influenced by the effluent, more fish potentially will be affected. The most observable change is likely to be shifts in the types of species (and their numbers) which inhabit the area; e.g., species which normally exhibit increased standing crops during naturally warm years will be more prevalent. Although the area of potential impact will be greater than estimated before, no fish populations are expected to be adversely impacted in the vicinity of the facility. Species composition changes, however, may affect commercial and recreational fishing within the thermal plume (in some cases adversely, and in others, beneficially; see FES-CP for details). However, because the plume will occupy a relatively small area of the available fishing space nearby, no significant changes in harvest rates for the various species are expected.

As stated in the FES-CP, cold kills of fish are not likely to occur to any large degree. The principal reasons are the relatively high ambient winter temperatures and the fact that all three units are not likely to be inoperative at any given time.

Benthic fauna. The major component of the ecosystem expected to receive the greatest impact from thermal discharges is the benthic community. Unlike free-swimming organisms, benthic individuals cannot easily avoid undesirable temperatures. And unlike planktonic organisms, they do not regenerate quickly to compensate for losses or experience continual, rapid recruitment from surrounding waters. Two major categories of the benthic community exist: animals, such as starfish and molluscs, and attached algae, the most conspicuous of which is kelp (discussed in the following section).

Among the benthic fauna recorded in the vicinity of SONGS during surveys conducted in 1977 in compliance with Environmental Technical Specifications criteria for SONGS Unit 1 were the gastropod molluscs Astraea undosa, Kelletia kelletii, and Roperia poulsoni, the asteroid echinoderm Pisaster giganteus, and the echinoid echinoderm Strongylocentrotus franciscanus.[10]

Although there have been only a limited number of detailed studies concerning the effects of temperature on marine species inhabiting the Pacific Coast, some recent laboratory simulation experiments of 12 to 14 weeks duration have examined the effects of thermal effluent on the survival, growth, and state of health of seven motile invertebrates from shallow rocky habitats along the southern California coast.[11] The treatment conditions simulated temperatures measured at distances of 84 and 335 m (276 and 1098 ft) from the cooling-water discharge structure of the Redondo Generating Station, located approximately 100 km (62 miles) upcoast of SONGS. Several of the species displayed low survival and impaired growth, especially among large adults, in response to the simulated thermal plume conditions at 84 m. Weekly mortality data for S. franciscanus, P. ochraceus, and R. poulsoni showed that individuals of all three species began to die when the temperature fluctuated over a range of 19° to 23°C (66° to 73°F), with a mean for the week of 21.4°C (70.5°F). No deaths had occurred the previous week when the same temperature range prevailed and the mean was slightly higher 22.8°C (73°F). The mortality observed during the second of these two weeks may, however, actually have been a delayed response to the higher average temperature of the previous week.

In the test involving R. poulsoni under a different thermal regime, deaths began occurring when the temperature flunctuated between 18° and 24°C (64° and 75°F) during the week, with a mean of 20.3°C (68.5°F). Although mortality began to appear at a lower mean temperature than in the previous experiment with this organism, the maximum temperature in this second experiment was 1°C (1.8°F) higher (24° vs 23°C) (75°F vs 73°F) and the temperature range was 2°C (3.6°F) wider (6° vs 4°C) (4.28° vs 39.2°F) than in the previous experiment. These results demonstrate the complicated nature of temperature effects; that is, adverse conditions can result from a critical high temperature of short duration, an extreme temperature fluctuation of short duration, or a prolonged period of a high but normally subcritical temperature.

The ambient depth-averaged temperatures predicted for the hottest time of the year (end of July) in the vicinity of SONGS are shown in 5.3.1. This section also contains data on the temperature expected during the operation of all three units. Temperatures potentially as high as 27.8°C (82°F) may occur naturally, and increases of 0.5° to 1.7°C (0.90° to 3.1°F) brought about by the operation of all three units can occur within an area of several square kilometers.

On the basis of the 1976 study,[11] the staff concludes that several components of the benthic fauna in the vicinity of SONGS would probably be adversely affected in areas where weekly mean temperatures of 22°C (71.6°F) prevail for one month or more or where daily temperatures reach or exceed 24°C (75°F). It is not, however, anticipated that temperatures averaging 22°C will occur for more than 2 to 3 weeks or that the area experiencing temperatures of 24°C or greater as a result of SONGS operation will be considerably larger than the area experiencing these temperatures under natural conditions.

The staff concludes that any impacts to the benthic fauna as a result of thermal discharges will be minimal and of an acceptable nature.

Kelp. Kelp beds off California occupy roughly 194 sq km (75 sq mi) of ocean bottom in water depths of 6-18 m (20-60 ft).[12] Although management efforts have possibly halted further severe decline, kelp bed coverage has decreased markedly since about 1920. Although this deterioration may have been partially a result of overharvesting, much of it is probably caused by the increased alteration of the near-shore environment by human activities. In particular, increased temperatures and increased turbidity have been shown to be inimical to kelp survival.[13]

Even without the influence of human perterbations, individual kelp beds experience long-term variations in stand density, productivity, areal extent, etc. Natural factors implicated in causing these variations include storm damage (causing detachment of plants), sand movement (burying holdfasts and causing detachment or prohibiting regeneration), introduction of turbid water masses, high natural temperatures, influx of grazing urchin masses, and fungal and bacterial diseases.[12] Thus, for example, in 1957-59, unusually warm temperatures off southern California caused an estimated loss of 90% of the regions' beds during this period (ER, pp. 2.2-28 and 2.2-29), as judged by surface examinations. Individual beds also commonly display changes in canopy extent during the year. For example, the three beds near the SONGS site showed marked variation in canopy area during 1975 and 1976 (Fig. 2.10). Typically, canopy tissue deteriorates during the warmest time of the year, leaving the basal portion of the plant (which is in cooler water) for regeneration when temperature and light conditions permit.[13] Reduced surface nutrients and higher bottom nutrient mixtures may also contribute to canopy deterioration and basal tissue regeneration respectively.[14]

Kelp beds represent a very important ecological community in California's near-shore waters. It has been estimated that kelp beds are at least three times more productive than the autotrophic components of other near-shore communities. Conservative estimates place the total standing crop of kelp in southern California at 1.8×10^9 kg (2 million tons) and new annual growth potential is on the order of 2-3 times this amount.[13] Kelp beds harbor numerous types of animals and plants, adding greatly to the diversity of an area. Invertebrates commonly found on the plants themselves include ostracods, copepods, amphipods, decapods, polychaetes, nematods, bryozoans, turbellaria and molluscs. Molluscs and echinoderms are kelp grazers prevalent on and around the plants. It is estimated that the larval, juvenile, and adult stages of 25 main sport fish use kelp beds for refuge and food gathering (eating the associated invertebrates, the kelp itself, or other algae), and the average standing crop of fish is estimated to be 300 kg/ha (300 lbs/acre).[13] Kelp not only enter the food chain via grazers, but they contribute large quantities of organic matter to the detritus-based food chains. For example, since several detritus feeders are intermediate in the grazing food chain of many of California's commercial fishes, kelp indirectly influences the populations of these fishes through the production of detritus.[13]

Kelp is an important commercial commodity as well. Although used extensively in the past for such diverse things as fertilizer, cattle feed, and for the production of potassium, acetone, and iodine, most kelp today is processed for the production of algin, a polysaccharide with numerous industrial uses.[12] It is estimated that roughly 15% of the annual kelp production is harvested yearly at a landed value (1964 dollars) of $2 million (market value is roughly 4 times this figure).[13] The kelp beds in the vicinity of SONGS are not now harvested.

Besides the necessity for a favorable physicochemical environment, kelp requires a solid substrate for attachment. Thus, the local distribution of kelp beds in an unperturbed area is largely substrate-dependent. Near the SONGS site, sandy bottoms are prevalent limiting the areas where beds can develop. Natural environmental fluctuations (e.g., higher-than-average temperatures) can virtually denude an area, but, since the casual phenomena are short-lived, kelp beds generally reestablish themselves quickly. However, anthropogenic disturbances frequently completely eliminate kelp beds in their sphere of influence because they generally are of long duration. Even chronic, low-level perturbations which only slightly decrease kelp production often cause the consumption by grazers to outpace new growth.[13]

The temperature tolerance of kelp is probably a reflection of a combination of factors, including physiological responses, susceptibility to disease, and susceptibility to grazing. It has been rather well established that temperatures above 18-20°C (64-68°F) cause deterioration of kelp, and the degree of degradation is directly related to the duration of the exposure to these temperatures. Increased surface temperatures caused by SONGS operation (all three units) would have the effect of extending the period of canopy absence. During the hottest time of the year, data in Section 5.3.1 suggest that the closest kelp bed (San Onofre bed) will experience an average surface temperature increase (over a 24-hr period) of 1.4°C (2.6°F); the range of temperature increase will be 0.6-2.2°C (1-4°F).

Although daily natural temperature variations of 1°C (2°F) are not uncommon in the area (ER, p. 2.2-28), they would not be continuous in nature and thus might not affect the bed

as severely as the continuous SONGS discharges would, where the thermal plume may impinge on the bed for a longer time. Prediction of the degree to which canopy disappearance would be prolonged is impossible. Regeneration would be quicker in years with naturally cooler ocean temperatures, assuming the regenerative tissues remained unaffected (see below).

The greatest threat of SONGS to the long-term survival of the San Onofre kelp bed is the possibility of injury to the basal tissues from which the canopy is regenerated each year as the waters cool. Estimates for bottom temperatures within the bed at the end of July (Section 5.3.1) indicate that temperatures could reach 23-25°C (74-76°F), with a 24-hr mean of 24°C (75°F). Such temperatures would represent a 1-1.5°C (2-3°F) increase above ambient conditions encountered during the hottest portion of the year (conditions which are likely to persist for up to approximately a one-week period) (Section 5.3.1). Although the ambient temperatures given above would in and of themselves be detrimental to the kelp, exposure to them for up to a week would not likely cause permanent degradation of the entire bed[13] because the mean exposure temperature does not quite exceed a recognized threshold temperature for rapid degradation (24°C) and deeper portions of the bed would be slightly cooler than the average and would have a greater probability of maintaining a viable population. However, adding 1-1.5°C to these ambient temperatures could place the bottom kelp tissues in a critical temperature environment subjecting the tissues of most of the plants to temperatures greater than their short-term tolerance, and prolonging the period of time in which the plants would experience temperatures greater than 20°C (68°F), which would cause them to be more susceptible to grazing pressure, diseases, etc., leading to their eventual demise.[13] Since ambient bottom temperature in the region from August – early September may typically range up to 19°C (66°F) (Section 5.3.1), a several week period could exist in which temperatures exceed 19°C.

The information above suggests that the thermal discharges from SONGS 1, 2 and 3 may result in the destruction of at least a portion of the San Onofre Kelp Bed during the summer months. Under average conditions, the result may not be detectable or it may be manifested in a noticeably earlier decline of the canopy. However, under extreme worst case conditions (e.g., several days with high ambient temperatures and slack currents, and with all three plants operating continuously), destruction of the basal regenerative tissues might result. Although recolonization of the area from outside sources could occur during the cooler months, the community, if destroyed frequently, could never achieve a stable state characteristic of other kelp beds in the area. Furthermore, constant temperature increases coupled with added turbidity would be inimical to interim reestablishment since these factors tend to increase the effects of grazing.[13] The perennial occurrence of worst case conditions seems highly unlikely (Section 5.3.1) and the staff thus concludes that the long-term thermal impacts from normal station operation are not likely to be severe. However, in view of (1) the potential additive of synergistic effects of turbidity and sediment with thermal discharges, (2) the ecological importance of kelp beds and their already diminished stature, and (3) the fact that the San Onofre bed represents about one-third of this resource along approximately 16 km (10 mi) of shoreline in the vicinity of SONGS, the staff recommends monitoring to ensure the bed's protection.

Heat treatment

In addition to the thermal discharge associated with the normal operation of the facility (see above), the applicant proposes to heat treat portions of the intake and discharge systems to remove biological growth (see Section 5.3.1.2). This antifouling procedure will result in periodic discharge temperatures higher than those normally encountered. As a result, the state required the applicant to perform a demonstration to determine if significant impacts will result from the procedure. This demonstration, in part provided for under part 316(a) of the Federal Water Pollution Control Act of 1972, was used to determine if the proposed process is acceptable to these government agencies. To date, approvals have been obtained from the California State Water Resources Control Board (Resolution No. 80-95 adopted December 18, 1980), thus removing any regulatory obstacles from the state for conducting the antifouling process.

As stated in Section 5.3.1.2, biofouling control will be needed primarily in the winter; ambient summer temperatures will normally be sufficiently high to obviate the need for the procedure at that time. Additionally, the state has imposed a five-week minimum treatment interval for each unit. Hence, the biological effects will be a manifestation of short-term intermittent stress. Localized mortality and chronic debilitation are inevitable, particularly for sessile organisms. However, only one community of organisms is judged to be significantly vulnerable ecologically – the San Onofre Kelp Bed.

The thermal effects of normal operation on kelp are discussed above along with more detailed information on thermal tolerances, etc. Since intake heat treatment should produce smaller far-field ΔT's than that produced by normal operation (Section 5.3.1.2), the effects on kelp will be less than or equal to the effects induced normally. Discharge heat treatment is

judged to produce potentially greater far-field thermal effects, however. Without dispersing currents (i.e., during a slack in the tidal cycle), kelp bed temperatures during the summer may increase by ca. 0.4°C (0.72°F) (above normal operations) (Section 5.3.1.2). This negligible increase would not be likely to affect the kelp, particularly since the canopy will be naturally reduced (see kelp discussion above) and the heated water is not likely to be near the bottom.

Discharge heat treatment during the winter may cause a temperature increase in the kelp bed of up to 4°C (7.2°F). The kelp are ordinarily tolerant of the absolute temperatures this would produce, but the rapid heat-up involved (e.g., 0.5 h) could be deleterious since the kelp would not be "hardened" for such a temperature regime. However, it is not possible to tell from the literature the severity of such an event. The plants could be only temporarily taxed physiologically and rebound without sequelae. Conversely, the stress could initiate an increased vulnerability to other, natural stresses such as predation, sloughing, and encrustation. Overt mortality is unlikely. In the absence of definitive data, it would be wise to (1) ensure continuation of the kelp monitoring program and (2) attempt to avoid heat treatment during unfavorable ocean current conditions. As pointed out in Section 5.3.1.2, effects can be mitigated by staggering heat treatment at Units 2 and 3 (thus allowing thermal dispersion from the first treated unit before treating the second) and by conducting the antifouling procedures when current and tidal cycles are known to move the adjacent water mass away from the kelp bed.

Turbidity and sediment transport effects

The FES-CP discusses the types of effects turbidity increases due to SONGS operation will have on the various biological communities, indicating that it is not possible to predict the areal extent of this impact.

The organisms likely to receive the greatest impact from increased turbidity are those which cannot readily avoid adverse conditions or do not regenerate quickly (or experience rapid recruitment from surrounding waters), namely, the benthos. Since the San Onofre Kelp Bed is estimated to be enveloped within the thermal plume, it is likely that it will also experience increased turbidity. The effect on the kelp would potentially be decreased photosynthesis, possibly causing many of the plants to die if the exposure is continuous (a 1% increase in the absorption coefficient has been found to result in a 20% loss in net photysynthesis at 15 m (49.2 ft)[13] and burial of the holdfasts in particles which settle out, inhibiting regeneration and recolonization. Regardless of the magnitude of these effects, their presence would add to the probability that the kelp bed would be adversely affected (see preceding section).

Some of the effects of increased sediment transport on benthic fauna are addressed in the FES-CP. The staff has further addressed the impact of the change in sediment size in areas near the SONGS site which would result from sediment redistribution. A study conducted during SONGS 1 operation, shutdown, and subsequent startup showed a significant reduction in the number of species and the total abundance of individual benthic fauna (primarily molluses and polychaete worms) within 200 m (656 ft) of the intake and discharge structure, probably because of the coarsening of the grain size of the sediments in this area.[15] Sediment coarsening appears to be mainly a result of the discharge of shells and shell fragments of fouling organisms (barnacles, molluscs) sloughed from the insides of the intake and discharge pipes during normal operation and especially during heat treatment.

The sediment-altered area associated with SONGS 1 (following 13 years of operation) is estimated to be approximately 125,600 m^2 (.048 mi^2), on the assumption of a circular pattern of effect with a radius of 200 m (656 ft).[15] Assuming sediment alteration associated with SONGS 2 and 3 forms a rectangular pattern approximately 200 m from the sides and ends of each diffuser, the area affected by SONGS 2 and 3 would be approximately 0.8 km^2 (0.31 mi^2). Adding this to the area affected by SONGS 1 (125,600 m^2 (0.48 mi^2)) plus an estimate of the area affected by heat-treatment backflushing of the SONGS 2 condenser (59,900 m^2 (0.023mi^2)) gives a total area affected by all three units, from both normal operation and heat treatments, of approximately 1.0 km^2 (.386 mi^2).

It is difficult, however, to extrapolate from the effects associated with the point source discharge of SONGS 1 to the 762-m (2500-ft) long dual, staggered diffusers of SONGS 2 and 3. SONGS 2 and 3 jointly are expected to have 5 times the cooling water flow rate, 3.3 times the intake pipe area per intake structure, and 12.5 times the total fouling surface area associated with the two outfall lines that SONGS 1 has.[15] None of these factors has been taken into consideration in calculating the area potentially affected by SONGS 2 and 3. The magnitude of the effect will also increase with duration of operation.

In contrast to the above prediction of benthic impoverishment, the staff concludes that a zone of enhanced species diversity and abundance is to be anticipated beyond the area of

sediment modification. This conclusion is also based on results of the Marine Review Committee study,[15] which indicates that within a zone of 200 to 800 m (656 to 2424 ft) from the intake and outfall of SONGS 1, diversity and abundance of benthic fauna show a positive correlation with proximity to these structures. It has been estimated that this area contains 2 times the diversity and 8 times the abundance of benthic fauna as the sediment-altered area within the 200-m (656-ft) radius of the outfall. This phenomenon is believed to be a result of organic enrichment from sinking plankton fragments and/or material continually resuspended by the localized turbulence of the discharged cooling water.[15]

Assuming an eliptical ring pattern for this area of enhancement, starting from a point 200 m (656 ft) on either side of the intake and outfall structures of SONGS 1, to 1200 m (3936 ft) upshore and downshore (the extent of enhancement appears to diminish between 800-1500 m (2624-4920 ft) downcoast) and extending for a distance of 400 m (1312 ft) beyond the 200-m (656-ft) point in the onshore and offshore directions (offshore/onshore effect is much less than longshore), the area of enhancement is estimated to be approximately 2.1 km^2 (0.81 mi^2).

Predicting the magnitude of an enhancement effect associated with SONGS 2 and 3 on the basis of SONGS 1 observations is complicated. The total volume of dead plankton dispersed might be approximately 5 times that of SONGS 1 as a result of the 5-fold increase in cooling water flow rate. However, the volume of discharge for each diffuser port is less than for the single outfall of SONGS 1 so that the distance the entrained plankton are dispersed would be expected to be less. There may also be considerable differences between the shallow current patterns where the SONGS 1 outfall is located and the current patterns in the deeper waters where the SONGS 2 and 3 diffusers will be located.

If it is assumed that the dispersal distances for dead plankton will extend approximately half the distance from the sediment-altered area surrounding the SONGS 2 and 3 diffusers as was found associated with the SONGS 1 discharge, and accounting for overlap, the area of enhancement would be approximately 2.4 km^2 (0.93 mi^2). Adding to this the area affected similarly by SONGS 1 gives a total of 4.5 km^2 (1.74 mi^2). This is an area approximately 5 times that estimated to show a reduction in benthic diversity and abundance. The staff concludes that the impacts likely to occur to the benthic fauna as a result of sediment transport effects are acceptable.

Entrainment

The staff's analysis of entrainment effects in the FES-CP remains valid (FES-CP, p. 5-7 to 5-12). A program on the mortality experienced by entrained ichthyoplankton is being planned currently at SONGS 1 and is expected to be submitted to the NRC staff in 1981. The results of this program should help to determine the significance of any impacts although the analysis presented in the FES-CP indicates that impacts should not be significant. The completion date for this study will be approximately one year after it is initiated.

The circulation of water from near-shore areas to offshore areas will cause some redistribution of species, particularly zooplankton, since species composition is not exactly the same for both areas (Section 2.5.2). Although this may result in long-term species composition changes, the areas affected should be small (FES-CP, Section 5.3.2) relative to the coastal areas as a whole around San Onofre. Because no other power plants or industrial facilities that could exert a similar influence exist within several miles, this impact is judged acceptable.

Impingement

The basic impingement analysis contained in the FES-CP remains valid. Some additional information is available, however, on the design and efficiency of the fish return system. The system is described in detail in Section 3.4 of the ER and in Section 3.2.2 of this document. Basically, the fish return system consists of a mechanism for shunting any fish entrained in the intake to a side holding area by means of an angled conduit design to avoid impinging them on the trash removal mechanisms in front of the final intake. Preliminary experimental results (ER, p. 5.1-20) indicate that perhaps 90% or more of the fish can be returned to the ocean unharmed. However, precise figures on the effectiveness of this system will not be available until the fish return system is in full-scale operation. The FES-CP analysis assumes a worst-case situation in which the fish return system is not at all effective. Under these conditions, 33 to 91 tonnes (36 to 100 tons) of fish per year would be removed from the San Onofre area. These figures are based on extrapolations from data obtained on SONGS 1 operation; new data do not indicate that these figures should be adjusted significantly. The majority of the fish impinged at SONGS 1 are queenfish, and, for reasons given in the FES-CP, losses from all three units should not have a significant impact on the population. Moreover, of the dominant recreational fish impinged at SONGS 1, losses were less than 0.8% of the amount taken by fishermen. Likewise, the primary

commercial fish of the area – jack mackerel, Pacific bonito, and white seabass – were seldom entrained at SONGS 1.

Offshore current induction

The analysis of the effects of induced circulation as given in the FES-CP (p. 5-16) remains valid, despite the design changes described in Section 3.2.2.

5.4.2.2 Effects of biocides and other chemical discharges

The FES-CP expressed concern about the potential long-term effects of copper being released into surrounding water by corrosion of the condenser tubing. Design changes have eliminated the plan to use a copper-nickel alloy for condenser tubing; titanium tubing will be used. Therefore, copper- or nickel-induced stresses to the receiving water from condenser tubing would not occur.

The FES-CP conclusion that the effects of chlorine will not be significant remains valid. However, new information is available on this subject. The applicant estimates that the effluent chlorine concentrations will be no greater than 1.5 ppm as total residual before discharge to the ocean (ER, p. 5.3-2). With a 10-to-1 mixing in the immediate vicinity of the diffuser ports (ER, p. 5.3-2), this value would be reduced to 0.15 ppm. The FES-CP required, and the applicant agreed, that the total residual concentration of chlorine and other halogens in the immediate vicinity of the discharge from each unit be limited to less than 0.1 ppm for no more than six 15-min periods each day [FES-CP, p. iv, item 7.a(2)]. Experience at SONGS 1 indicates that total residual chlorine concentrations quickly dissipate to undetectable quantities within a hundred or so meters of the outfall and, for any given 15-min dosing period, are only detectable over the outfall for 2 to 18 min (ER, p. 5.3-2). Even assuming a worst-case condition for SONGS 2 and 3 in which chlorine remains at levels around 0.15 ppm (total residual) in the vicinity of the outfall ports for as long as 30 min, any significant impacts are unlikely.[16] Thus, any chlorine effects are likely to be minimal and of an acceptable nature. Moreover, the difference in effect between discharges of 0.1 and 0.15 ppm are negligible. In view of this and in light of the provisions of the Federal Water Pollution Control Act Amendments of 1972, the staff does not believe that a more stringent limitation on chlorine discharges is necessary.

Miscellaneous chemicals will be discharged through the circulating water outfall system and will include laboratory wastes, ion exchange regeneration chemicals, and pH adjusters (Section 3.2.4 of this document and Section 3.5 of the FES-CP). The FES-CP analysis of the impact of these chemicals remains valid; that is, because of the small quantities involved, the great dilution factors present, and the relatively innocuous nature of most of these chemicals, impacts will not be detectable.

5.4.2.3 Effects of sanitary waste discharge

The effects of sanitary waste discharge are not discussed specifically in the FES-CP. However, any effects will be insignificant for the following reasons.

1. On the average, only about 26 m^3/day (7000 gpd) of secondary treated sewage will be discharged.

2. The discharge will be made into the circulatory water system at the rate of 0.02 m^3/min (5 gpm). The cooling water flow is about 1200 m^3/min (320,000 gpm). Thus, a 6400 dilution factor will result.

3. The resulting concentrations of suspended solids, BOD, N, P, coliform bacteria, and chlorine will not result in detectable incremental increases above ambient levels even before discharge into the ocean.

5.5 RADIOLOGICAL IMPACTS

5.5.1 Radiological impact on man

The impact on man associated with the routine release of radioactive effluents from SONGS 2 and 3 has been estimated. The quantities of radioactive material that may be released annually from the plant are estimated based on the description of the radwaste systems given in the applicant's ER and PSAR and using the calculational model and parameters described in NUREG-0017.[17] Using these quantities and site environs information, the dose commitments to individuals are estimated using models and considerations discussed in detail in Regulatory Guide 1.109. Additional assumptions and models described in Appendix B of this environmental statement were used to estimate integrated population doses.

5.5.1.1 Exposure pathways

The environmental pathways that were considered in calculating the radiological impact are shown in Fig. 5.17. Calculations of radiation doses to man at and beyond the site boundary were based on the radioactive material quantities shown in Tables 3.2 and 3.3, on site meteorological and hydrological considerations, and on exposure pathways at SONGS 2 & 3.

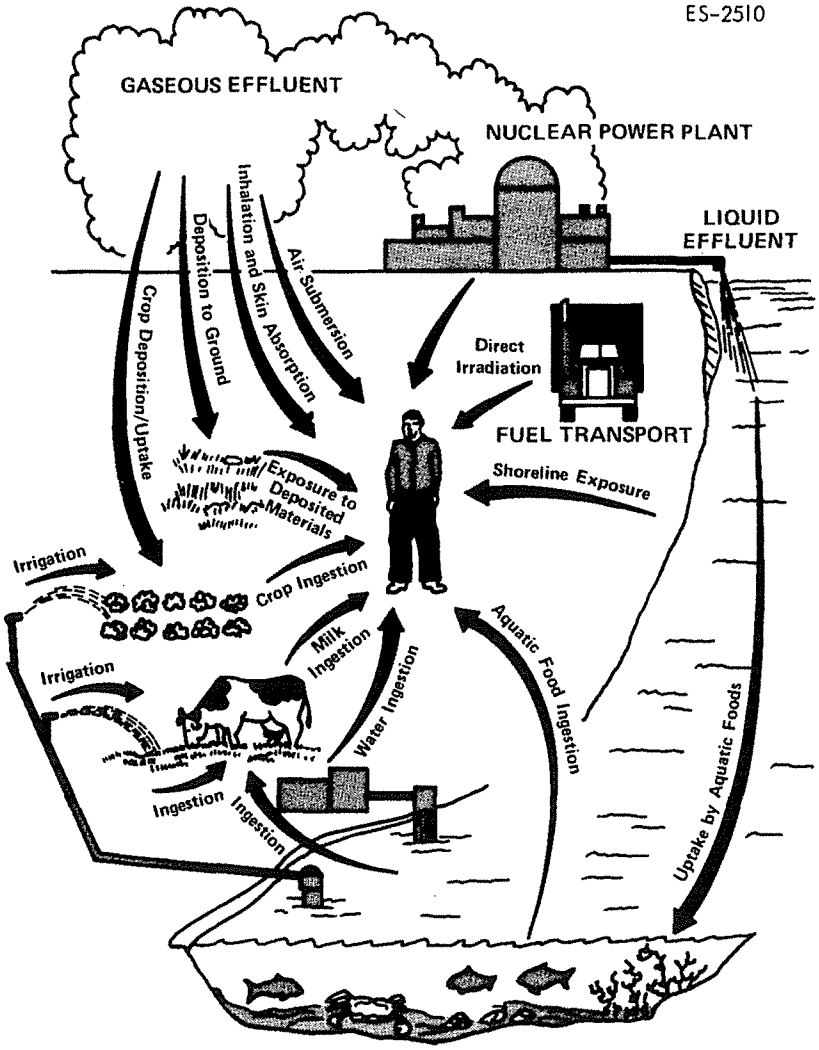

Fig. 5.17. Exposure pathways to man.

In the analysis of all effluent radionuclides released from the plant, tritium, carbon-14, radiocesium and radiocobalt inhaled with air and ingested with food and water were found to account for essentially all total-body dose commitments to individuals and the population within 80 km (50 miles) of the plant.

5.5.1.2 Dose commitments from radioactive releases to the atmosphere

Radioactive effluents released to the atmosphere from SONGS 2 & 3 will result in small radiation doses to the public. NRC staff estimates of the expected gaseous and particulate releases listed in Table 3.3 and the site meteorological considerations discussed in Sect. 2.4 of this statement and summarized in Table 5.1 were used to estimate radiation doses to individuals and populations.

Table 5.1. Summary of atmospheric dispersion factors and deposition values for selected locations near SONGS 2 & 3[a]

Location	Source[b]	X/Q (sec/m^3)	Relative deposition (m^{-2})
Nearest site land boundary (0.36 mile NNW)[c]			
	A	5.4 E–5	2.1 E–7
	B	2.4 E–5	9.3 E–8
Nearest residence and garden (1.3 mile NNW)[c]			
	A	4.8 E–6	2.0 E–8
	B	1.7 E–6	6.9 E–9

[a]The doses presented in the following tables are corrected for radioactive decay and cloud depletion from deposition, where appropriate, in accordance with Regulatory Guide 1.111, Rev. 1, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light Water Reactors," July 1977.

[b]Source A is gas decay tank, 48 purges per year, 12 hr per purge; source B is continuous release.

[c]"Nearest" refers to that type of location where the highest radiation dose is expected to occur from all appropriate pathways.

[d]Here E-x is used to indicate the factor 10^{-x}; i.e., 5.4 E–5 = 5.4 X 10^{-5}

(To change mi to km, multiply by 1.609.)

Dose commitments to individuals and the population can be estimated using different methodologies. The staff's assessment of dose is based on a 50-year commitment and is described in Regulatory Guide 1.109. The results of the calculations are discussed below.

Radiation dose commitments to individuals

The predicted dose commitments to the "maximum" individual from radioiodine and particulate releases are listed in Tables 5.2 and 5.3. The maximum individual has been estimated to receive the highest dose commitment from SONGS 2 & 3 and is assumed to consume well above average quantities of the foods considered (see Table A-2 in Regulatory Guide 1.109). The maximum annual air, total body, and skin doses from noble gas releases are presented in Tables 5.3 and 5.4.

Table 5.2. Maximum annual dose commitments to an individual near the SONGS 2 & 3 plant caused by particulate and liquid effluents

Location	Pathway	Dose (millirems per year per unit)		
		Total body	Thyroid	Other organs (if greater than 10% of dose)
	Iodine and particulate doses			
Nearest residence and garden (1.3 NNW)[a]	Ground deposit	0.66	0.66	NA
	Inhalation	0.07	0.48	
	Vegetation	0.40	2.5	
Totals		1.1	3.7	
	Liquid effluent doses			
Nearest fish	Fish ingestion	0.019	0.018	0.0016
	Invertebrate ingestion	0.0058	0.025	0.104
	Shoreline use	0.039	0.039	0.039
Totals		0.064	0.082	0.15

[a]"Nearest" refers to the location where the highest radiation dose to an individual from all applicable pathways has been estimated.

(To change mi to km, multiply by 1.609.)

Table 5.3. Maximum calculated dose commitments to an individual and the population from SONGS 2 & 3[a]

	Appendix I Design objectives	Calculated doses
	(Annual dose per reactor unit)	
Maximum individual doses		
Liquid effluents		
Dose to total body from all pathways, millirems	3	0.064
Dose to any organ from all pathways, millirems	10	0.15
Noble gas effluents (at site boundary)		
Gamma dose in air, millirads	10	4.6
Beta dose in air, millirads	20	14
Dose to total body of an individual, millirems	5	2.8
Dose to skin of an individual, millirems	15	8.5
Radioiodines and particulates[b]		
Dose to any organ from all pathways, millirems	15	3.7

Population doses within 80 km (50 miles)

	Total body (man-rems)	Thyroid (man-rems)
Natural radiation background[c]	700,000	
Liquid effluents	0.17	0.14
Gaseous effluents	21	46

[a] Appendix I design objectives from Sects. II.A, II.B, II.C, and II.D of Appendix I, 10 CFR 50; considers maximum doses to individuals and population per reactor unit. Source: *Federal Regist.* 40, 19442, May 5, 1975.

[b] Carbon-14 and tritium have been added to this category.

[c] "Natural Radiation Exposure in the United States," U.S. Environmental Protection Agency, ORP-SID-72-1 (June 1972); using the average State of California background dose of 97 millirems per year and year 2000 projected population of 262 million.

Table 5.4. Annual total-body, skin, and air doses at the nearest site boundary of SONGS 2 & 3 caused by gaseous radioactive effluents[a]

Location	Dose (millirem per year per unit)			
	Total body	Skin	Gamma air dose	Beta air dose
Nearest site boundary (0.36 mile WNW)[a]	2.5	8.3	4.2	14

[a] "Nearest" refers to that site boundary location where the highest radiation doses caused by gaseous effluents have been estimated to occur.

(To convert mi to km, multiply by 1.6.)

Radiation dose commitments to populations

The calculated annual radiation dose commitments to the population within 80 km (50 mi) of SONGS 2 and 3 from gaseous and particulate releases are presented in Table 5.3. Estimated dose commitments to the U.S. population are presented in Table 5.5. Background radiation doses are provided for comparison.

Within 80 km of the plant site, specific meteorological, populational, and agricultural data for each of 16 compass sectors around the plant were used to evaluate the doses. Beyond 80 km, meteorological models were extrapolated by assuming uniform dispersion of noble gases and continued deposition of radioiodines and particulates until no suspended radionuclides remained. Doses were evaluated using average population densities and food production values discussed in Appendix B. The doses from atmospheric releases during normal operation represent an extremely small increase in the normal population dose from background radiation sources.

Table 5.5. Annual total-body population dose commitments in the year 2000

Category	U.S. population dose commitment for the site
Natural background radiation, man-rems per year[a]	27,000,000
SONGS 2 & 3 operation, man-rems per year per site	
Plant workers	2600
General public	
Gas and particulates	160
Liquid effluents	<1
Transportation of fuel and waste	14

[a]Using the average U.S. background dose of 102 man-rems per year and year 2000 projected U.S. population from "Population Estimates and Projections," Series II, U.S. Department of Commerce, Bureau of the Census, Series P-25, No. 541 (February 1975).

5.5.1.3 Dose commitments from radioactive liquid releases to the hydrosphere

Radioactive effluents released to the hydrosphere from SONGS 2 & 3 during normal operation will result in small radiation doses to individuals and populations. The staff estimates of the expected liquid releases listed in Table 3.2 and the site hydrological considerations discussed in Sect. 2.3 of this statement and summarized in Table 5.6 were used to estimate radiation dose commitments to individuals and populations. The results of the calculations are discussed below.

Table 5.6. Summary of hydrologic transport and dispersion for liquid releases from SONGS 2 & 3[a]

Location	Transit time (hr)	Dilution factor
Nearest sport fishing location (plant outfall)[b]	0.1	1
Nearest shoreline (plant boundary)	0.1	1

[a]See Regulatory Guide 1.112, "Analytical Models for Estimating Radioisotope Concentrations in Different Water Bodies," (1976).
[b]Assumed for purposes of an upper-limit estimate; detailed information not available.

Radiation dose commitments to individuals

The estimated dose commitments to individuals at selected offsite locations where exposures are expected to be largest are listed in Tables 5.2 and 5.3. The standard NRC models given in Regulatory Guide 1.109 were used for these analyses.

Radiation dose commitments to populations

The estimated population radiation dose commitments to 80 km for SONGS 2 & 3 from liquid releases, based on the use of water and biota from the Pacific Ocean, are shown in Table 5.3. Dose commitments beyond 80 km were based on the assumptions discussed in Appendix B.

Background radiation doses are provided for comparison. The dose commitments from liquid releases from SONGS 2 & 3 represent small increases in the population dose from background radiation sources.

5.5.1.4 Direct radiation

Radiation from the facility

Radiation fields are produced in nuclear plant environs as a result of radioactivity contained within the reactor and its associated components. Doses from sources within the plant are

primarily due to nitrogen-16, a radionuclide produced in the reactor core. Since the primary coolant of pressurized water reactors is contained in a heavily shielded area of the plant, dose rates in the vicinity of PWRs are generally undetectable (less than 5 millirems per year). Low-level radioactivity storage containers outside the plant are estimated to contribute less than 0.01 millirem per year at the site boundary.

Occupational radiation exposure

The dose to nuclear plant workers varies from reactor to reactor and can be projected for environmental impact purposes by using the experience to date with modern pressurized water reactors (PWRs). Most of the dose to nuclear plant workers is due to external exposure to radiation from radioactive materials outside of the body rather than from internal exposure from inhaled or ingested radioactive materials. Recently licensed 1000 MWe PWRs are designed and operated in a manner consistent with the new (post-1975) regulatory requirements and guidelines. These new requirements and guidelines place increased emphasis on maintaining occupational exposure at nuclear power plants as low as is reasonably achievable (ALARA), and are outlined in 10 CFR Part 20, Standard Review Plan Chapter 12, and Regulatory Guide 8.8. The applicant's proposed implementation of these requirements and guidelines are reviewed by the NRC staff at the construction permit licensing stage, the operating license licensing stage, and during actual operation. Approval of the proposed implementation of these requirements and guidelines is granted only after the review indicates that an ALARA program can actually be implemented. As a result of our review the staff has determined that the applicant is committed to design features and operating practices that will assure that individual occupational radiation doses can be maintained within the limits of 10 CFR Part 20 and that individual and population doses will be as low as is reasonably achievable.

On the basis of actual operating experience, it has been observed that this occupational dose has varied considerably from plant to plant, and from year to year. Average individual and collective dose information is available from over 190 reactor-years of operation between 1974 and 1979. These data indicate that the average reactor annual dose at PWRs has been about 410 man-rem, with particular plants experiencing an average annual dose as high as 1300 man-rem. These dose averages are based on widely varying yearly doses at PWRs. For example, annual collective doses for PWRs have ranged from 18 to 5262 man-rem per reactor. The average annual dose per nuclear plant worker has been about 0.8 rem.

The wide range of annual doses (18 to 5262 man-rems) experienced by U.S. PWRs is dependent on a number of factors, such as the amount of required routine and special maintenance, and the degree of reactor operations and inplant surveillance. Since these factors can vary in an unpredictable manner, it is impossible to determine in advance a specific year-to-year or average annual occupational radiation dose for a particular plant over its operating lifetime. It is necessary to recognize that high doses may occur, even at plants with radiation protection programs that have been developed to assure that occupational radiation doses will be kept at levels that are ALARA. Consequently, the NRC staff's occupational dose estimates for environmental impact purposes for SONGS 2 and 3 are based on the conservation assumption that the station may have an higher than average level of special maintenance work. On the basis of the staff's review of the applicant's Safety Analysis Report, as well as occupational dose data from over 190 PWR reactor operating years, the NRC staff projects that the occupational doses at SONGS 2 and 3 could average as much as 1300 man-rem/yr when averaged over the life of the plant. However, actual year to year doses may differ greatly from this average, depending on actual plant operating conditions.

Transportation of radioactive material

The transportation of cold fuel to a reactor, of irradiated fuel from the reactor to a fuel reprocessing plant, and of solid radioactive wastes from the reactor to burial grounds is within the scope of the NRC report entitled "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants" [10 CFR 51.20(g)]. The estimated population dose commitments associated with transportation of fuels and wastes are listed in Tables 5.5 and 5.7.

5.5.1.5 Comparison of dose assessment models

The applicant's site and environmental data provided in the ER and in subsequent answers to staff questions were used extensively in the dose calculations. Any additional data received which could significantly affect the conclusions reached in this draft statement will be used in preparing the final statement.

Table 5.7. Environmental impact of transportation of fuel and waste to and from one light-water-cooled nuclear power reactor[a,b]

Exposed population	Estimated *number of* persons	Range of doses to exposed *individuals* (millirems per reactor year)[c]	Cumulative dose to exposed population (man-rems per reactor year)[d]
Transportation workers	200	0.01 to 300	4
General public			
Onlookers	1,100	0.003 to 1.3	
Along Route	600,000	0.001 to 0.06	3
Accidents in transport			
Radiological effects		Small[e]	
Common (nonradiological) causes		1 fatal injury in 100 reactor years; 1 nonfatal injury in 10 reactor years; $475 property damage per reactor year	

[a]*Data supporting this table are given in the Commission's Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants,* WASH-1238, December 1972, and Suppl. I, NUREG-75/038, April 1975.

[b]Normal conditions of transport: heat (per irradiated fuel cask in transit), 250,000 Btu/hr; weight (governed by Federal or State restrictions), 73,000 lb per truck; 100 tons per cask per rail car; traffic density, <1 per day; rail <3 per month.

[c]The Federal Radiation Council has recommended that radiation doses from all sources of radiation other than natural background and medical exposures should be limited to 5000 *millirems per year for individuals as a result of occupational exposure and should* be limited to 500 millirems per year for individuals in the general population. The dose to individuals as a result of average natural background radiation is about 102 millirems per year.

[d]Man-rem is an expression for the summation of whole body doses to individuals in a group. Thus, if each member of a population group of 1000 people were to receive a dose of 0.001 rem (1 millirem), or if 2 people were to receive a dose of 0.5 rem (500 millirems) each, the total man-rem in each case would be 1 man-rem.

[e]Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single reactor or a multireactor site.

(To convert lb to kg, multiply by 0.45; to convert tons to tonnes, multiply by 0.907.)

5.5.1.6 Evaluation of radiological impact

The actual radiological impact associated with the operation of SONGS 2 & 3 will depend, in part, on the manner in which the radioactive waste treatment system is operated. The staff concludes on the basis of their evaluation of the potential performance of the radwaste system that the system as proposed is capable of meeting the dose design objectives of 10 CFR Part 50, Appendix I. Table 5.3 compares the calculated maximum individual doses to the dose design objectives. However, because the facility's operation will be governed by operating license technical specifications and because the technical specifications will be based on the dose design objectives of 10 CFR Part 50, Appendix I, as shown in the first column of Table 5.3, the actual radiological impact of plant operation may result in doses close to the dose design objectives. Even if this situation exists, however, the individual doses will still be very small when compared to natural background doses (~100 millirems per year) or of the dose limits specified in 10 CFR Part 20. As a result the staff concludes that there will be no measurable radiological impact on man from routine operation of SONGS 2 & 3.

5.5.2 Radiological impacts to biota other than man

Depending on the pathway and the radiation source, terrestrial and aquatic biota will receive doses approximately the same or somewhat higher than man receives. Although guidelines have not been established for acceptable limits for radiation exposure to species other than man, it is generally agreed that the limits established for humans are also conservative for other species. Experience has shown that it is the maintenance of population stability that is crucial to the survival of a species, and species in most ecosystems suffer rather high mortality rates from natural causes. Although the existence of extremely sensitive biota is possible and increased radiosensitivity in organisms may result from environmental interactions with other stresses (e.g., heat, biocides, etc.), no biota have yet been discovered that show a sensitivity (in terms

of increased morbidity or mortality) to radiation exposures as low as those expected in the area surrounding SONGS 2 & 3. Furthermore, in all the plants for which an analysis of radiation exposure to biota other than man has been made, there have been no cases of exposures that can be considered significant in terms of harm to the species, or that approach the exposure limits to members of the public permitted by 10 CFR Part 20.[19] Since the BEIR Report[20] concluded that the evidence to date indicates that no other living organisms are very much more radiosensitive than man, no measurable radiological impact on populations of biota is expected as a result of the routine operation of this plant.

5.5.3 Environmental effects of the uranium fuel cycle

On March 14, 1977, the Commission presented in the *Federal Register* (42 FR 13803) an interim rule regarding the environmental considerations of the uranium fuel cycle. It was effective (by Amendment of September 12, 1978) through March 14, 1979 and revised Table S-3 of Paragraph (e) of 10 CFR Part 51.20.* In a subsequent announcement on April 14, 1978, (43 FR 15613), the Commission further amended Table S-3 to delete the numerical entry for the estimate of radon releases and to clarify that the table does not cover health effects. On July 27, 1979, the Commission approved a final rule setting out revised environmental impact values for the uranium fuel cycle to be included in environmental reports and environmental statements for reactors (44 FR 45362). The final rule reflects new and updated information relative to reprocessing of spent fuel and radioactive waste management as discussed in NUREG-0116, *Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle*,[21] and NUREG-0216,[22] which presents staff responses to comments on NUREG-0116. The rule also considers other environmental factors of the uranium fuel cycle, including aspects of mining and milling, isotopic enrichment, fuel fabrication, and management of low-and high-level wastes. These are described in the AEC report WASH-1248, *Environmental Survey of the Uranium Fuel Cycle*.[23]

Specific categories of natural resource use are included in Table S-3 of the final rule, which is reproduced in this statement as Table 5.8.† These categories relate to land use, water consumption and thermal effluents, radioactive releases, burial of transuranic and high- and low-level wastes, and radiation doses from transportation and occupational exposures. The contributions in Table 5.8 for reprocessing, waste management, and transportation of wastes are maximized for either of the two fuel cycles (uranium only and no recycle); that is, the cycle that results in the greater impact is used.

The following assessment of the environmental impacts of the fuel cycle as related to the operation of SONGS 2 & 3 is based on the values given in Table 5.8 and the staff's analysis of the radiological impact from radon releases. For the sake of consistency, the analysis of fuel-cycle impacts has been cast in terms of a model 1000 MWe LWR operating at an annual capacity factor of 80%. In the following review and evaluation of the environmental impacts of the fuel cycle, the staff conclusions would not be altered if the analysis were to be based on the net electrical power output of SONGS 2 & 3.

The total annual land requirement for the fuel cycle supporting a model 1000 MWe LWR is about 46 ha (114 acres). Approximately 5 ha (13 acres) per year are permanently committed land, and 40 ha (100 acres) per year are temporarily committed. (A "temporary" land commitment is a commitment for the life of the specific fuel-cycle plant, e.g., mill, enrichment plant, or succeeding plants. On abandonment or decommissioning, such land can be used for any purpose. "Permanent" commitments represent land that may not be released for use after plant shutdown and/or decommissioning.) Of the 40 ha per year of temporarily committed land, 32 ha (79 acres) are undisturbed and 9 ha (22 acres) are disturbed. Considering common classes of land use in the U.S.,‡ fuel-cycle land-use requirements to support the model 1000 MWe LWR do not represent a significant impact.

The principal water-use requirement for the fuel cycle supporting a model 1000 MWe LWR is that required to remove waste heat from the power stations supplying electrical energy to the enrichment step of this cycle. Of the total annual requirement of 43 x 10^6 m^3 (11,000 x 10^6 gal), about 42 x 10^6 m^3 are required for this purpose, assuming that these plants use once-through cooling. Other water uses involve the discharge to air (e.g., evaporation losses in process cooling) of about 0.6 x 10^6 m^3 per year and water discharged to ground (e.g., mine drainage) of about 0.5 x 10^6 m^3 per year.

*A notice of final rulemaking proceedings was given in the *Federal Register* of May 26, 1977 (42 FR 26987) that calls for additional public comment before adoption or final modification of the interim rule.

†A narrative explanation of Table 5.8 (Table S-3) was published in the *Federal Register* (46 FR 15154-75) on March 4, 1981.

‡A coal-fired power plant of 1000 MWe capacity using strip-mined coal requires the disturbance of about 81 ha (200 acres) per year for fuel alone.

Table S.8. Summary of environmental considerations for uranium fuel cycle[a]

Normalized to model LWR annual fuel requirement (WASH-1248) or reference reactor year (NUREG-0116)

Natural resource use	Total	Maximum effect per annual fuel requirement or reference reactor year of model 1000-MWe LWR
Land, acres		
Temporarily committed[b]	100	
Undisturbed area	79	
Disturbed area	22	Equivalent to 110-MWe coal-fired power plant
Permanently committed	7.1	
Overburden moved, millions of metric tons	2.8	Equivalent to 95-MWe coal-fired power plant
Water, millions of gallons		
Discharged to air	160	Equals 2% of model 1000-MWe LWR with cooling tower
Discharged to water bodies	11,090	
Discharged to ground	127	
Total	11,377	Less than 4% of model 1000-MWe LWR with once-through cooling
Fossil fuel		
Electrical energy, thousands of megawatt hours	321	Less than 5% of model 1000-MWe LWR output
Equivalent coal, thousands of metric tons	117	Equivalent to the consumption of a 45-MWe coal-fired power plant
Natural gas, millions of standard cubic feet	135	Less than 0.3% of model 1000-MWe energy output
Effluents — chemical, metric tons		
Gases (including entrainment)[c]		
SO_x	4,400	
NO_x[d]	1,190	Equivalent to emissions from 45-MWe coal-fired power plant for a year
Hydrocarbons	14	
CO	29.6	
Particulates	1,154	
Other gases		
F^-	0.67	Principally from UF_6 production, enrichment, and reprocessing. Concentration within range of state standards — below level that has effects on human health
HCl	0.014	
Liquids		
SO_4^{2-}	9.9	From enrichment, fuel fabrication, and reprocessing steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. The constituents that require dilution and the flow of dilution water are: NH_3 — 600 cfs NO_3 — 20 cfs *Fluoride — 70 cfs*
NO_3^-	25.8	
Fluoride	12.9	
Ca^{2+}	5.4	
Cl^-	8.5	
Na^+	12.1	
NH_3	10.0	
Fe	0.4	
Tailings solutions, thousands of metric tons	240	From mills only — no significant effluents to environment
Solids	91,000	Principally from mills — no significant effluents to environment
Effluents — radiological, curies		
Gases (including entrainment)		
Rn-222		Presently under reconsideration by the Commission
Ra-226	0.02	
Th-230	0.02	
Uranium	0.034	
Tritium, thousands	18.1	
C-14	24	
Kr-85, thousands	400	
Ru-106	0.14	Principally from fuel reprocessing plants
I-129	1.3	
I-131	0.83	
Tc-99	0.203	Presently under consideration by the Commission
Fission products and transuranics		
Liquids		
Uranium and daughters	2.1	Principally from milling — included in tailings liquor and returned to ground — no effluents; therefore, no effect on environment
Ra-226	0.0034	From UF_6 production
Th-230	0.0015	
Th-234	0.01	From fuel fabrication plants — concentration 10% of 10 CFR Part 20 for total processing 26 annual fuel requirements for model LWR
Fission and activation products	5.9×10^{-6}	
Solids (buried on site)		
Other than high level (shallow)	11,300	9100 Ci come from low-level reactor wastes and 1500 Ci come from reactor decontamination and decommissioning — buried at land burial facilities. Mills produce 600 Ci — included in tailings returned to ground; about 60 Ci come from conversion and spent-fuel storage. No significant effluent to the environment
TRU and HLW (deep)	1.1×10^7	Buried at Federal repository
Effluents — thermal, billions of British thermal units	4.063	Less than 4% of model 1000-MWe LWR
Transportation, person-rems	2.5	
Exposure of workers and general public		
Occupational exposure, person-rems	22.6	From reprocessing and waste management

[a] In some cases where no entry appears, it is clear from the background documents that the matter was addressed and that, in effect, this table should be read as if a specific zero entry had been made. However, there are other areas that are not addressed at al in this table. Table S-3 of WASH-1248 does not include health effects from the effluents described in this table or estimates of releases of Radon-222 from the uranium fuel cycle. These issues which are not addressed at all by this table may be the subject of litigation in individual licensing proceedings. Data supporting this table are given in the *Environmental Survey of the Uranium Fuel Cycle*, WASH-1248, April 1974; the *Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle*, NUREG-0116 (Suppl. 1 to WASH-1248); and the *Discussion of Comments Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle*, NUREG-0216 (Suppl. 2 to WASH-1248). The contributions from reprocessing, waste management, and transportation of wastes are maximized for either of the two fuel cycles (uranium only and no-recycle). The contribution from transportation excludes transportation of coal fuel to a reactor and of irradiated fuel and radioactive wastes from a reactor which are considered in Table S-4 of Sect. 51.20(g). The contributions from the other steps of the fuel cycle are given in columns A — E of Table S-3A of WASH-1248.

[b] The contributions to temporarily committed land from reprocessing are not prorated over 30 years, because the complete temporary impact accrues regardless of whether the plant services 1 reactor for 1 year or 57 reactors for 30 years.

[c] Estimated effluents based on combustion of equivalent coal for power generation.

[d] 1.2% from natural gas use and process.

On a thermal effluent basis, annual discharges from the nuclear fuel cycle are about 4% of those from the model 1000 MWe LWR using once-through cooling. The consumptive water use of 0.6×10^6 m^3 per year is about 2% of that of the model 1000 MWe LWR using cooling towers. The maximum consumptive water use (assuming that all plants supplying electrical energy to the nuclear fuel cycle used cooling towers) would be about 6% of that of the model 1000 MWe LWR using cooling towers. Under this condition, thermal effluents would be negligible. The staff finds that these combinations of thermal loadings and water consumption are acceptable relative to the water use and thermal discharges of the proposed project.

Electrical energy and process heat are required during various phases of the fuel-cycle process. The electrical energy is usually produced by the combustion of fossil fuel at conventional power plants. Electrical energy associated with the fuel cycle represents about 5% of the annual electrical power production of the model 1000 MWe LWR. Process heat is primarily generated by the combustion of natural gas. This gas consumption, if used to generate electricity, would be less than 0.3% of the electrical output from a 1000 MWe plant. The staff finds that the direct and indirect consumption of electrical energy for fuel-cycle operations are small and acceptable relative to the net power production of the proposed project.

The quantities of chemical, gaseous, and particulate effluents with fuel-cycle processes are given in Table 5.8. The principal species are SO_x, NO_x, and particulates. The staff finds, on the basis of data in a Council on Environmental Quality report,[24] that these emissions constitute an extremely small additional atmospheric loading in comparison with these emissions from the stationary fuel-combustion and transportation sectors in the U.S., i.e., about 0.02% of the annual national releases for each of these species. The staff believes such small increases in releases of these pollutants are acceptable.

Liquid chemical effluents produced in fuel-cycle processes are related to fuel-enrichment, -fabrication, and -reprocessing operations and may be released to receiving waters. These effluents are usually present in such dilute concentrations that only small amounts of dilution water are required to reach levels of concentration that are within established standards. Table 5.8 specifies the flow of dilution water required for specific constituents. Additionally, all liquid discharges into the navigable waters of the United States from plants associated with the fuel-cycle operations will be subject to requirements and limitations set forth in an NPDES permit issued by an appropriate state or Federal regulatory agency.

Tailings solutions and solids are generated during the milling process. These solutions and solids are not released in quantities sufficient to have a significant impact on the environment.

Radioactive effluents estimated to be released to the environment from reprocessing and waste management activities and certain other phases of the fuel-cycle process are set forth in Table 5.8. Using these data, the staff has calculated the 100-year involuntary environmental dose commitment* to the U.S. population. These calculations estimate that the overall involuntary total body gaseous dose commitment to the U.S. population from the fuel cycle (excluding reactor releases and the dose commitment due to radon-222) would be approximately 400 man-rems per year of operation of the model 1000 MWe LWR. The additional involuntary total body dose commitment to the U.S. population from radioactive liquid effluents due to all fuel-cycle operations other than reactor operation, estimated on the basis of the values given in Table 5.8, would be approximately 100 man-rems per year of operation. Thus, the estimated involuntary 100-year environmental dose commitment to the U.S. population from radioactive gaseous and liquid releases due to these portions of the fuel cycle is approximately 500 man-rems (whole body) per year of operation of the model 1000 MWe LWR.

At this time Table 5.8 does not address the radiological impacts associated with radon-222 releases. Principal radon releases occur during mining and milling operations and, following completion of mining and milling, as emissions from stabilized mill tailings and from unreclaimed open-pit mines. The staff has determined that releases from these operations for each year of operation of the model 1000 MWe LWR are as follows:

*The environmental dose commitment (EDC) is the integrated population dose for 100 years; i.e., it represents the sum of the annual population doses for a total of 100 years. The population dose varies with time, and it is not practical to calculate this dose for every year.

Mining: (during active mining)[25]	4060 Ci
Mining: (unreclaimed open-pit mines)[26]	30 to 40 Ci/year
Milling and Tailings:[27] (during active milling)	780 Ci
Inactive Tailings:[27] (prior to stabilization)	350 Ci
Stabilized Tailings:[27] (several hundred years)	1 to 10 Ci/year
Stabilized Tailings:[27] (after several hundred years)	110 Ci/year

The staff has calculated population dose commitments for these sources of radon-222 using the RABGAD computer code described in Section IV.J of Appendix A of NUREG-0002.[28] The results of these calculations for mining and milling activities prior to tailings stabilization are shown in Table 5.9.

Table 5.9. *Estimated 100-year environmental dose commitment per year of operation of the model 1000 MWe LWR*

Radon-222 releases		Dose commitments (man-rems)		
Source	Amount (Ci)	Total body	Bone	Lung (bronchial *epithelium*)
Mining	4100	110	2800	2300
Milling and active *tailings*	1100	29	750	620
Total		140	3600	2900

When added to the 500 man-rem total body dose commitment for the balance of the fuel cycle, the overall estimated total body involuntary 100-year environmental dose commitment to the U.S. population from the fuel cycle for the model 1000 MWe LWR is approximately 600 man-rems. Over this period of time, this dose is equivalent to 0.00002% of the natural background dose of about 3,000,000,000 man-rems to the U.S. population.*

The staff has considered health effects associated with the releases of radon-222, including both the short-term effects of mining, milling, and active tailings and the potential long-term effects from unreclaimed open-pit mines and stabilized tailings. After completion of active mining, the staff has assumed that underground mines will be sealed, with the result that releases of radon-222 from them will return to background levels. For purposes of providing an upper-bound impact assessment, the staff has assumed that open-pit mines will be unreclaimed and has calculated that if all ore were produced from open-pit mines, releases from them would be 110 Ci/year of operation of the model 1000 MWe LWR. However, since the distribution of uranium ore reserves available by conventional mining methods is 66.8% underground and 33.2% open pit,[29] the staff has further assumed that uranium to fuel LWRs will be produced by conventional mining methods in these proportions. This means that long-term releases from unreclaimed open-pit mines will be 0.332 x 110 or 37 Ci/year of operation of the model LWR.

On the basis of these assumptions, the radon released from unreclaimed open-pit mines over 100- and 1000-year periods can be calculated to be about 3700 Ci and 37000 Ci/year of operation of the model reactor, respectively. The total dose commitments for a 100-1000-year period would be as follows:

*Based on an annual average natural background individual dose commitment of 100 mrem and a stabilized U.S. population of 300 million.

Time span	Total release	Population dose commitments (man-rems)		
		Total body	Bone	Lung (brochial epithelium)
100 years	3,700	96	2,500	2,000
500 years	19,000	480	13,000	11,000
1,000 years	37,000	960	25,000	20,000

The above dose commitments represent a worst-case situation since no mitigation circumstances are assumed. However, state and Federal laws currently require reclamation of strip and open-pit coal mines, and it is very probable that similar reclamation will be required for uranium open-pit mines. If so, long-term releases from such mines should approach background levels.

For long-term radon releases from stabilized tailings piles, the staff has assumed that these tailings would emit, per year of operation of the model 1000 MWe LWR, 1 Ci/year for 100 years, 10 Ci/year for the next 400 years, and 100 Ci/year for periods beyond 500 years. With these assumptions, the cumulative radon-222 release from stabilized tailings piles per operating year of the model reactor will be 100 Ci in 100 years, 4,090 Ci in 500 years, and 53,800 Ci in 1000 years[30]. The total body, bone, and bronchial epithelium dose commitments for these periods are as follows:

Time span	Total release	Population dose commitments (man-rems)		
		Total body	Bone	Lung (brochial epithelium)
100 years	100	2.6	68	56
500 years	4,090	110	2,800	2,300
1,000 years	53,800	1,400	37,000	30,000

Using risk estimators of 135, 6.9, and 22.2 cancer deaths per million man-rems for total body, bone, and lung exposures, respectively, the estimated risk of cancer mortality due to mining, milling, and active tailings emissions of radon-222 would be about 0.11 cancer fatalities per operating year of the model 1000 MWe LWR. When the risk due to radon-222 emissions from stabilized tailings over a 100-year release period is added, the estimated risk of cancer mortality over a 100-year period is unchanged. Similarly, a risk of about 1.2 cancer fatalities is estimated over a 1000-year release period per operating year of the model 1000 MWe LWR. When potential radon releases from reclaimed and unreclaimed open-pit mines are included, the overall risks of radon induced cancer fatalities per operating year of the model 1000 MWe LWR would range as follows:

0.11-0.19 fatalities for a 100-year period

0.19-0.57 fatalities for a 500-year period

1.2-2.0 fatalities for a 1000-year period

To illustrate: A single model 1000 MWe LWR operating at an 80% capacity factor for 30 years would be predicted to induce between 3.3 and 5.7 cancer fatalities in 100 years, 5.7 and 17 in 500 years, and 36 and 60 in 1000 years as a result of releases of radon-222.

These doses and predicted health effects have been compared with those that can be expected from natural-background emissions of radon-222. Using data from the National Council on Radiation Protection[31], the average radon 222 concentration in air in the contiguous United States is about 150 pCi/m^3, which the NCRP estimates will result in an annual dose to the bronchial epithelium of 450 mrem. For a stabilized future U.S. population of 300 million, this represents a total lung dose commitment of 135 million man-rems per year. Using the same risk estimator of 22.2 lung cancer fatalities per million man-lung-rems used to predict cancer fatalities for the model 1000 MWe LWR, estimated lung cancer fatalities alone from background radon-222 in the air can be calculated to be about 3000 per year or 300,000 to 3,000,000 lung cancer deaths over periods of 100 and 1,000 years respectively.

Other nuclides produced in the cycle, such as carbon-14, will contribute to population exposures in addition to the radon-related potential health effects from the fuel cycle. It is estimated that 0.08 to 0.12 additional cancer deaths may occur per operating year of the model 1000 MWe LWR (assuming that no cure or prevention of cancer is ever developed) over the next 100 to 1000 years, respectively, from exposures to these other nuclides.

These latter exposures can also be compared with those from naturally-occurring terrestrial and cosmic-ray sources, which average about 100 mrem. Therefore, for a stable future population of 300 million persons, the whole-body dose commitment would be about 30 million man-rems per year, or 3 billion man-rems and 30 billion man-rems for periods of 100 and 1000 years respectively. These dose commitments could produce about 400,000 and 4,000,000 cancer deaths during the same time periods. From the above analysis, the staff concludes that both the dose commitments and health effects of the uranium fuel cycle are insignificant when compared to dose commitments and potential health effects to the U.S. population resulting from all natural background sources.

5.6 SOCIOECONOMIC IMPACTS

5.6.1 Introduction

A 96-km (60-mile) radius of the San Onofre site circumscribes most of the metropolitan areas of Los Angeles and San Diego, the third and fourteenth largest cities, respectively, in the United States. Between 1970 and 1980, San Diego County had a 37.1% increase in population, reaching a total of 1,861,846 in 1980 and a density of about 170/km^2 (438/m^2).

Continued growth within 96 km (60 miles) of the San Onofre site is expected for the next three decades. The central portion of Orange County and the city of San Diego and its immediate environs are projected to be the major growth areas (ER, Sect. 2.1.3.2.2). The population growth rates within 16 km (10 miles) of the site are expected to fluctuate over the operating life of SONGS 2 and 3. The annual growth rate between 1976 and 1980 is expected to be 4.2%, decreasing to 0.3% between 1990 and 2000, and rising to 1.1% between 2010 and 2020 (ER, Sect. 2.1.3.1.1).

5.6.2 Impact of the construction labor force

A peak labor force of about 3000 workers was employed at SONGS 2 and 3 in late 1979. Of this number, the applicant has estimated that about 600 workers (20% of the peak labor force) have relocated to the southern California area (Sect. 2.2.3). Although the staff could not determine the exact location of these workers, current growth projections for the area indicate that the addition of 600 workers represents an insignificant impact. Between 1976 and 1980 the population in the area that is 16 to 80 km (10 to 50 miles) from the site was projected to increase 2.2% (ER, Sect. 2.1.3.2.1). The addition of 600 workers accounts for less than 0.1% of the growth expected during that time period.

Staff interviews with local and regional officials indicated that construction of SONGS 2 and 3 has had no impact on cities within 24 km (15 mi) of the site. Representatives of Southern California Association of Governments stated that it was doubtful that any significant impact attributable to plant construction could be identified in Orange County. The facts that (1) the majority of the work force commuted to site, (2) there was widespread busing to and from Orange County, Oceanside, Vista, Escondido, and San Diego, and (3) the region is currently experiencing rapid population growth support the staff's judgment that no significant social impact has occurred or is likely to occur due to in-migration of construction workers.

Cessation of large construction projects can result in varying degrees of economic dislocation to an area, especially if a previously underdeveloped commercial and service structure is expanded to meet the requirements of a large, short-term population influx. The southern California area has a well-developed infrastructure; thus, ending the construction phase of SONGS 2 and 3 is not expected to produce significant economic dislocation.

5.6.3 Impact of the operating labor force

The operation of SONGS 2 and 3 will employ about 200 workers. Table 5.10 provides an estimate for typical operating personnel requirements and types of employment positions at a two-unit pressurized-water reactor (PWR). The operations positions will be filled first by current members of I.B.E.W. Local No. 246. Positions unfilled will be offered to all Southern California Edison (SCE) employees, and if the position remains unfilled, SCE will advertise in local and regional newspapers (ER, p. S.2-175). Because of the diversified labor markets of Los Angeles and San Diego, the staff believes that at least 75% of these workers can be hired from within a 96-km (60-mile) radius of the site.

The applicant conducted surveys in March 1976 to determine the residential location of SONGS 1 workers. Seventy-five percent of these workers lived within 40 km (25 miles) of the San Onofre site, and 65% resided in Orange County, 30% in San Diego County, and 5% in Los Angeles and Riverside counties (ER, Appendix 8A, p. 10). The surveys further indicated that the cities of Carlsbad, Oceanside, San Clemente, San Juan Capistrano, and Vista were the major

Table 5.10. Operating personnel for a two-unit PWR

1 Plant superintendent	Warehouse staff
1 Assistant plant superintendent	1 Superintendent
2 Safety engineers	1 Assistant superintendent
	5 Clerks
Quality assurance staff	1 Truck driver
1 Superintendent	Engineering section
4 Engineers	1 Superintendent
5 Engineering aides	3 Instrument engineers
	3 Instrument engineering aides
Administrative services	2 Senior instrument mechanic foremen
1 Superintendent	20 Mechanics
1 Assistant superintendent	2 Mechanical engineers
3 Payroll clerks	3 Mechanical engineering aides
9 Stenographers and file clerks	1 Reactor engineer
7 Janitors	1 Reactor engineering aide
	2 Nuclear engineers
1 Industrial engineer	1 Chemical engineer
1 Nurse	9 Chemical engineering aides
Health physics staff	Maintenance staff
1 Superintendent	1 Superintendent
2 Technicians	1 Assistant superintendent (electrical)
1 Clerk	1 Assistant superintendent (mechanical)
	2 Mechanical maintenance engineers
Security staff	1 Electrical maintenance engineer
1 Superintendent	3 Engineering aides
1 Assistant superintendent	
9 Security officers	Trades and labor staff
	1 Machinist foreman
Operations	11 Machinists
Control room staff	1 Boiler-maker foreman
1 Superintendent	5 Boiler makers
1 Assistant superintendent	1 Steam-fitter foreman
1 Training coordinator	12 Steam fitters
5 Clerks	1 Electrician foreman
6 Shift engineers	10 Electricians
10 Assistant shift engineers	1 Labor foreman
15 Unit operators	10 Laborers
18 Assistant unit operators	2 Truck drivers
	2 Carpenters
Communications engineering staff	2 Sheet metal workers
2 Engineers	2 Painters
3 Engineering aides	2 Insulators
	1 Structural iron worker

Source: Tennessee Valley Authority, Department of Planning, Chattanooga, Tenn., 1977.

communities of worker residence. The staff estimates that approximately the same pattern of location will occur with SONGS 2 and 3 workers as occurred with SONGS 1 workers.

Between 1973 and 1980, northern San Diego County was expected to have a population increase of about 22,000. From 1975 to 1980 southern Orange County was projected to grow by about 21,000 persons. Assuming that all operations workers relocated to the area, the staff concludes that the addition of 200 workers and their households represents a negligible effect.

The staff cannot determine precisely the number of workers who will (1) relocate from outside the area or (2) choose to move from within the 96-km (60-mile) radius to a residence closer to the plant. In order to predict the maximum possible impact on housing in the area, the staff assumes that all of the workers will relocate and thus require housing. A relocating operations force will likely demand permanent housing. From Table 5.11, it appears that housing availability in Orange and San Diego counties is sufficient to provide diversity in location for all operations workers' households. The table further indicates that, based on the number of vacant units in 1976, a surplus of housing exists in each of the communities expected to house workers.

Estimates on the location of SONGS 1 worker indicate SONGS 2 and 3 households will likely contribute to increased enrollments in the school districts of Carlsbad, Capistrano, Oceanside, Saddleback Valley, and Vista. The total additional enrollment at all five school districts

Table 5.11. Housing availability in Orange and San Diego counties

Communities	Residential distribution of households SONGS 2 & 3	Number of existing dwelling units as of Jan. 1, 1976	Number of vacant units as indicated by number of idle electric meters for Jan. 1, 1976
Orange County total	127	592,932	10,080
San Clemente	32	10,636	170
San Juan Capistrano	41	4,561	73
Saddleback (Irvine)	22	11,102	178
Other unincorporated areas	32	76,260	1,220
San Diego County total	61	547,708	8,763
Carlsbad	11	9,111	200
Oceanside	25	20,835	458
Vista	20	12,539	276
Other unincorporated areas	5	108,841	2,395

Source: ER, Suppl. 2, Table 89-A, p. S.2-178.

will be about 105 students (ER, Appendix A, p. 20). The community college districts of Oceanside-Carlsbad, Palomar, and Saddleback will likely increase their enrollments by approximately 20 to 25 students (ER, Appendix 8A, p. 20). The staff concludes that this estimated increased enrollment represents a negligible impact on the school districts.

Operations employment at SONGS 2 and 3 will be relatively high-paying, stable work. About 87% of the total work force will have gross incomes in excess of $15,000 per year (ER, Appendix 8A, p. 15). The annual average income in 1976 dollars for a SONGS 2 and 3 household will be about $20,800. This compares to a median family income in 1980 for San Diego and Orange counties of $21,500 and $26,200 respectively. SONGS 2 and 3 households are expected to contribute to the economic activity of the area. Total taxable retail expenditures by households of operations employees are estimated to be about $855,000 per year (ER, p. S.2-176). In addition, those workers who build homes will contribute further to the economic activity of the area.

5.6.4 Economic impacts

The staff believes that the major economic impact associated with the operation of SONGS 2 and 3 will be a result of tax revenues generated by the plant. These taxes include property tax, state income tax, utility users tax, franchise tax payments, and sales and use taxes. The analysis presented here differs from that presented earlier in the DES by taking into account the impacts of the Jarvis-Gann Amendment (Proposition 13). The following discussion is based on two important assumptions. (1) The method of determining the value of state-regulated utility systems, currently before the State Court of Appeals, will be decided in accordance with the decision of the State Board of Equalization. Accordingly, SONGS 2 and 3 will be assessed on current market value, based on historical methods of valuation rather than on the 1975-76 base year as prescribed in Proposition 13. (2) The allocation of tax revenues among the various funds and districts within the county will remain roughly the same as at present.[32] Changes in either of the above conditions in the future may result in significant variation from the situation described here.

Under Proposition 13, neither the assessed value of the SONGS 2 and 3 units nor their annual tax liability differs greatly from the figures presented in the DES. Earlier projections were for an assessed valuation of $348 million in 1976 dollars (ER, Appendix 8-A, p. 4) and an annual property tax payment of $13.1 million (DES, Sect. 5.6.4). Current calculations show an eventual assessed value of $326 million in 1979 dollars and an annual tax of approximately $13 million (Table 5.12). At present, current construction at SONGS 2 and 3 is already assessed at roughly $100 million and is generating $4 million yearly in property tax revenues. The remaining $9 million in property taxes will be added as construction is completed.[32]

While the total tax burden is not significantly different under the terms of Proposition 13, the distribution of the resulting revenues is. Previously, it was projected that nearly all of the $13 million in property taxes generated by SONGS 2 and 3 would go to the County General Fund, the County Library Fund, and three local school districts in the immediate vicinity of the plant – Fallbrook Union Elementary, Fallbrook Union High, and Palomar Community College (DES,

Table 5.12. Projected impacts of SONGS 2 & 3 on San Diego County property tax revenues

	San Diego County	SONGS 2 & 3	Total: County plus SONGS 2 & 3	SONGS 2 & 3 as % of total
Assessed value	$7,775.5 million[1]	$326 million[3]	$8,101.5 million	4.0%
Annual taxes	$311 million[2]	$13 million[3]	$324 million	4.0%

[1]For FY 1978-79, not counting $100 million of SONGS 2 & 3 construction currently on tax rolls.
[2]For FY 1978-79, not counting $4 million currently received for SONGS 2 & 3 construction.
[3]As of project completion, in 1979 dollars.
Source: Letter from J. H. Drake, Southern California Edison Co., to W. H. Regan, Jr., U.S. NRC, dated April 17, 1979.

Sect. 5.6.4). Now, however, the new revenues will be distributed throughout the county on the basis of the historical property tax revenue relationships between all the various funds and districts. Accordingly, the five entities named above will receive roughly one-fourth of the plant-induced taxes, or $3.4 million, because this is the proportion of all county funds they have traditionally received. The remaining $9.6 million will go to other recipients county-wide. Because of this widespread distribution, the property taxes paid by SONGS 2 and 3 will not bring a large windfall to any single district but, rather, a modest 4.0% increase to all county funds and districts over pre-construction receipts (2.9% over the present situation where $100 million of plant construction is already on the tax rolls). The debt service rate of the three previously named school districts will be reduced as a result of plant induced revenues but this represents a very small part of the total property tax.[32]

Sales and use taxes payable to the State of California are levied at 6% of the retail or use value of fixtures, equipment, machinery, and materials purchased either in or outside of the State of California and placed in use within the state. For every 6 cents collected, 1.25 cents is allocated to counties and cities. The state tax on nuclear fuel for SONGS 2 and 3 is expected to be about $2.5 million per year. In addition, $415,000 in sales tax for materials will be paid in 1981, the first year of operation (ER, Appendix 8A, p. 8).

Over the operating life of SONGS 2 & 3, about $66 million in California state corporate income taxes will be paid by the applicant. California also has a City Utility Users Tax that, although it is difficult to determine the proportion for which SONGS 2 & 3 are directly responsible, is estimated to increase by $1.6 million per year (ER, Appendix 8A, p. 8). This tax varies for each city, and the revenues are not earmarked for any particular purposes.

The California Energy Resources Surcharge is included in the retail customer's bill and is collected by the utility. The current surcharge is $0.00015 per kilowatt-hour. The revenues collected are placed in the State Energy Resources Conservation and Development Special Account in the General Fund in the State Treasury by the State Board of Equalization. All funds in the account are to be expended for the purpose of carrying out the provisions of the Warren-Alquist State Energy Resources Conservation and Development Act.

5.6.5 Impact on recreational resources

In the early 1960s the applicant secured a leasehold from the U.S. Marine Corps at Camp Pendleton. During construction of SONGS 1, the Marine Corps released about 5.6 km (3.5 miles) of beach front to the State of California to be maintained as San Onofre State Beach. When this park opened in 1971, an additional 2440 m (8000 ft) of beach front had gained public access. Of this, 1370 m (4500 ft) are on the applicant's leasehold and the remaining 1070 m (3500 ft) are immediately north of the plant site, comprising another section of the state beach.

In order to comply with NRC regulations regarding the siting of nuclear power plants set forth in 10 CFR Part 100, the applicant proposes to control recreational activities on the beach for a distance of about 1.4 km (0.85 mile) adjacent to the station (ER, Sect. 2.1.2). Access to this area will be permitted for the purpose of viewing the barrancas and bluffs south of the station and for pedestrian passage between the public beach areas north and south of the station. Recreational activities, such as sunbathing or picnicking, will not be permitted within the landward portion of this restricted area. To facilitate passage between the beaches, a walkway will be constructed through the restricted area adjacent to the seawall. This walkway will be 4.6 m (15 ft) wide, will be bounded by a 2.4-m (8-ft) chain link fence, and will be used only for passage through the restricted area. It is the judgment of the staff that the fence proposed by the applicant is inappropriate in light of the scenic nature of the area and that a less aesthetically objectionable way should be

sought to restrict access to the beach. Therefore, it is recommended that the applicant consider alternate methods of beach enclosure that will safely restrict access in a manner compatible with the scenic nature of this area.

In the Final Environmental Statement required for the construction permit of SONGS 2 and 3, the staff stated, "Use of the beach will not be restricted after construction is complete" (FES-CP, p. 2-11). The current plan to restrict use of approximately 1.4 km (0.85 mile) of the beach front for the 30-year operating life of the plant is a significant loss of valuable recreational and scenic space and represents a substantial change in action between issuance of the FES-CP and application for an operating license. The staff further stated, "The beach in the vicinity of the Station (5639 m (18,500 ft) south and 1036 m (3400 ft) north) is considered to be a unique and scarce recreational resource," (FES-CP, p. 2-11) and "Closure for even a brief period is objectionable" (FES-CP, p. 8-1). The loss of this resource precludes recreational benefits to significant numbers of beach users in the vicinity of San Onofre Beach. The staff reiterates those judgments and concludes that the current plan to restrict the public's use of this beach is a significant cost of the project, unanticipated at issuance of the construction permit. This impact is not sufficiently adverse, however, to warrant denying an operating license.

While all state beaches in the Pendleton coast area experienced increased usage in recent years, the attendance at San Onofre State Beach has risen significantly faster than at the other facilities. Between 1972 and 1978, the annual number of visits to the San Onofre State Beach rose by 98% while San Clemente and Doheny State Beaches showed increases of 46% and 25%, respectively (ER, Appendix 8A, Table 24, and Reference 32). As demand on available recreational resources increases, the significance of removing the beach in front of SONGS 2 & 3 from unrestricted public use will increase.

5.6.6 Emergency planning impacts

The applicants are currently revising the Emergency Plan, San Onofre Nuclear Generating Station Units 2 and 3 in accordance with 10 CFR Part 50, as amended July 23, 1980, as well as the recommended criteria contained in NUREG-0654. The staff believes the only noteworthy potential source of impact on the public from emergency planning would be associated with the siren alert system. The system will be designed to provide a minimum 10db dissonant differential from the ambient noise levels. The maximum sound level received by any member of the public should be lower than 123db. A complete cycle test will be required annually. The test requirements and alarm noise levels are consistant with those used for existing alert systems; therefore the staff concludes that the noise impacts associated with the siren alert system will be infrequent and insignificant.

5.6.7 Summary and conclusion

The staff concludes that, with the significant exception of restricting public use of 1.4 km (0.85 mi) of the San Onofre beach, the social and economic impact of operating SONGS 2 & 3 will be moderate. The large population within 96 km (60 miles) of the site and the projected population growth in the area is such that the addition of all 200 workers and their families would represent negligible impact to the area. Under the terms of Proposition 13, the property tax revenues received by the various funds and districts in San Diego County will be relatively small in proportion to existing revenues.

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* Available for inspection and copying for a fee in the NRC Public Document Room, 1717 H St., NW., Washington, DC 20555.
** Available from the NRC/GPO Sales Program, Washington, DC 20555, or the National Technical Information Service, Springfield, VA 22161.
***Available from NTIS only.

6. ENVIRONMENTAL MONITORING

6.1 SUMMARY

The applicant has expanded its San Onofre Unit 1 environmental monitoring program (biological, chemical, physical, and thermal) to determine environmental effects which may occur as a result of site preparation and construction of Units 2 and 3 and to establish an adequate preoperational baseline by which the operational effects of Units 2 and 3 may be judged.

The aquatic preoperational environmental monitoring program for SONGS 2 and 3 was approved by NRC and implemented by the applicant in April 1978. The NRC-approved program terminated in September 1980. However, all NPDES permit monitoring program requirements will continue to be met until an approved operational monitoring program is implemented. Results of the preoperational monitoring program will be used in formulating the operational monitoring program, which the applicant will submit for approval by the California Regional Water Quality Control Board to be incorporated in the NPDES permit monitoring program.

The environmental monitoring programs presented here differ somewhat from the description in the FES-CP. More detailed information is given here than in the FES-CP. Two state agencies, the California Regional Water Quality Control Board and the California Coastal Commission, have imposed environmental monitoring requirements in the vicinity of the San Onofre Station. NRC has discussed the results of its environmental review with the State agencies and has provided the State with recommendations for monitoring. The sections which follow include NRC staff recommendations based on its environmental review. However, requirements for non-radiological monitoring of the aquatic environment will be the responsibility of the State.

6.2 PREOPERATIONAL ENVIRONMENTAL PROGRAMS

The results from the preoperational monitoring program for Units 2 and 3 will be submitted with the Annual Operating Report for Unit 1.

6.2.1 Aquatic biological monitoring program

The applicant's preoperational aquatic biological monitoring program was designed to determine the species composition, abundance, and the temporal and spatial distribution of phytoplankton, zooplankton, ichthyoplankton, nekton, benthos, kelp beds, and intertidal organisms. The data obtained will be used to provide a basis for comparison with future operational monitoring data to determine if plant operation has caused observable perturbations in the ecosystem.

The possible operational impacts identified in this document and the FES-CP include: changes in local plankton populations due to entrainment; changes in the abundance of fish eggs, larvae, juveniles, and adults due to entrainment; adult fish population shifts due to fish impingement; alterations in some of the benthic and fish communities from thermal discharges; and changes in benthic and planktonic communities from increased turbidity. Thus, results from the preoperational and operational monitoring programs will be used to determine the extent to which the above effects occur.

6.2.1.1 Phytoplankton and zooplankton

Phytoplankton and zooplankton were sampled bimonthly. Samples were collected from at least four fixed stations, one each in zones 0B, 1B, 2B and 6 (Figure 6.1). A pump system is used to sample the water column and a 202 μm mesh-size screen is used to collect the zooplankton. Zooplankton biomass is determined and predominant species are enumerated. Chlorophyll analyses are performed on whole-water samples. Collections are coordinated, as much as possible, with the collection of pertinent physical data such as temperature, transparency, and current velocity and direction.

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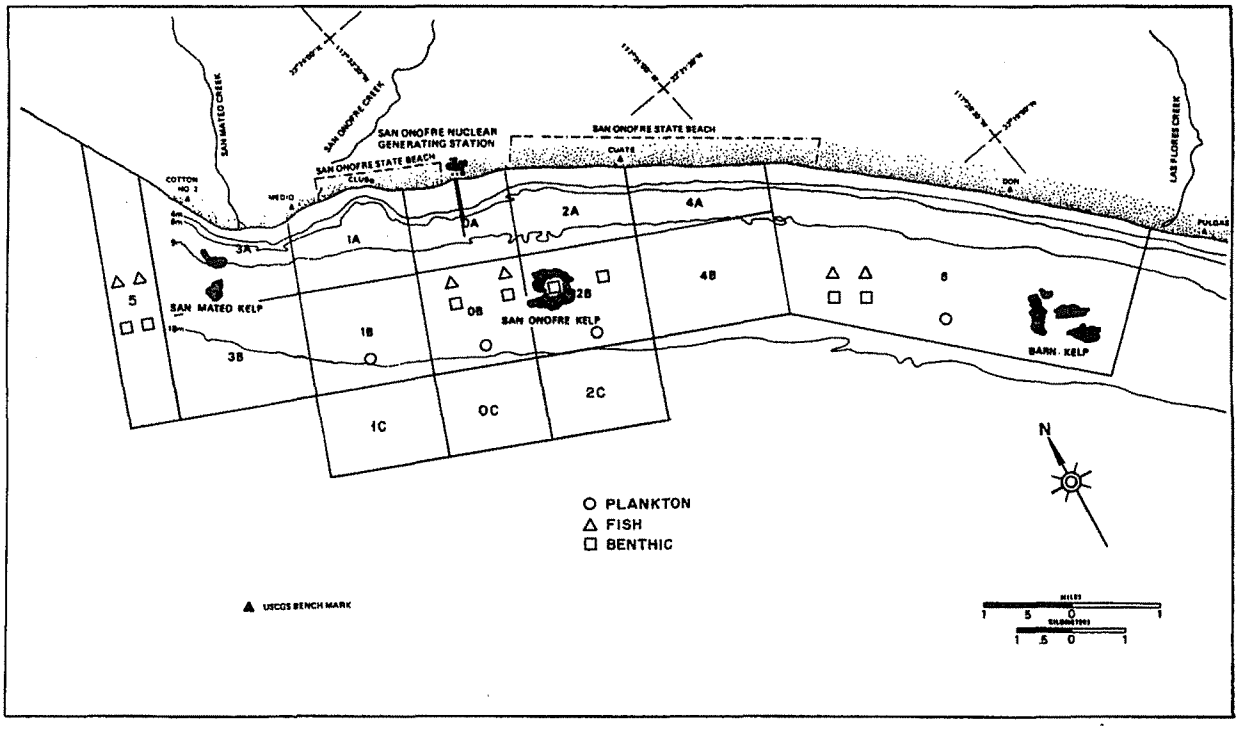

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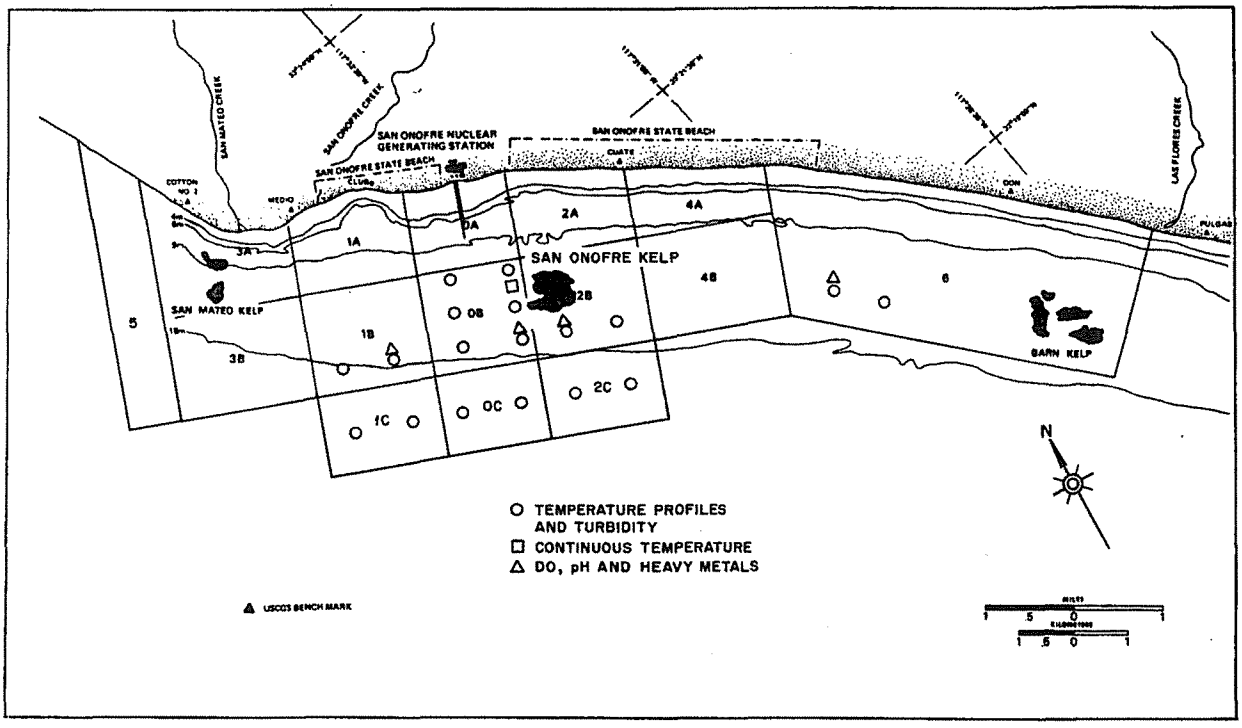

Fig. 6.1. Environmental monitoring stations for SONGS 2 and 3 preoperational monitoring program. Source: ER, Apendix 6A, Figs. 1 and 2.

The staff recommends that predominant phytoplankton genera also be enumerated to provide baseline conditions for this group. This would enable, for example, the determination of whether operation of the facility promotes red tide development (see Sect. 5.3.2, FES-CP).

6.2.1.2 Ichthyoplankton

Ichthyoplankton will be collected monthly at two stations in the Units 2 and 3 discharge area, zone 0B, and at two stations in the reference area, either zone 5 or 6. Additionally, the Unit 1 intake area will be sampled. The study began approximately two years prior to initial operation of Unit 2 and lasted one year. Sampling was conducted during the day, at night, at dawn, and at dusk at the intake; night sampling was employed at the other locations. The water surface, water column, and epibenthos was sampled at each station. Fish larvae were identified to the lowest taxon possible and enumerated. Fish eggs were sorted and enumerated.

A study by the Marine Review Committee (MRC) was initiated in July 1976 (see Section 6.4.2) to assess the distribution, abundance, and entrainment of ichthyoplankton at SONGS 1. It is expected that data acquired from this work will also help characterize the SONGS 2 and 3 environment.

6.2.1.3 Nekton

Replicate fish samples were collected on a quarterly basis from at least two stations in zone 0B, two in zone 5, two in the control zone, zone 6 (Figure 6.1). The gill nets used were 2- by 46-m (6- by 150-ft) full size, containing six 7.5-m (25-ft) panels of 19.05-, 25.4-, 31.75-, 38.1-, 44.5-, and 63.5-mm (3/4-, 1-, 1-1/4-, 1-1/2-, 1-3/4-, and 2-1/2-in.) bar mesh. The fish were measured, their state of health was assessed, and sexual maturation was determined on subsamples. Synoptic measurements of temperature and transmissivity were taken at each station.

6.2.1.4 Benthos

Benthic samples were collected quarterly at at least two stations within each of zones 0B, 2B, 6 and 5 (or zones 3A and/or 3B) (Fig. 6.1). Permanent sampling stations exist in which a 6-m^2 (64.56-ft^2) sampling area has been established. Each sampling area contains 300 evenly spaced contact points which are used to estimate the distribution and relative abundance of sessile invertebrates, large motile invertebrates and macrophytes. Species enumeration and substrate type are recorded for each contact point. Additionally, four 0.125 m^2 (1.35-ft^2) quadrants are randomly placed within the sampling area to evaluate the distribution and abundance of small, clumped, or patchily distributed organisms. General observations to be recorded during sampling include: quantity and composition of drift algae, conspicuous or sparsely distributed biota not sampled with the point contact method, and substrate alteration (e.g., increased sedimentation). Selected species which are enumerated will be measured, and their general condition recorded. Procurement of some of the physical data, such as temperature and turbidity, will be coordinated with the benthic sampling program.

6.2.1.5 Intertidal organisms

Although not a required component of the preoperational monitoring program, quarterly observations were made along cobble intertidal transects at four monitoring stations and one control station. Predominant macroscopic species and substrate composition were identified and enumerated within three permanent 0.25-m^2 (2.69-ft^2) quadrats along a line perpendicular to the beach. Photographs were also taken of each quadrat for a permanent record of any possible ecological changes.

The staff believes that it is unnecessary to begin the intertidal sampling program until the time of removal of the construction apron from SONGS 2 and 3 (See FES-CP, Sect. 4.3.2, p. 4-9). At that time the intertidal monitoring program should be reinstated to assess the effect of the added sand movement in the intertidal zone. Provided the data show no significant effects, this program may be terminated after all translocation of sand has occurred or after two years. Until the time of apron removal, visual inspection of the intertidal zone will be sufficient, with biological sampling and laboratory analysis initiated only if needed. Deletion of the intertidal program may be reasonable during operational monitoring because of the extensive impact sustained by the intertidal area from activities unassociated with SONGS (Sect. 2.5.2.4) and because of the unlikely potential for any significant impact resulting from SONGS operation.

6.2.1.6 Kelp beds

The three kelp beds, San Mateo, San Onofre, and Barn, located near SONGS (Fig. 6.1) are being studied. A brief outline of the scope of effort at the three kelp beds is as follows:

1. Three benthic stations are located in and about the San Onofre kelp bed and one each at Barn kelp and San Mateo kelp. Stations are quantitatively assessed quarterly.

2. Kelp canopies and rock substrate are mapped for areal extent on a quarterly basis.

3. Water nutrient analysis for ammonia, nitrates, nitrites, and phosphate are taken monthly at all three beds. Water samples are taken from the surface and bottom from within each bed and offshore of each bed. An additional offshore station serves as a monitoring area for upwelling.

4. Kelp tissue analysis for nutrient content is conducted on a monthly basis at all three kelp beds. Each leaf is analyzed for nitrogen content.

5. An assessment of the health of the kelp plants in the three beds is made on a quarterly basis. Parameters assessed include: success of juvenile recruitment, density of kelp plants, amount of encrusting organisms and grazing by herbivores and abundance of senile and diseased plants.

6. Aerial infra-red photographs of the three kelp bed canopies will be taken on a monthly basis.

6.2.2 Water quality monitoring program

The preoperational water quality monitoring program is an expansion of the existing program required by the Environmental Technical Specifications for SONGS 1. This program is designed to establish baseline characteristics of selected oceanographic parameters for comparison with data obtained during the operation of SONGS. This comparison will allow determination of the extent to which SONGS operation alters water quality. Those parameters identified in the FES-CP and in this document which might be altered include: pH, temperature, turbidity, certain heavy metals, and dissolved oxygen.

Sea water temperature-depth profiles are measured bimonthly at stations in the area of the Units 2 and 3 diffusers and at a reference station outside of the area of predicted thermal influence. Stations are as follows: two within each of zones 1B, 2B, 1C, OC, 2C, and 6, six stations within zone OB (Fig. 6.1). Additionally, sea water temperatures are continuously monitored near the surface, at mid-depth, and near the bottom at a permanent station in zone OB. Temperatures from each depth are recorded hourly. The accuracy of the system is ±0.5 degrees centigrade, ±30 minutes per month.

Turbidity is monitored bimonthly at two stations within each of zones 1B, 2B, 1C, OC, 2C, and 6, and at six stations within zone OB (Fig. 6.1). The pH is monitored bimonthly at four sampling stations — one in each of zones OB, 1B, 2B, and 6. Dissolved oxygen is measured bimonthly at four stations — one in each of zones OB, 1B, 2B, and 6.

Mid-depth ocean water samples and grab samples of ocean bottom sediments are collected quarterly in the area of the Units 2 and 3 diffusers and an appropriate control area for analysis of heavy metals. One station in each of zones 1B, 2B, OB, and 6 is sampled. Samples will be analyzed for chromium, iron, and titanium. Copper will not be monitored as the applicant has indicated that SONGS 2 and 3 will have titanium condenser tubing.

The staff considers this program adequate with the following additions: (1) the water quality data should be collected within a two-day period at maximum to permit station-by-station comparisons and the investigation of possible cause and effect relationships, and (2) all control samples should be collected from an area predicted to be unaffected by any discharge effect.

6.2.3 Terrestrial monitoring program

The baseline terrestrial environmental monitoring program for the FES-CP was very nominal. As a condition of the construction permit, the applicant expanded its terrestrial monitoring program to establish an adequate preoperational baseline by which the operational effects of SONGS 2 and 3 may be judged. Biological data were collected seasonally in order to document changes in the biotic communities over a one-year time span. Methods utilized included

small mammal trapping; bird censusing; observations of reptiles, amphibians, and large mammals; plant species lists; and vegetation analyses using the line intercept and quadrat methods. Results of this expanded monitoring program are presented in Sect. 2.5.1.

The applicant has proposed and is currently monitoring areas of cut and fill associated with construction of the plant and transmission lines to detect areas of erosion (ER, Appendix 6A, Special Studies I). Visual inspections are conducted and documented biweekly; any erosion resulting from the applicant's construction activities will receive appropriate corrective action.

6.2.4 Radiological monitoring program

Radiological environmental monitoring programs are established to provide data on measurable levels of radiation and radioactive materials in the site environs. Appendix I to 10 CFR Part 50 requires that the relationship between quantities of radioactive material released in effluents during normal operation, including anticipated operational occurrences, and resultant radioactive doses to individuals from principal pathways of exposure be evaluated. Monitoring programs are conducted to verify the effectiveness of in-plant controls used for reducing the release of radioactive materials and to provide public reassurance that undetected radioactivity will not build up in the environment. A surveillance program is established to identify changes in the use of unrestricted areas to provide a basis for modifications of the monitoring programs.

The preoperational phase of the monitoring program provides for the measurement of background levels and their variations along the anticipated important pathways in the area surrounding the plant; the training of personnel; and the evaluation of procedures, equipment, and techniques.

This is discussed in greater detail in NRC Regulatory Guide 4.1, Rev. 1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," and the Radiological Assessment Branch Technical Position, August 1977, "Standard Technical Specification for Radiological Environmental Monitoring Program."

The applicant has proposed a radiological environmental monitoring program to meet the objectives discussed above. The applicant's proposed preoperational radiological environmental monitoring program is presented in Sect. 6.1.5 of the applicant's Environmental Report.

The applicant proposes to initiate parts of the program two years prior to operation of the facility, with the remaining portions beginning either six months or one year prior to operation.

The staff concludes that the radiological preoperational monitoring program proposed by the applicant is acceptable.

6.2.5 Onsite meteorological monitoring program[1,2,3]

The original onsite meteorological program began in late 1964 with wind measurements at the top of a 19.5-m (64-ft) mast. In December 1970, the current meteorological monitoring program began with the installation of a 36.6-m (120-ft) tower atop the coastal bluff about 100 m (330 ft) west-northwest from the Unit 1 containment and 420 m (1380 ft) west-northwest of the Unit 2 containment. In October 1975 the tower was extended to a height of about 43 m (140 ft). Table 6.1 describes the kinds of measurements and their elevations on the tower between 1970 and the present.

Southern California Edison Company also conducted an onshore tracer test program at the San Onofre site. Among the objectives of the program were (1) to evaluate the appropriateness of using data measured on the existing site meteorological tower located on the coastal bluff for making dispersion estimates for onshore flows, and (2) to characterize dispersion representative of meteorological conditions during routine plant releases. NUS-1927[3] describes the test program and data.

On the basis of our analysis of the test data, we conclude that the wind and vertical temperature data measured on the San Onofre onsite (bluff) tower are acceptable for use in calculating atmospheric dispersion estimates for the site vicinity using the staff's model, described in Sect. 2.4.4.

Table 6.1. SONGS onsite meteorological instrumentation

Period	Measured parameter	Elevation above ground	
		Meters	Feet
December 1970–January 1973	Wind direction, speed and standard deviation	36.6	120
	Dry bulb vertical temperature gradient	36.6–6.1	120–20
January 1973–October 1975	Wind direction and speed	10, 36.6	33, 120
	Wind direction standard deviation	36.6	120
	Dry bulb temperature[a]	6.1	20
	Wet bulb temperature[b]	6.1	20
	Dry bulb vertical gradient	36.6–6.1	120–20
October 1975–present	Wind direction and speed	10, 20,[c] 40	33, 66, 131
	Wind direction standard deviation	10	33
	Dry bulb temperature	10	33,
	Dry bulb vertical gradient	40–10[d]	131–33
		36.6–6.1[c]	120–20

[a] Installed January 1974.
[b] Installed January 1974, removed January 1975.
[c] Temporary.
[d] Two sets of instruments.

6.3 OPERATIONAL MONITORING PROGRAMS

6.3.1 Aquatic biological monitoring program

The aquatic biological operational monitoring program will contain sampling programs which are extensions of the baseline and preoperational programs so that analyses can readily be made of the changes, if any, that occur in the aquatic environment due to plant operation. Thus, the ichthyoplankton study now being conducted and the required kelp preoperational program should be continued during operation of the facility until such time as it is possible to state credibly that no significant impacts result from the facility.

The new fish return system (Sect. 3.2.2) is expected to be about 90% effective according to laboratory models (ER, p. 5.1-20). Precise figures on its effectiveness will not be available until it is operated in conjunction with the heat dissipation system. The staff recommends that the applicant include a program for optimizing the effectiveness of the fish return system. This should include consideration of the delayed mortality of the fish successfully diverted by the fish return system by holding them for 48 to 96 hours before returning them to the ocean.

Consideration of deletion of the intertidal sampling program from the operational monitoring program for SONGS 2 and 3 is discussed in Sect. 6.2.1.5.

6.3.2 Water quality monitoring program

The water quality operational monitoring program is a continuation of the existing preoperational water quality monitoring program (Sect. 6.2.2). This continuity will allow for confirmatory monitoring to assess any possible changes to water quality due to operation of San Onofre Units 2 and 3.

The NRC and the California Regional Water Quality Control Board, San Diego Region (CRWQCB) have worked in a cooperative manner in order to develop the preoperational monitoring program for SONGS 2 and 3. NRC and CRWQCB have agreed to continue to work together to establish an operational phase NPDES permit which will incorporate the aquatic concerns from each regulatory group.

6.3.3 Terrestrial monitoring program

The applicant does not have an operational terrestrial monitoring program. The staff does not recommend any operational monitoring of floral or faunal species because no significant

effects have been identified between the operation of SONGS 2 & 3 and the terrestrial environment. The California Coastal Commission, however, requires the applicant to protect the bluffs 0.5 km (0.31 mile) south of the plant site for the duration of the site easement (expiration date, May 1, 2023) (ER, Appendix 12B).

6.3.4 Radiological monitoring program

The operational offsite radiological monitoring program is conducted to measure radiation levels and radioactivity in the plant environs. It assists and provides backup support to the detailed effluent monitoring (as recommended in NRC Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Release of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants") which is needed to evaluate individual and population exposures and to verify projected or anticipated radioactivity concentrations.

The applicant plans essentially to continued the proposed preoperational program during the operating period. However, refinements may be made in the program to reflect changes in land use or preoperational monitoring experience.

6.3.5 Meteorological monitoring program

The applicant plans to continue the program begun for the construction permit evaluation. The onsite meteorological tower provides data in accordance with the recommendations of Regulatory Guide 1.23, "Onsite Meteorological Programs." Furthermore, operating technical specifications require meteorological monitoring as a condition of operation.

6.4 RELATED ENVIRONMENTAL RESOURCE DATA

6.4.1 Thermal exception studies

As a condition of the exception to the State Thermal Plan granted by the California Regional Water Quality Control Board, San Diego, the applicants are required to perform studies to determine the optimum mode of heat treatment to control fouling organisms while minimizing adverse effects on marine life and to permit the Regional Board to set precise limits on the frequency, degree, and duration of heat treatment. These studies were submitted to the State Water Resources Control Board on January 31, 1979. On December 18, 1980, the Board determined that the studies fulfilled the conditions set earlier and further determined that the heat treatment operating conditions proposed by the applicant will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife within the meaning of Section 316(a) of the Clean Water Act.

6.4.2 Marine Review Committee studies

The California Coastal Commission specified in the Coastal Zone Permit issued in 1974 for SONGS 2 and 3 that an extensive study be conducted at San Onofre. The study program is funded by the utility and is being administered by a three-member Marine Review Committee (MRC) appointed by the Coastal Commission. The intent of the program is to provide an independent assessment of the marine environment and a prediction of the potential impact of SONGS 2 and 3. The MRC has identified the following areas for study: physical, oceanographic, and ecological monitoring and modeling; plankton – far field effects and entrainment; fish populations, impingement, and diversion; and benthic communities, intertidal zone organisms, and kelp beds.

MRC has conducted studies at SONGS 2 and 3 in some of the above mentioned areas since August 1976. In November 1980 the MRC issued a report containing its recommendations, predictions, and rationale. The conclusions of the MRC are essentially consistent with those of the staff as described in Section 5 of this statement. Although noting uncertainties, the MRC has concluded that it does not predict at this time that substantial adverse effects on the marine environment are likely to occur from the operations of the SONGS cooling system. Accordingly, the report recommends no design changes but does recommend continued monitoring of the aquatic community to ensure that there is no serious ecological damage, especially to the kelp beds, as a result of plant operation. (See Appendix E for the options and recommendations of the Marine Review Committee.)

6.5 CONCLUSIONS

The preoperational and operational monitoring programs as described above give adequate attention to impacts discussed in this environmental impact statement.

REFERENCES

These documents are available for inspection and copying for a fee in the NRC Public Document room 1717 H Street, N.W., Washington, D.C. 20555

1. Southern California Edison Company, "San Onofre Nuclear Generating Station Units 2 and 3, Environmental Report – Operating License Stage," Docket No. 50-361/362, 1977.

2. Southern California Edison Company, "San Onofre Generating Station Units 2 and 3, Final Safety Analysis Report," Docket No. 50-361/362, 1977.

3. M. Septoff, A. E. Mitchell, and L. H. Teuscher, "Final Report of the Onshore Tracer Tests Conducted December 1976 through March 1977 at the San Onofre Nuclear Generating Station," Report NUS-1927, NUS Corporation, Rockville, Md., 1977.

7. ENVIRONMENTAL IMPACT OF POSTULATED ACCIDENTS

7.1 PLANT ACCIDENTS

The staff has considered the potential radiological impacts on the environment of possible accidents at the San Onofre Nuclear Generating Station Units 2 and 3 in accordance with a Statement of Interim Policy published by the Nuclear Regulatory Commission on June 13, 1980.[1] The following discussion reflects these considerations and conclusions.

The first section deals with general characteristics of nuclear power plant accidents including a brief summary of safety measures to minimize the probability of their occurrence and to mitigate their consequences if they should occur. Also described are the important properties of radioactive materials and the pathways by which they could be transported to become environmental hazards. Potential adverse health effects and impacts on society associated with actions to avoid such health effects are also identified.

Next, actual experience with nuclear power plant accidents and their observed health effects and other societal impacts are then described. This is followed by a summary review of safety features of the San Onofre Units 2 and 3 facilities and of the site that act to mitigate the consequences of accidents.

The results of calculations of the potential consequences of accidents that have been postulated in the design basis are then given. Also described are the results of calculations for the San Onofre site using probabilistic methods to estimate the possible impacts and the risks associated with severe accident sequences of exceedingly low probability of occurrence.

7.1.1 General characteristics of accidents

The term accident, as used in this section, refers to any unintentional event not addressed in Section 5.5 that results in a release of radioactive materials into the environment. The predominant focus, therefore, is on events that can lead to releases substantially in excess of permissible limits for normal operation. Such limits are specified in the Commission's regulations at 10 CFR Part 20 and 10 CFR Part 50, Appendix I.

There are several features which combine to reduce the risk associated with accidents at nuclear power plants. Safety features in the design, construction, and operation comprising the first line of defense are to a very large extent devoted to the prevention of the release of these radioactive materials from their normal places of confinement within the plant. There are also a number of additional lines of defenses that are designed to mitigate the consequences of failures in the first line. Descriptions of these features for the San Onofre Units 2 and 3 plant may be found in the applicant's Final Safety Analysis Report,[2] and in the staff's Safety Evaluation Report.[3] The most important mitigative features are described in Section 7.1.3.1 below.

These safety features are designed taking into consideration the specific locations of radioactive materials within the plant, their amounts, their nuclear, physical, and chemical properties, and their relative tendency to be transported into and for creating biological hazards in the environment.

7.1.1.1 Fission product characteristics

By far the largest inventory of radioactive material in a nuclear power plant is produced as a byproduct of the fission process and is located in the uranium oxide fuel pellets in the form of fission products. These pellets are contained in the fuel rods which make up the fuel assemblies. During periodic refueling shutdowns, the assemblies containing these fuel pellets are transferred to a spent fuel storage pool so that the second largest inventory of radioactive material is located in this storage area. Much smaller inventories of radioactive materials are also normally present in the water that circulates in the primary coolant system and in the systems used to process gaseous and liquid radioactive wastes in the plant.

These radioactive materials exist in a variety of physical and chemical forms. Their potential for dispersion into the environment is dependent not only on mechanical forces that might physically transport them, but also upon their inherent properties, particularly their volatility. The majority of these materials exist as nonvolatile solids over a wide range of temperatures. Some, however, are relatively volatile solids and a few are gaseous in nature. These characteristics have a significant bearing upon the assessment of the environmental radiological impact of accidents.

The gaseous materials include radioactive forms of the chemcially inert noble gases krypton and xenon. These have the highest potential for release into the atmosphere. If a reactor accident were to occur involving degradation of the fuel cladding, the release of substantial quantities of these radioactive gases from the fuel is a virtual certainty. Such accidents are very low frequency but credible events (see Section 7.1.2). It is for this reason that the safety analysis of each nuclear power plant analyzes a hypothetical design basis accident that postulates the release of the entire contained inventory of radioactive noble gases from the fuel into the containment structure. If further released to the environment as a possible result of failure of safety features, the hazard to individuals from these noble gases would arise predominantly through the external gamma radiation from the airborne plume. The reactor containment structure is designed to minimize this type of release.

Radioactive forms of iodine are formed in substantial quantities in the fuel by the fission process and in some chemical forms may be quite volatile. For this reason, they have traditionally been regarded as having a relatively high potential for release from the fuel. The chemical forms in which the fission product radioiodines are found are generally solid materials at room temperature, however, so that they have a strong tendency to condense (or "plate out") upon cooler surfaces. In addition, most of the iodine compounds are quite soluble in, or chemically reactive with, water. Although these properties do not inhibit the release of radioiodines from degraded fuel, they do act to mitigate the release from containment structures that have large internal surface areas and that contain large quantities of water as a result of an accident. The same properties affect the behavior of radioiodines that may "escape" into the atmosphere. Thus, if rainfall occurs during a release, or if there is moisture on exposed surfaces, e.g., dew, the radioiodines will show a strong tendency to be absorbed by the moisture. Because of radioiodine's relatively high solubility and distinct radiological hazard, its potential for release to the atmosphere has also been reduced by the use of special containment spray systems. If released to the environment, the principal radiological hazard associated with the radioiodines is ingestion into the human body and subsequent concentration in the thyroid gland.

Other radioactive materials formed during the operation of a nuclear power plant have lower volatilities and therefore, by comparison with the noble gases and iodine, a much smaller tendency to escape from degraded fuel unless the temperature of the fuel becomes quite high. By the same token, such materials, if they escape by volatilization from the fuel, tend to condense quite rapidly to solid form again when transported to a lower temperature region and/or dissolve in water when present. The former mechanism can have the result of producing some solid particles of sufficiently small size to be carried some distance by a moving stream of gas or air. If such particulate materials are dispersed into the atmosphere as a result of failure of the containment barrier, they will tend to be carried downwind and deposit on surface features by gravitational settling or by precipitation (fallout), where they will become "contamination" hazards in the environment.

All of these radioactive materials exhibit the property of radioactive decay with characteristic half-lives ranging from fractions of a second to many days or years (see Table 7.1). Many of them decay through a sequence or chain of decay processes and all eventually become stable (nonradioactive) materials. The radiation emitted during these decay processes is the reason that they are hazardous materials.

7.1.1.2 Exposure pathways

The radiation exposure (hazard) to individuals is determined by their proximity to the radioactive material, the duration of exposure, and factors that act to shield the individual from the radiation. Pathways for the transport of radiation and radioactive materials that lead to radiation exposure hazards to humans are generally the same for accidental as for "normal" releases. These are depicted in Section 5, Figure 5.17. There are two additional possible pathways that could be significant for accident releases that are not shown in Figure 5.17. One of these is the fallout onto open bodies of water of radioactivity initially carried in the air. The second would be unique to an accident that results in temperatures inside the reactor core sufficiently high to cause melting and subsequent penetration of the basemat underlying the reactor by the molten core debris. This creates the potential for the release of radioactive material into the hydrosphere through contact with ground water. These pathways may lead to external exposure to radiation, and to internal exposures if radioactivity is inhaled, or ingested from contaminated food or water.

Table 7.1 Activity of Radionuclides in a San Onofre Reactor Core at 3560 MWt

Group/Radionuclide	Radioactive Inventory (millions of curies)	Half-life (days)
A. NOBLE GASES		
Krypton-85	0.63	3,950
Krypton-85m	27	0.183
Krypton-87	52	0.0528
Krypton-88	76	0.117
Xenon-133	190	5.28
Xenon-135	38	0.384
B. IODINES		
Iodine-131	95	8.05
Iodine-132	130	0.0958
Iodine-133	190	0.875
Iodine-134	210	0.0366
Iodine-135	170	0.280
C. ALKALI METALS		
Rubidium-86	0.029	18.7
Cesium-134	8.3	750
Cesium-136	3.3	13.0
Cesium-137	5.2	11,000
D. TELLURIUM-ANTIMONY		
Tellurium-127	0.029	18.7
Tellurium-127m	1.2	109
Tellurium-129	34	0.048
Tellurium-129m	5.9	34.0
Tellurium-131m	14	1.25
Tellurium-132	130	3.25
Antimony-127	6.8	3.88
Antimony-129	37	0.179
E. AKALINE EARTHS		
Strontium-89	100	52.1
Strontium-90	4.1	11,030
Strontium-91	120	0.403
Barium-140	180	12.8
F. COBALT AND NOBLE METALS		
Cobalt-58	0.87	71.0
Cobalt-60	0.32	1,920
Molybdenum-99	180	2.8
Technetium-99m	160	0.25
Ruthenium-103	120	39.5
Ruthenium-105	80	0.185
Ruthenium-106	28	366
Rhodium-105	55	1.50
G. RARE EARTHS, REFRACTORY OXIDES AND TRANSURANICS		
Yttrium-99	4.3	2.67
Yttrium-91	130	59.0
Zirconium-95	170	65.2
Zirconium-97	170	0.71
Niobium-95	170	35.0
Lanthanum-140	180	1.67
Cerium-141	170	32.3
Cerium-143	150	1.38
Cerium-144	95	284

Table 7.1 (Continued)

Group/Radionuclide	Radioactive Inventory (millions of curies)	Half-life (days)
G. RARE EARTHS, REFRACTORY OXIDES AND TRANSURANICS (Continued)		
Praseodymium-143	150	13.7
Neodymium-147	67	11.1
Neptunium-239	1800	2.35
Plutonium-238	0.063	32,500
Plutonium-239	0.023	8.9×10^6
Plutonium-240	0.023	2.4×10^6
Plutonium-241	3.8	5,350
Americium-241	0.0019	1.5×10^5
Curium-242	0.56	163
Curium-244	0.026	6,630

NOTE: The above grouping of radionuclides corresponds to that in Table 7.3.

It is characteristic of these pathways that during the transport of radioactive material by wind or by water, the material tends to spread and disperse, like a plume of smoke from a smokestack, becoming less concentrated in larger volumes of air or water. The result of these natural processes is to lessen the intensity of exposure to individuals downwind or downstream of the point of release, but they also tend to increase the number who may be exposed. For a release into the atmosphere, the degree to which dispersion reduces the concentration in the plume at any downwind point is governed by the turbulence characteristics of the atmosphere which vary considerably with time and from place to place. This fact, taken in conjunction with the variability of wind direction and the presence or absence of precipitation, means that accident consequences are very much dependent upon the weather conditions existing at the time.

7.1.1.3 Health effects

The cause and effect relationships between radiation exposure and adverse health effects are quite complex[4] but they have been more exhaustively studied than any other environmental contaminant.

Whole-body radiation exposure resulting in a dose greater than about 10 rem for a few persons and about 25 rem for nearly all people over a short period of time (hours) is necessary before any physiological effects to an individual are clinically detectable. Doses about to 10 to 20 times larger than the latter dose, also received over a relatively short period of time (hours to a few days), can be expected to cause some fatal injuries. At the severe, but extremely low probability end of the accident spectrum, exposures of these magnitudes are theoretically possible for persons in the close proximity of such accidents if measures are not or cannot be taken to provide protection, e.g., by sheltering or evacuation.

Lower levels of exposures may also constitute a health risk, but the ability to define a direct cause and effect relationship between any given health effect and a known exposure to radiation is difficult given the backdrop of the many other possible reasons why a particular effect is observed in a specific individual. For this reason, it is necessary to assess such effects on a statistical basis. Such effects include cancer and genetic changes in future generations after exposure of a prospective parent. Cancer in the exposed population may begin to develop only after a lapse of 2 to 15 years (latent period) from the time of exposure and then continue over a period of about 30 years (plateau period). However, in the case of exposure of fetuses (in utero), cancer may begin to develop at birth (no latent period) and end at age 10 (i.e., the plateau period is 10 years). The health consequences model currently being used is based on the 1972 BEIR Report of the National Academy of Sciences.[5]

Most authorities are in agreement that a reasonable and probably conservative estimate of the statistical relationship between low levels of radiation exposure to a large number of people is within the range of about 10 to 500 potential cancer deaths (although zero

is not excluded by the data) per million man-rem. The range comes from the latest NAS BEIR III Report (1980)[6] which also indicates a probable value of about 150. This value is virtually identical to the value of about 140 used in the current NRC health effects models. In addition, approximately 220 genetic changes per million person-rem would be projected by BEIR III over succeeding generations. That also compares well with the value of about 260 per million man-rem currently used by the NRC staff.

7.1.1.4 Health effects avoidance

Radiation hazards in the environment tend to disappear by the natural process of radioactive decay. Where the decay process is a slow one, however, and where the material becomes relatively fixed in its location as an environmental contaminant (e.g., in soil), the hazard can continue to exist for a relatively long period of time--months, years, or even decades. Thus, a possible consequential environmental societal impact of severe accidents is the avoidance of the health hazard rather than the health hazard itself, by restrictions on the use of the contaminated property or contaminated foodstuffs, milk, and drinking water. The potential economic impacts that this can cause are discussed below.

7.1.2 Accident experience and observed impacts

The evidence of accident frequency and impacts in the past is a useful indicator of future probabilities and impacts. As of mid-1980, there were 69 commercial nuclear power reactor units licensed for operation in the United States at 48 sites with power generating capacities ranging from 50 to 1130 megawatts electric (MWe). (The San Onofre Units 2 and 3 are designed for 1140 MWe each.) The combined experience with these units represents approximately 500 reactor years of operation over an elapsed time of about 20 years. Accidents have occurred at several of these facilities.[7] Some of these have resulted in releases of radioactive material to the environment, ranging from very small fractions of a curie to a few million curies. None is known to have caused any radiation injury or fatality to any member of the public, nor any significant individual or collective public radiation exposure, nor any significant contamination of the environment. This experience base is not large enough to permit a reliable quantitative statistical inference. It does, however, suggest that significant environmental impacts due to accidents are very unlikely to occur over time periods of a few decades.

Melting or severe degradation of reactor fuel has occurred in only one of these 69 operating units, during the accident at Three Mile Island - Unit 2 (TMI-2) on March 28, 1979. In addition to the release of a few million curies of xenon-133, it has been estimated that approximately 15 curies of radioiodine was also released to the environment at TMI-2.[8] This amount represents an extremely minute fraction of the total radioiodine inventory present in the reactor at the time of the accident. No other radioactive fission products were released in measurable quantity.

It has been estimated that the maximum cumulative offsite radiation dose to an individual was less than 100 millirem.[8,9] The total population exposure has been estimated to be in the range from about 1000 to 3000 man-rem. This exposure could produce between none and one additional fatal cancer over the lifetime of the population. The same population receives each year from natural background radiation about 240,000 man-rem and approximately a half-million cancers are expected to develop in this group over its lifetime,[8,9] primarily from causes other than radiation. Trace quantities (barely above the limit of detectability) of radioiodine were found in a few samples of milk produced in the area. No other food or water supplies were impacted.

Accidents at nuclear power plants have also caused occupational injuries and a few fatalities but none attributed to radiation exposure. Individual worker exposures have ranged up to about 4 rems as a direct consequence of accidents, but the collective worker exposure levels (man-rem) are a small fraction of the exposures experienced during normal routine operations that average about 500 man-rem per reactor year.

Accidents have also occurred at other nuclear reactor facilities in the United States and in other countries.[7] Due to inherent differences in design, construction, operation, and purpose of most of these other facilities, their accident record has only indirect relevance to current nuclear power plants. Melting of reactor fuel occurred in at least seven of these accidents, including the one in 1966 at the Enrico Fermi Atomic Power Plant Unit 1. This was a sodium-cooled fast breeder demonstration reactor designed to generate 61 MWe. The damages were repaired and the reactor reached full power four years following the accident. It operated successfully and completed its mission in 1973. This accident did not release any radioactivity to the environment.

A reactor accident in 1957 at Windscale, England released a significant quantity of radioiodine, approximately 20,000 curies, to the environment. This reactor, which was not operated to generate electricity, used air rather than water to cool the uranium fuel. During a special operation to heat the large amount of graphite in this reactor, the fuel overheated and radioiodine and noble gases were released directly to the atmosphere from a 123-m (405-ft) stack. Milk produced in a 512-km^2 (200-mi^2) area around the facility was impounded for up to 44 days. This kind of accident cannot occur in a reactor like San Onofre, however, because of its water-cooled design.

7.1.3 Mitigation of accident consequences

The Nuclear Regulatory Commission is conducting a safety evaluation of the application to operate San Onofre Units 2 and 3. Although this evaluation will contain more detailed information on plant design, the principal design features are presented in the following section.

7.1.3.1 Design features

San Onofre Units 2 and 3 are essentially identical units. Each contains features designed to prevent accidental release of radioactive fission products from the fuel and to lessen the consequences should such a release occur. Many of the design and operating specifications of these features are derived from the analysis of postulated events known as design basis accidents. These accident preventive and mitigative features are collectively referred to as engineered safety features (ESF). The possibilities or probabilities of failure of these systems are incorporated in the assessments discussed in section 7.1.4.

Each steel-lined concrete containment building is a passive mitigating system which is designed to minimize accidental radioactivity releases to the environment. Safety injection systems are incorporated to provide cooling water to the reactor core during an accident to prevent or minimize fuel damage. The containment atmosphere cooling system provides heat removal capability inside the containment following steam release accidents and helps to prevent containment failure due to overpressure. Similarly, the containment spray system is designed to spray cool water into the containment atmosphere. The spray water also contains an additive (sodium hydroxide) which will chemically react with any airborne radioiodine to remove it from the containment atmosphere and prevent its release to the environment.

The mechanical systems mentioned above are supplied with emergency power from onsite diesel generators in the event that normal offsite station power is interrupted.

The fuel handling area of each unit is located in a fuel building, a low leakage structure with a safety-grade ventilation system for accident mitigation. The safety-grade ventilation system is an internal recirculation system and contains both charcoal and high efficiency particulate filters. If radioactivity were to be released into the building, it would be drawn through the ventilation system, and radioactive iodine and particulate fission products would be removed from the flow stream, reducing the concentration within the building and hence the amount that might leak to the atmosphere.

There are features of each unit that are necessary for its power generation function that can also play a role in mitigating certain accident consequences. For example, the main condenser, although not classified as an ESF, can act to mitigate the consequences of accidents involving leakage from the primary to the secondary side of the steam generators (such as steam generator-tube ruptures).

If normal offsite power is maintained, the ability of the plant to send contaminated steam to the condenser instead of releasing it through the safety valves or atmospheric dump valves can significantly reduce the amount of radioactivity released to the environment. In this case, the fission product removal capability of the normally operating off-gas treatment system would come into play.

Much more extensive discussions of the safety features and characteristics of San Onofre Units 2 and 3 may be found in the applicant's Final Safety Analysis Report.[2] The staff evaluation of these features is addressed in the Safety Evaluation Report. In addition, the implementation of the lessons learned from the TMI-2 accident, in the form of improvements in design and procedures, and operator training, will significantly reduce the likelihood of a degraded core accident which could result in large releases of fission products to the containment. Specifically, the applicant will be required to meet those TMI-related requirements specified in NUREG-0737. As noted in Section 7.1.4.7, no credit has been taken for these actions and improvements in discussing the radiological risk of accidents in this supplement.

7.1.3.2 Site features

In the process of considering the suitability of the site of San Onofre Units 2 and 3, pursuant to NRC's Reactor Site Criteria in 10 CFR Part 100, consideration was given to certain factors that tend to minimize the risk and the potential impact of accidents. First, the site has an exclusion area as required in 10 CFR Part 100. The exclusion area of the (33.8 hectare (83.6-acre)) site has a minimum exclusion distance of (1968 ft) 600 meters from the containment centerlines to the closest site boundary. The applicant's authority to control all activities within the exclusion area was acquired by a grant of easement from the United States of America made by the Secretary of the Navy. The exclusion area is traversed by old U.S. Highway 101, the San Diego Freeway (Interstate 5), and the Atchison, Topeka and Santa Fe Railroad. The exclusion area on the ocean side extends over a narrow strip of beach and into the Pacific Ocean.

The applicant's control of the landward portion of the exclusion area extends to the mean high tide line but does not include the strip of beach lying between high and low tide that is occasionally uncovered. This strip of "tidal beach" is owned by the State of California and is used primarily as a passageway for individuals walking along the beach. The applicant's lack of control of this strip of tidal beach has been adjudicated in a Commission proceeding (see ALAB-432) and has been determined to be de minimis on the basis of its occasional use, together with the high probability that any radiation exposure to individuals in this zone will be within the guideline values of 10 CFR Part 100 in the event of an emergency.

Activities within the exclusion area which are unrelated to plant operation include a gas pipeline, railroad traffic, through traffic on the San Diego Freeway, and local recreational traffic on old U.S. Highway 101. Recreational activities in the plant vicinity include swimming, camping, and surfing. Recreational activities, such as sunbathing or picnicking, are discouraged within the landward portion of the exclusion area (the area landward of the contour of mean high tide). The seaward portion of the exclusion area (the area seaward of the contour of mean high tide) may be occupied by small numbers of people for passageway transit between the public beach areas upcoast and downcoast from the plant. Additional small numbers of people may be anticipated to occasionally be in the water within the exclusion area.

Transient access to an approximate 2.02-hectare (5-acre) at the southwest corner of the site for the purposes of viewing the scenic bluffs and barrancas will be on an unimproved walkway. The applicant has estimated that at any one time a maximum of 100 persons will be in the walkway and a 2.02-hectare (5-acre) viewing area, and on the beach and water below the mean high tide. The improved walkway affords landward passage between the two beach areas.

In case of a radiological emergency, the applicants have made arrangements with agencies of the State and local governments to control all traffic on the railroad, roadways, and waterways.

Second, beyond and surrounding the exclusion area is a low population zone (LPZ), also required by Part 100. This is a circular area of 3.14 km (1.95 mi) outer radius. Within this zone the applicant must assure that there is reasonable probability that appropriate measures could be taken on behalf of the residents in the event of a serious accident.

The San Onofre State Beach northwest and southwest of the San Onofre exclusion areas represents a public waterfront recreation area within an 8-km (5-mi) radius of the plant. The beach south of the nuclear facility is used for swimming, hiking, and vehicle parking. The 1036 m (3,400-ft) stretch of beach north of the site is used primarily for surfing.

The largest communities in the vicinity of the site are San Clemente, located about 4.8 km (3 mi) away, which had a 1976 estimated population of 23,000, and the U.S. Marine Corp base Camp Pendleton, with a total estimated population of about 33,000. The Marine Corp base consists of several population clusters or camps located at distances from 2.4 km to 19.31 km (1.5 mi to 12 mi) away.

The applicant has estimated a peak transient population in major tourist and recreational activities along Interstate 5 in a 16-km (10-mi) radius of the plant to be 56,600 persons. This occurs during the summer months and is due to persons engaged in water sport recreation on the Pacific Ocean beach and coastal waters.

The Mexican border lies about 121 km (75 mi) from San Onofre, toward the southeast. The cities of Tijuana, Mexicali, and Ensenada are within 241 km (150 mi) of the site.

The safety evaluation of the San Onofre site has also included a review of potential external hazards, i.e., activities offsite that might adversely affect the operation of the plant and cause an accident. This review encompassed nearby industrial, transportation, and military facilities that might create explosive, missile, toxic gas, or similar hazards. The staff concluded at the construction permit stage that the hazards from the nearby military facility are negligibly small. However, the hazards from the nearby interstate highway, the railroad right of way, and natural gas pipelines, are still under review by the staff. Reevaluation of these hazards has been requested by the staff, and the results will be reported in a supplement to the staff's Safety Evaluation Report. It is anticipated that the review will show that either the risks are acceptably small or may be acceptably small.

7.1.3.3 Emergency preparedness

Emergency preparedness plans including protective action measures for the San Onofre facility and environs are in an advanced, but not yet fully completed stage. In accordance with the provisions of 10 CFR Section 50.47, effective November 3, 1980, no operating license will be issued to the applicant unless a finding is made by the NRC that the state of onsite and offsite emergency preparedness provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Among the standards that must be met by these plans are provisions for two Emergency Planning Zones (EPZ). A plume exposure pathway EPZ of about 16 km (10 mi) in radius and an ingestion exposure pathway EPZ of about 80 km (50 mi) in radius are required. Other standards include appropriate ranges of protective actions for each of these zones, provisions for dissemination to the public of basic emergency planning information, provisions for rapid notification of the public during a serious reactor emergency, and methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences in the EPZs of a radiological emergency condition.

NRC findings will be based upon a review of the Federal Emergency Management Agency (FEMA) findings and determinations as to whether State and local government emergency plans are adequate and capable of being implemented, and on the NRC assessment as to whether the applicant's onsite plans are adequate and capable of being implemented. NRC staff findings will be reported in a supplement to the staff's Safety Evaluation Report. Although the presence of adequate and tested emergency plans cannot prevent the occurrence of an accident, it is the judgment of the staff that they can and will substantially mitigate the consequences to the public if one should occur.

7.1.4 Accident risk and impact assessment

7.1.4.1 Design basis accidents

As a means of assuring that certain features of the San Onofre Units 2 and 3 plants meet acceptable design and performance criteria, both the applicant and the staff have analyzed the potential consequences of a number of postulated accidents. Some of these could lead to significant releases of radioactive materials to the environment, and calculations have been performed to estimate the potential radiological consequences to persons offsite. For each postulated initiating event, the potential radiological consequences cover a considerable range of values depending upon the particular course taken by the accident and the conditions, including wind direction and weather, prevalent during the accident.

In the safety analysis of the San Onofre Units 2 and 3 plants, three categories of accidents have been considered. These categories are based upon their probability of occurrence and include (a) incidents of moderate frequency, i.e., events that can reasonably be expected to occur during any year of operation, (b) infrequent accidents, i.e., events that might occur once during the lifetime of the plant, and (c) limiting faults, i.e., accidents not expected to occur but that have the potential for significant releases of radioactivity. The radiological consequences of incidents in the first category, also called anticipated operational occurrences, are discussed in Section 5. Initiating events postulated in the second and third categories for the San Onofre Units 2 and 3 are shown in Table 7.2. These are collectively designated design basis accidents in that specific design and operating features as described above in Section 7.1.3.1 are provided to limit their potential radiological consequences. Approximate radiation doses that might be received by a person at the nearest site boundary (600 meters from the plant) are also shown in the table, along with a characterization of the time duration of the releases.

Table 7.2 Approximate Radiation Doses from Design Basis Accidents, Conservative Calculational Model

	Duration of Release	Dose (rem at 600 m[1]) Whole Body	Thyroid
Infrequent Accidents:			
Waste Gas Tank Failure	< 2 hr	< 3	< 30
Steam Generator Tube[2] Rupture	< 2 hr	< 3	2
Fuel Handling Accident	< 2 hr	7	40
Limiting Faults:			
Main Steam Line Break	< 2 hr	6	10
Control Rod Ejection	hrs-days	< 6	60
Large-Break LOCA	hrs-days	3	100

[1]The nearest site boundary.
[2]See NUREG-0651[6] for descriptions of three steam generator tube rupture accidents that have occurred in the United States.

The calculational model used is a conservative one in that it is expected to provide a reasonable estimate of the potential upper bound for individual exposures. The results are used to implement the provisions of 10 CFR 100 and to establish performance requirements for certain engineered safety features. The conservative assumptions used in these analyses include: (1) large (upper bound) amounts of radioactive material released by the initiating event, (2) single failures in important equipment, including operating the engineered safety features in a degraded mode,* (3) very adverse meteorological conditions, and (4) no reduction in exposure due to possible protective actions.

The results of these calculations show that, for these events, the limiting whole-body exposures are not expected to exceed 7 rem. They also show that radioiodine releases have the potential for offsite exposures ranging up to about 100 rem to the thyroid. For such an exposure to occur, an individual would have to be located at a point on the site boundary where the radioiodine concentration in the plume has its highest value and inhale at a breathing rate characteristic of a person jogging, for a period of two hours. The health risk to an individual receiving such a thyroid exposure is the potential appearance of benign or malignant thyroid nodules in about 4 out of 100 cases, and the development of a fatal cancer in about 2 out of 1000 cases.

The realistically expected consequences, were one of these initiating events actually to occur, would be very substantially less. Therefore, the risk is judged to be extremely small for these design basis accidents. The subject of risk is more fully discussed in Section 7.1.4.6 below.

7.1.4.2 Probabilistic assessment of severe accidents

In this and the following three sections, there is a discussion of the probabilities and consequences of accidents of greater severity than the design basis accidents identified in the previous section. As a class, they are considered less likely to occur, but their consequences could be more severe, both for the plant itself and for the environment. These severe accidents, heretofore frequently called Class 9 accidents, can be distinguished from design basis accidents in two primary respects: they involve substantial physical deterioration of the fuel in the reactor core, including overheating to the point of melting, and they involve deterioration of the capability of the containment structure to perform its intended function of limiting the release of radioactive materials to the environment.

*The containment structure, however, is assumed to prevent leakage in excess of that which can be demonstrated by testing, as provided in 10 CFR Section 100.11(a).

The assessment methodology employed is that described in the Reactor Safety Study (RSS) which was published in 1975.[10]* The San Onofre Units 2 and 3 are Combustion Engineering-designed pressurized water reactors (PWR) having similar design and operating characteristics to the Surry Unit 1 facility used in the RSS as a prototype for PWRs. This assessment has used as its starting point, therefore, the same set of accident sequences that were found in the RSS to be dominant contributors to risk in the prototype PWR. The same set of nine release categories, designated PWR 1 through 9, have also been used to represent the spectrum of severe accident releases that are hypothesized for the San Onofre Units 2 and 3. Characteristics of these categories are shown in Table 7.3. Sequences initiated by natural phenomena such as tornadoes, floods, or seismic events and those that could be initiated by deliberate acts of sabotage are not included in these events sequences. The radiological consequences of such events would not be different in kind from those which have been treated. Moreover, it is the staff's judgment, based upon design requirements of 10 CFR Part 50, Appendix A, relating to effects of natural phenomena, and safeguards requirements of 10 CFR Part 73, that these events do not contribute significantly to risk. The facts upon which the staff based its Safe Shutdown Earthquake and its conclusions regarding the effects of natural phenomena on the plant are given in the Safety Evaluation Report.

A calculated probability per reactor year associated with each release category is also shown in the second column in Table 7.3. These probabilities are the result of a detailed engineering analysis of the prototype PWR in the Reactor Safety Study. There are substantial uncertainties in these probabilities. This is due, in part, to difficulties associated with the quantification of human error and to inadequacies in the data base on failure rates of individual plant components that were used to calculate the probabilities[11] (see Section 7.1.4.7 below). Also, the detailed engineering analysis represents a plant designed by a different nuclear steam supply system designer (CE versus Westinghouse) with different detailed designs. The probability of accident sequences from the Surry plant were used to give a perspective of the societal risk at San Onofre Units 2 and 3 because, although the probabilities of particular accident sequences may be substantially different, the overall effect of all sequences taken together is likely to be within the uncertainties. Except as indicated in the footnotes in Table 7.3, the staff has no present basis for judging whether the probabilities may be too high or too low. The error band for the probabilities of some of the event sequences could be as great as a factor of 100. The event sequences in categories PWR 1-7 lead to partial or complete melting of the reactor core while those in the last two categories do not involve melting of the core. In release categories 1 to 3, the event sequences include containment failure by steam explosion, hydrogen burning, or overpressure. In release categories 6 and 7, the dominant containment failure mode is by melt-through of the containment base mat. The other release categories contain event sequences in which the systems intended to isolate the containment fail to act properly.

The magnitudes (curies) of radioactivity releases for each category are obtained by multiplying the release fractions shown in Table 7.3 by the amounts that would be present in the core at the time of the hypothetical accident. These are shown in Table 7.1 for a San Onofre plant at a core thermal power level of 3560 megawatts.

The potential radiological consequences of these releases have been calculated by the consequence model used in the RSS[12] and adapted to apply to a specific site. The essential elements are shown in schematic form in Figure 7.1. Environmental parameters specific to the San Onofre site have been used and include the following:

(1) Meteorological data for the site representing a full year of consecutive hourly measurements and seasonal variations.

(2) Projected population in the United States and Mexico for the year 2000 extending throughout regions of 80 and 560 km (50 and 350 mi) radius from the site.

(3) The habitable land fraction within the 560-km (350-mi) radius.

(4) Land use statistics, on a state-wide basis, including farm land values, farm product values including dairy production, and growing season information, for the State of California and each surrounding State within the 560-km (350-mi) region.

(5) Land use statistics for Mexico on a country-wide basis. Farm land values, growing season information, and comparison between agriculture and dairy products are based on comparison with U.S. values for nearby States. Farm product values are based on Mexico-average Gross National Product and "agriculture" percentage.

*Because this report has been the subject of considerable controversy, a discussion of the uncertainties surrounding it is provided in Section 7.1.4-7.

Table 7.3

Summary of Atmospheric Release Categories Representing Hypothetical Accidents in a PWR

Release Category	Probability (reactor-yr^{-1})	Fraction of Core Inventory Released[a]						
		Xe-Kr	I	Cs-Rb	Te-Sb	Ba-Sr	Ru[b]	La[c]
PWR 1	5.1 x10^{-6}[d]	0.9	0.7	0.4	0.4	0.05	0.4	3 x 10^{-3}
PWR 2	7 x 10^{-6}	0.9	0.7	0.5	0.3	0.06	0.02	4 x 10^{-3}
PWR 3	2.3 x 10^{-6}	0.8	0.2	0.2	0.3	0.02	0.03	3 x 10^{-3}
PWR 4	2.1 x 10^{-11}	0.6	0.09	0.04	0.03	5 x 10^{-3}	3 x 10^{-3}	4 x 10^{-4}
PWR 5	5 x 10^{-8}	0.3	0.03	9 x 10^{-3}	5 x 10^{-3}	1 x 10^{-3}	6 x 10^{-4}	7 x 10^{-5}
PWR 6	6 x 10^{-7}	0.3	3 x 10^{-3}	8 x 10^{-4}	1 x 10^{-3}	9 x 10^{-5}	7 x 10^{-5}	1 x 10^{-5}
PWR 7	4 x 10^{-5}	6 x 10^{-3}	4 x 10^{-5}	1 x 10^{-5}	2 x 10^{-5}	1 x 10^{-6}	1 x 10^{-6}	2 x 10^{-7}
PWR 8	4 x 10^{-5}	2 x 10^{-3}	1 x 10^{-4}	5 x 10^{-4}	1 x 10^{-6}	1 x 10^{-8}	0	0
PWR 9	4 x 10^{-4}	3 x 10^{-6}	1 x 10^{-7}	6 x 10^{-7}	1 x 10^{-9}	1 x 10^{-11}	0	0

(a) Background on the isotope groups and release mechanisms is presented in Appendix VII, WASH-1400 (Ref. 9).

(b) Includes Ru, Rh, Co, Mo, Tc.

(c) Includes, Y, La, Zr, Nb, Ce, Pr, Nd, Np, Pu, Am, Cm.

(d) Current understanding of the phenomenon of containment failure by steam explosion embodied in this release category indicates the probability should be lower than stated.

NOTE: Refer to Section 7.1.4.6 for a discussion of uncertainties in risk estimates.

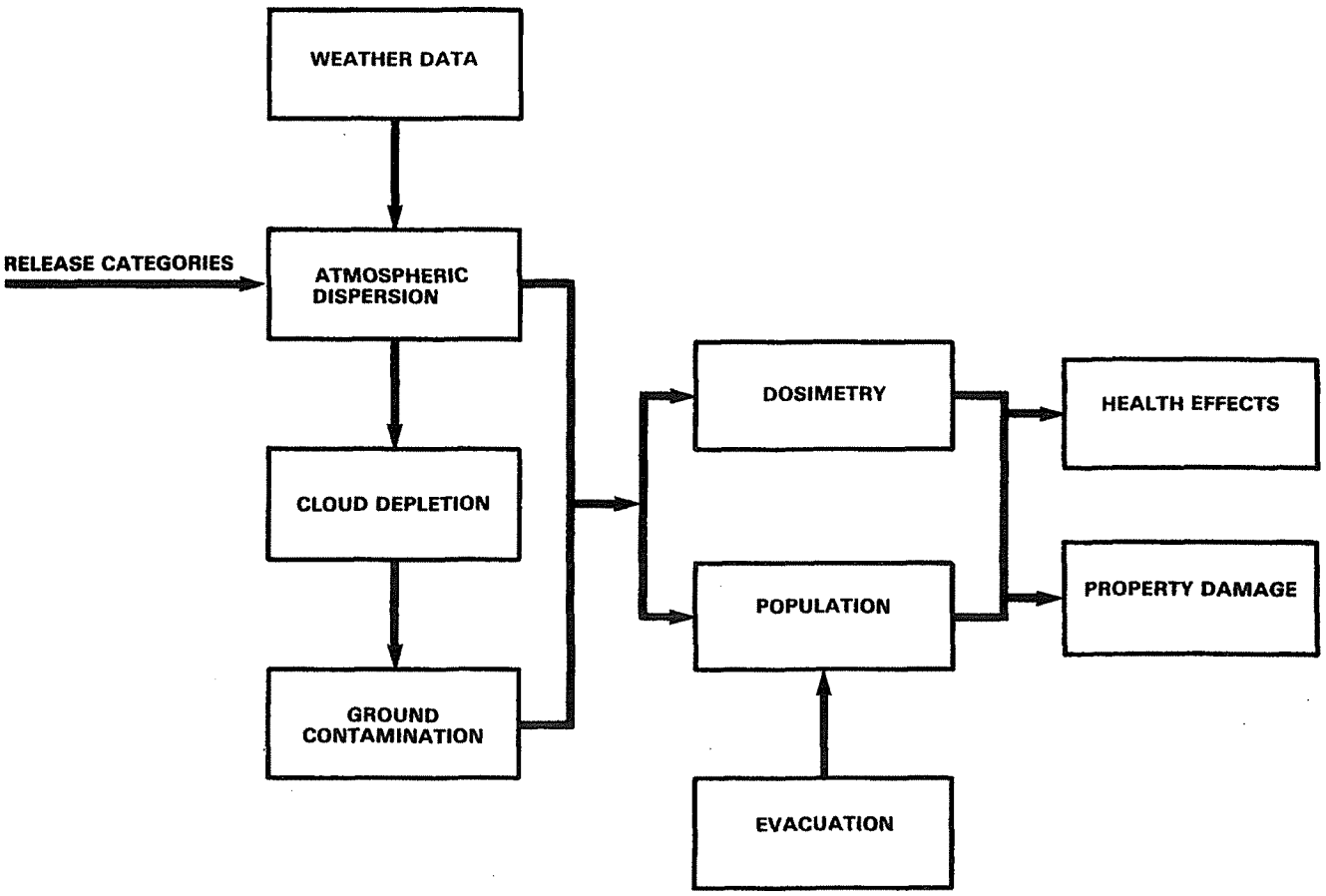

Figure 7.1 Schematic outline of consequence model

To obtain a probability distribution of consequences the calculations are performed assuming the occurrence of each accident release sequence at each of 91 different "start" times throughout a one-year period. Each calculation utilizes the site specific hourly meteorological data and seasonal information for the time period following each "start" time. The consequence model also contains provisions for incorporating the consequence reduction benefits of evacuation and other protective actions. Early evacuation of people would considerably reduce the exposure from the radioactive cloud and the contaminated ground in the wake of the cloud passage. The evacuation model used (see Appendix F) has been revised from that used in the RSS for better site-specific application. The quantitative characteristics of the evacuation model used for the San Onofre site are best estimate values made by the staff and based upon evacuation time estimates prepared by the applicant. Actual evacuation effectiveness could be greater or less than that characterized but would not be expected to be much less, even under adverse conditions.

The other protective actions include: (a) either complete denial of use (interdiction), or permitting use only at a sufficiently later time after appropriate decontamination of food stuffs such as crops and milk, (b) decontamination of severely contaminated environment (land and property) when it is considered to be economically feasible to lower the levels of contamination to protective action guide (PAG) levels, and (c) denial of use (interdiction) of severely contaminated land and property for varying periods of time until the contamination levels reduce to such values by radioactive decay and weathering so that land and property can be economically decontaminated as in (b) above. These actions would reduce the radiological exposure to the people from immediate and/or subsequent use of or living in the contaminated environment.

Early evaucation and other protective actions as mentioned above are considered as essential sequels to serious nuclear reactor accidents involving significant release of radioactivity to the atmosphere. Therefore, the results shown for San Onofre reactor include the benefits of these protective actions.

There are also uncertainties in the estimates of consequences, and the error bounds may be as large as they are for the probabilities. It is the judgment of the staff, however, that it is more likely that the calculated results are overestimates of consequences rather than underestimates.

The results of the calculations using this consequence model are radiological doses to individuals and to populations, health effects that might result from these exposures, costs of implementing protective actions, and costs associated with property damage by radioactive contamination.

7.1.4.3 Dose and health impacts of atmospheric releases

The results of the calculations of dose and health impacts performed for the San Onofre facility and site are presented in the form of probability distributions in Figures 7.2 through 7.5 and are included in the impact Summary Table 7.4. All of the nine release categories shown in Table 7.3 contribute to the results, the consequences from each being weighted by its associated probability.

Figure 7.2 shows the probability distribution for the number of persons who might receive whole body doses equal to or greater than 200 rem and 25 rem, and thyroid doses equal to or greater than 300 rem from early exposure,* all on a per-reactor-year basis. The 200 rem whole body dose figure corresponds approximately to a threshold value for which hospitalization would be indicated for the treatment of radiation injury. The 25 rem whole body (which has been identified earlier as the lower limit for clinically obervable physiological effects in nearly all people) and 300 rem thyroid figures correspond to the Commission's guidelines values for reactor siting in 10 CFR Part 100.

The figure shows in the left-hand portion that there is less than 1 chance in 100,000 per year (i.e. 10^{-5}) that one or more persons may receive doses equal to or greater than any of the doses specified. The fact that the three curves run almost parallel in horizontal lines initially shows that if one person were to receive such doses, the chances are about the same that several tens to hundreds would be so exposed. The chances of larger numbers of persons being exposed at those levels are seen to be considerably smaller. For example, the chances are about 1 in 100,000,000 (i.e. 10^{-8}) that 100,000 or more people might receive doses of 200 rem or greater. A majority of the exposures reflected in this figure would be expected to occur to persons within a 80-km (50-mi) radius of the plant. Virtually all would occur with a 160-km (100-mi) radius.

*The containment structure, however, is assumed to prevent leakage in excess of that which can be demonstrated by testing, as provided in 10 CFR Section 100.11(a).

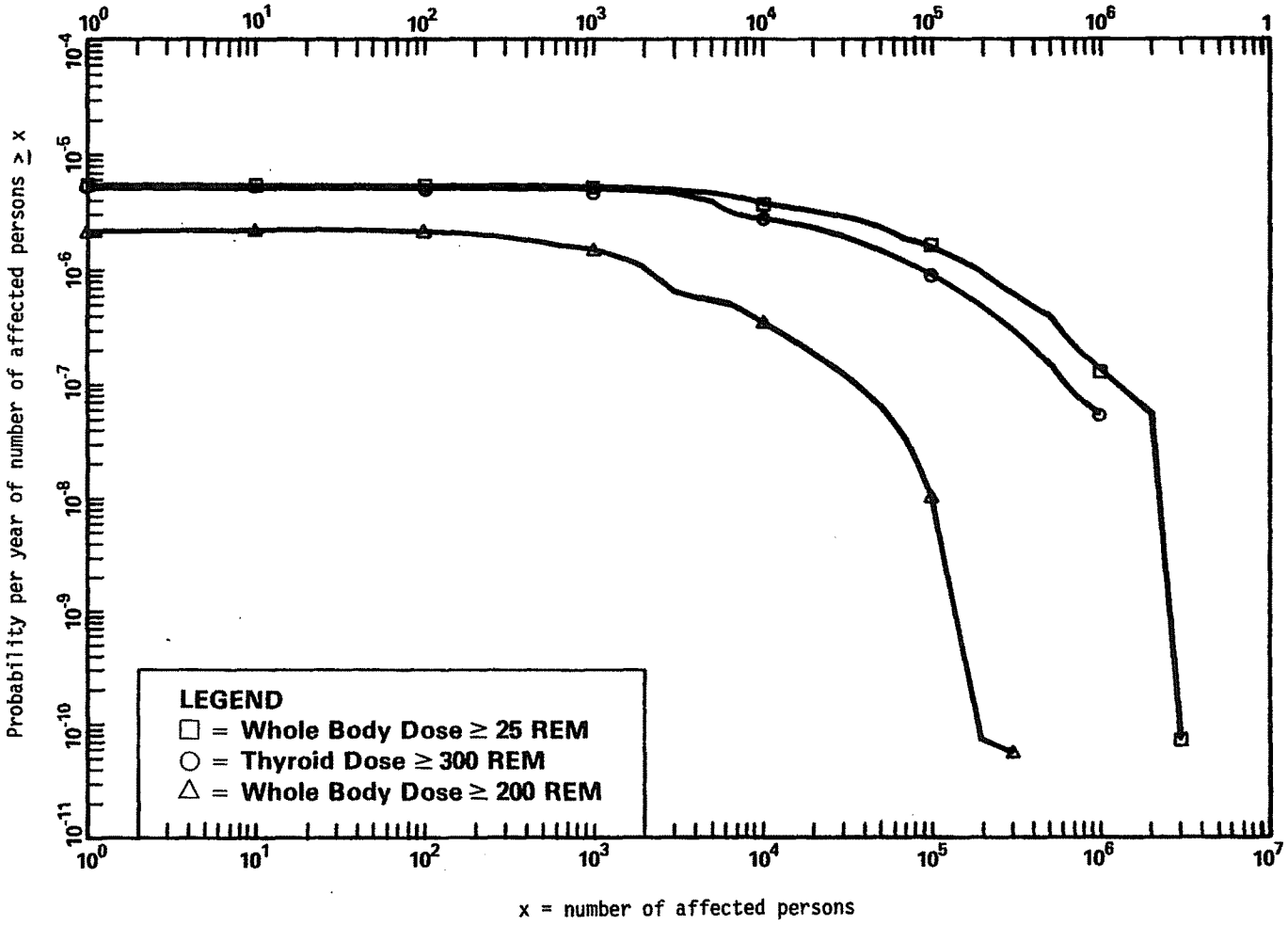

Figure 7.2 Probability distribution of individual dose impacts
(See Section 7.1.4.6 for a discussion of uncertainties in risk estimates.)

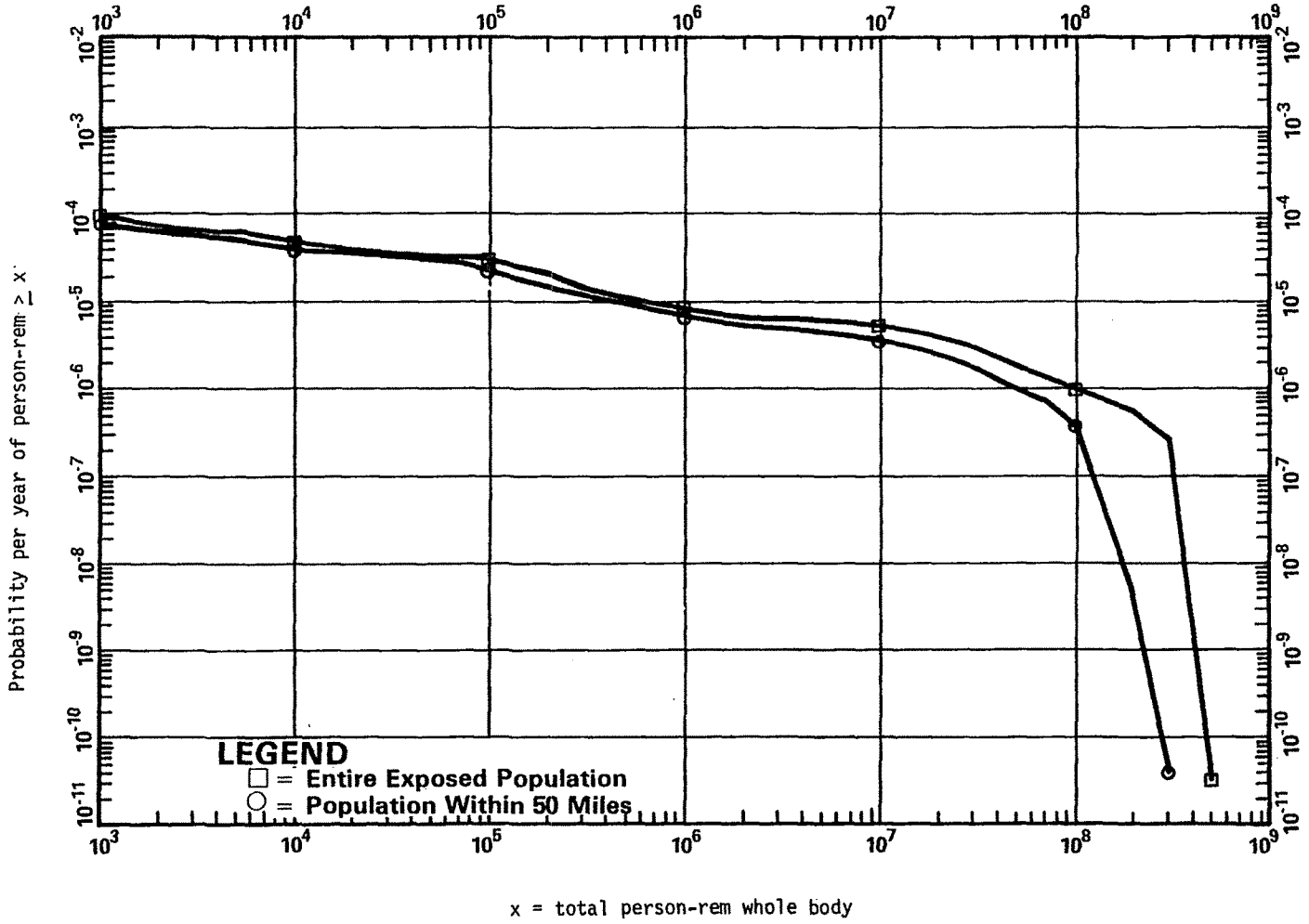

Figure 7.3 Probability distribution of population exposures. (See Section 7.1.4.6 for discussion of uncertainties in risk estimates.) (To convert miles to kilometers, multiply by 1.6.)

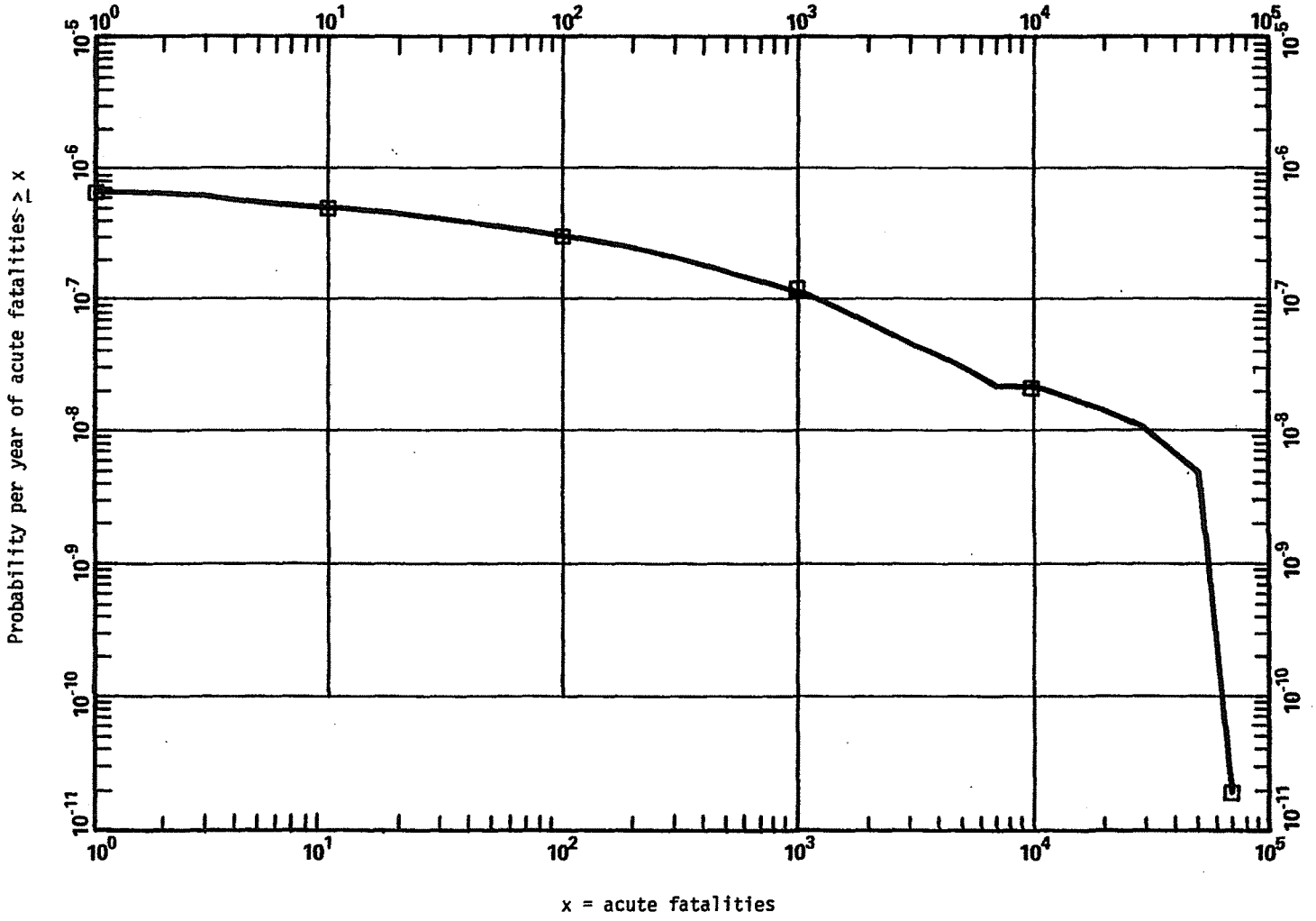

Figure 7.4 Probability distribution of acute fatalities. (See Section 7.1.4.6 for discussion of uncertainties in risk estimates.)

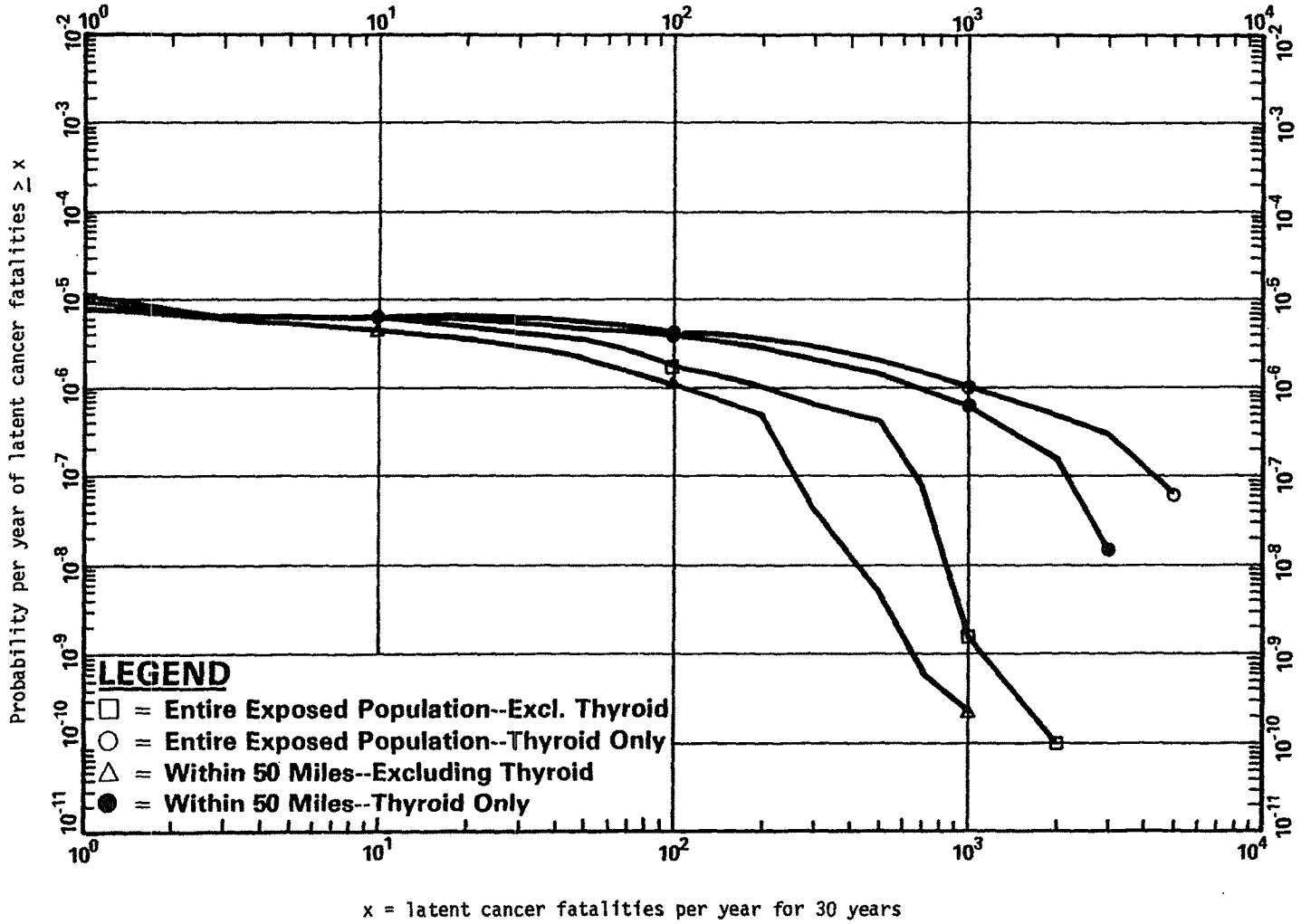

Figure 7.5 Probability distribution of cancer fatalities. (See Section 7.1.4.6 for discussion of uncertainties in risk estimates.) (To convert miles to kilometers, multiply by 1.6.)

Table 7.4 Summary of Environmental Impacts and Probabilities

Probability of impact per year	Persons exposed over 200 rem	Persons exposed over 25 rem	Acute fatalities	Population exposure, millions of man-rem 80 km/total	Latent* cancers, 80 km/total	Cost of offsite mitigating actions, $ millions
10^{-4}	< 1	< 1	< 1	< 0.001	< 60	< 0.001
10^{-5}	< 1	< 1	< 1	0.4/0.6	< 60	12
5×10^{-6}	< 1	160	< 1	2/10	1,400/2,500	400
10^{-6}	2,000	190,000	< 1	45/100	23,000/36,000	5,000
10^{-7}	31,000	1,100,000	1,100	110/300	71,000/143,000	15,000
10^{-8}	100,000	2,000,000	30,000	170/340	12,000/24,000	35,000
Related Figure	7.2	7.2	7.4	7.3	7.5	7.6

*Genetic effects would be approximately twice the number of latent cancers. Thirty times the values shown in the Figure 7.5 are shown in this column reflecting the 30-year period over which they might occur.

NOTE: Refer to Section 7.1.4.6 for a discussion of uncertainties in risk estimates.

Figure 7.3 shows the probability distribution for the total population exposure in person-rem, i.e., the probability per reactor-year that the total population exposure will equal or exceed the values given. A substantial fraction of the population exposure would occur within 80 km (50 mi) but the more severe releases (PWR 1-6) would result in exposure to persons beyond the 80-km (50-mi) range as shown.

For perspective, population doses shown in Figure 7.3 may be compared with the annual average dose to the population within 80 km (50 mi) of the San Onofre site due to natural background radiation of 700,000 man-rem, and to the anticipated annual population dose to the general public from normal station operation of 460 man-rem (excluding plant workers) (Section 5, Table 5.3 and 5.5).

Figure 7.4 shows the probability distribution for acute fatalities, representing radiation injuries that would produce fatalities within about one year after exposure. Virtually all of the acute fatalities would be expected to occur within a 64-km (40-mi) radius. The results of the calculations shown in this figure and in Table 7.4 reflect the effect of evacuation within the 16-km (10-mi) plume exposure pathway EPZ only. For the very low probability accidents having the potential for causing radiation exposure above the threshold for acute fatality at distances beyond 16 km (10 mi), it would be realistic to expect that authorities would evacuate persons at all distances at which such exposures might occur. Acute fatality consequences would therefore reasonably be expected to be very much less than the numbers shown.

Figure 7.5 represents the statistical relationship between population exposure and the induction of fatal cancers that might appear over a period of many years following exposure. The impacts on the total population and the population within 80 km (50 mi) are shown separately. Further, the fatal, latent cancers have been subdivided into those attributable to exposures of the thyroid and all other organs.

7.1.4.4 Economic and societal impacts

As noted in Section 7.1.1, the various measures for avoidance of adverse health effects including those due to residual radioactive contamination in the environment are possible consequential impacts of severe accidents. Calculations of the probabilities and magnitudes of such impacts for the San Onofre facility and environs have also been made. Unlike the radiation exposure and adverse health effect impacts discussed above, impacts associated with adverse health effects avoidance are more readily transformed into economic impacts.

The results are shown as the probability distribution for costs of offsite mitigating actions in Figure 7.6 and are included in the impact Summary Table 7.4. The factors contributing to these estimated costs include the following:

- Evacuation costs
- Value of crops contaminated and condemned
- Value of milk contaminated and condemned
- Costs of decontamination of property where practical
- Indirect costs due to loss of use of property and incomes derived therefrom.

The last named costs would derive from the necessity for interdiction to prevent the use of property until it is either free of contamination or can be economically decontaminated.

Figure 7.6 shows that at the extreme end of the accident spectrum these costs could exceed tens of billions of dollars but that the probability that this would occur is exceedingly small, less than one chance in a hundred million per year.

Additional economic impacts that can be monetized include costs of decontamination of the facility itself and the costs of replacement power. Probability distributions for these impacts have not been calculated, but they are included in the discussion of risk considerations in Section 7.1.4.6 below.

7.1.4.5 Releases to groundwater

A pathway for public radiation exposure and environmental contamination that could be associated with severe reactor accidents was identified in Section 7.1.1.2 above. Consideration has been given to the potential environmental impact of this pathway for the San Onofre plant. The principal contributors to the risk are the core melt accidents associated with the PWR-1 through 7 release categories. The penetration of the basemat of the

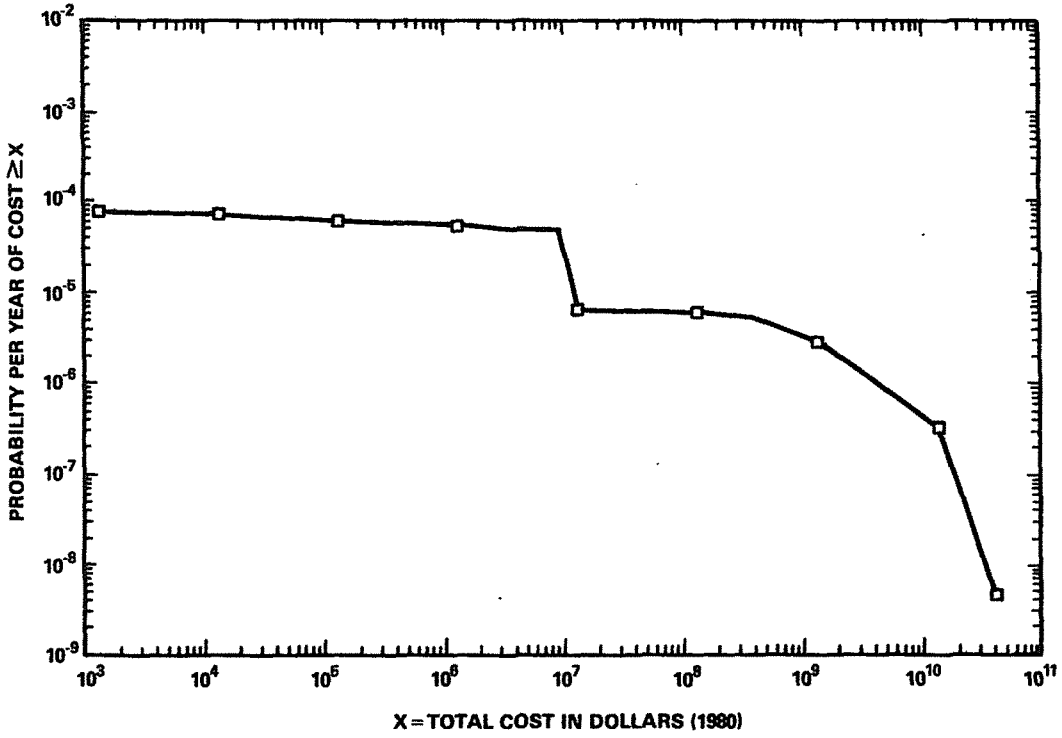

Figure 7.6 Probability distribution of cost of offsite mitigative measures

containment building can release molten core debris to the strata beneath the plant. Soluble radionuclides in this debris can be leached and transported with groundwater to downgradient domestic wells used for drinking or to surface water bodies used for drinking water, aquatic food and recreation. In pressurized water reactors, such as the San Onofre unit, there is an additional opportunity for groundwater contamination due to the release of contaminated sump water to the ground through a breach in the containment.

An analysis of the potential consequences of a liquid pathway release of radioactivity for generic sites was presented in the "Liquid Pathway Generic Study" (LPGS).[13] The LPGS compared the risk of accidents involving the liquid pathway (drinking water, irrigation, aquatic food, swimming and shoreline usage) for four conventional, generic land-based nuclear plants and a floating nuclear plant, for which the nuclear reactors would be mounted on a barge and moored in a water body. Parameters for the land-based sites were chosen to represent averages for a wide range of real sites and are thus "typical," but represented no real site in particular.

The discussion in this section is an analysis to determine whether or not the San Onofre site liquid pathway consequences would be unique when compared to land-based sites considered in the LPGS. The method consists of a direct scaling of the LPGS population doses based on the relative values of key parameters characterizing the LPGS "ocean" site and the San Onofre site. The parameters which were evaluated included amounts of radioactive materials entering the ground, groundwater travel time, sorption on geological media, surface water transport, aquatic food consumption, and shoreline usage.

Doses to individuals and populations were calculated in the LPGS without consideration of interdiction methods such as isolating the contaminated groundwater or denying use of the water. In the event of surface water contamination, commercial and sports fishing, as well as many other water-related activities would be restricted. The consequences would therefore be largely economic or social, rather than radiological. In any event, the individual and population doses for the liquid pathway range from fractions to very small fractions of those that can arise from the airborne pathways.

The San Onofre reactors are situated above the San Mateo Formation, which is about 274-m (876.8-ft) thick and consists of medium to coarse-grained sandstone.[2] Groundwater at the site occurs between elevation 0 and 1.5 m (4.8 ft) Mean Low-Low Water, under water table conditions. The basemat of the reactors would be beneath the water table.

The groundwater gradient is clearly toward the ocean. There are no wells between the site and the ocean, so no groundwater users could be affected by an accidental contamination from the plant. There is virtually no possibility of a reversal of the groundwater gradient due to heavy pumping inland, particularly because such a reversal would at the same time cause an unacceptable intrusion of saltwater into the aquifer. Therefore, liquid radioactivity released from a core melt accident could only cause contamination by being transported through the groundwater and subsequently released to the Pacific Ocean.

The staff's most conservative estimate of the groundwater travel time would be 215 days. For groundwater travel times of this magnitude, it is clear that the most important radionuclide contributors to the liquid pathway population dose would be Sr-90 and Cs-137. Conservative values of the retardation factors, which reflect the effects of sorption of the radionuclides on geologic materials, were estimated on media similar to the granular materials under the site[14] to be 31 for Sr-90 and 2204 for Cs-137. The mean transport time from the reactor building to the Pacific Ocean is therefore conservatively estimated to be about 16 years for Sr-90 and 1080 years for Cs-137. When these travel times are compared to 5.7 years for Sr-90 and 51 years for Cs-137 in the LPGS land-based ocean site case, the relatively larger travel times for the San Onofre site would allow a smaller portion of the radioactivity to enter the surface water. This reduces the Sr-90 release to about 78% of the LPGS value. Virtually all of the Cs-137 would have decayed before reaching surface water.

Contaminants released from the shoreline would disperse in the oceanic turbulence. The LPGS made no distinction between the turbulence which would be found in the east, gulf, or west coasts of the United States. The only assumption which can be made without site-specific data is that the mixing at the San Onofre and LPGS sites are similar.

The two major liquid pathway exposure pathways for an ocean site are aquatic food consumption and direct shoreline exposure.

The commercial and recreational finfish harvest for a rectangular block 80 km along shore and stretching 40 km offshore has been estimated by the staff from data provided in the

Environmental Report[15] to be about 13.1×10^6 kg. For comparison, the same size block using the LPGS ocean site fish catch densities would yield 5.8×10^6 kg of finfish.

Approximately 62% of population dose due to finfish consumption calculated in the LPGS was due to Cs-137 and approximately 38% was due to Sr-90. The only significant radionuclide which could reach the ocean in the San Onofre case would be Sr-90. The staff has conservatively estimated that the uninterdicted population dose in the San Onofre case would be about 69% of the LPGS land-based ocean case population dose for seafood consumption.

Nearly all of the direct shoreline exposure in the LPGS ocean-based site case was determined to emanate from Cs-137. Since virtually all of the Cs-137 would decay before reaching the ocean, the shoreline direct exposure can be eliminated from further consideration.

The San Onofre liquid pathway contribution to population dose has, therefore, been demonstrated to be smaller than that predicted for the LPGS land-based ocean site, which represents a "typical" ocean site. Thus, the San Onofre site is not unique in its liquid pathway contribution to risk.

There are measures which could be taken to minimize the impact of the liquid pathway. The staff estimated that the minimum groundwater travel time from the San Onofre site to the Pacific Ocean would be hundreds of days. In addition, the holdup of important radionuclides would provide additional time to utilize engineering measures such as slurry walls and well-point dewatering to isolate the radioactive contaminants at the source.

7.1.4.6 Risk considerations

The foregoing discussions have dealt with both the frequency (or likelihood of occurrence) of accidents and their impacts (or consequences). Since the ranges of both factors are quite broad, it is useful to combine them to obtain average measures of environmental risk. Such averages can be particularly instructive as an aid to the comparison of radiological risks associated with accident releases and with normal operational releases.

A common way in which this combination of factors is used to estimate risk is to multiply the probabilities by the consequences. The resultant risk is then expressed as a number of consequences expected per unit of time. Such a quantification of risk does not at all mean that there is universal agreement that people's attitudes about risk, or what constitutes an acceptable risk, can or should be governed solely by such a measure. At best, it can be a contributing factor to a risk judgment, but not necessarily a decisive factor.

In Table 7.5 are shown average values of risk associated with population dose, acute fatalities, latent fatalities, and costs for evacuation and other protective actions. These average values are obtained by summing the probabilities multiplied by the consequences over the entire range of the distributions. Since the probabilities are on a per-year basis, the averages shown are also on a per-year basis.

Table 7.5 Annual Average Values of Environmental Risks Due to Accidents

Population exposure	
man-rem within 80 km	170
man-rem total	380
Acute fatalities	
permanent residents	0.001
beach visitors	0.00002
Latent cancer fatalities	
all organs excluding thyroid	0.022
thyroid only	0.011
Cost of protective actions and decontamination	$19,000

NOTE: See Section 7.1.4.6 for discussions of uncertainties in risk estimates.

The population exposure risk due to accidents may be compared with that for normal operational releases. These are shown in Section 5, Tables 5.3 and 5.5, for San Onofre Units 2 and 3 operating concurrently. The radiological dose to the population from normal operational releases may result in:

(1) late somatic effects in the form of fatal and nonfatal cancer in various body organs--following age and organ-specific latency periods--of the exposed population, and

(2) fatal and nonfatal genetic disorders in the future generations of the exposed population.

Because of the randomness of these effects, calculations of these effects are made from the population dose (man-rem). Absolute risk estimators of 140 deaths from expression of latent cancer in various body organs per 10^6 total-body man-rem in the exposed population and 260 cases of all forms of genetic disorders per 10^6 total-body man-rem in the future generations of the exposed population were derived from the 1972 BEIR report.[5] This derivation assumes a linear and nonthreshold dose-effect relationship at all sublethal dose levels. Using these risk estimators and 228 man-rem as the annual population dose (Table 5.5, adjusted for one reactor), the staff calculated that there may occur 0.03 cancer deaths in the exposed population and 0.06 genetic disorders in all future generatons of the exposed population from each year of operation of one reactor.

The comparison of 0.03 cancer deaths given above with about the same value for latent cancer deaths from Table 7.1.4-5 shows that the accident risks are comparable to those for normal operational releases.

There are no acute fatality nor economic risks associated with protective actions and decontamination for normal releases; therefore, these risks are unique for accidents. For perspective and understanding of the meaning of the acute fatality risk of 0.001 per year, however, the staff notes that to a good approximation the population at risk is that within about 16 km (10 mi) of the plant, about 92,000 persons in the year 2000. Accidental fatalities per year for a population of this size, based upon overall averages for the United States, are approximately 20 for motor vehicle accidents, 7 from falls, 3 from drowning, 3 from burns, and 1 from firearms (ref. 5, p. 577).

As a separate item under acute fatalities in Table 7.5 is an entry of 0.00002 for "Beach visitors." As discussed in Section 7.1.3.2, the beaches near the site are heavily used for recreation. The average number of visitors has been estimated, based on seasonal and daily variation. The effects on the visitors are tallied separately because in actuality they are likely to be permanent residents from other nearby locations.

Figure 7.7 shows the calculated risk expressed as whole-body dose to an individual from early exposure as a function of the distance from the plant within the plume exposure pathway EPZ. The values are on a per-reactor-year basis and all accident sequences and release categories in Table 7.3 contributed to the dose, weighted by their associated probabilities. Calculated risk to an individual living within the plume exposure pathway EPZ of San Onofre of acute death due to potential accidents in the reactor is shown in Figure 7.8 as curves of constant risk per year to an individual as a function of distance due to potential reactor accidents. Figure 7.9 shows the same type of isopleths for death from latent cancer. Directional variation of these curves reflect the variation in the average fraction of the year the wind would be blowing into different directions from the plant. For comparison the following risk of fatality per year to an individual living in the U.S. may be noted (ref. 4, p. 577); automobile accident 2.2×10^{-4}, falls 7.7×10^{-5}, drowning 3.1×10^{-5}, burning 2.9×10^{-5}, and firearms 1.2×10^{-5}.

The economic risk associated with protective actions and decontamination could be compared with property damage costs associated with alternative energy generation technologies. The use of fossil fuels, coal or oil, for example, would emit substantial quantities of sulfur dioxide and nitrogen oxides into the atmosphere, and, among other things, lead to environmental and ecological damage through the phenomenon of acid rain (Ref. 4, 559-560). This effect has not, however, been sufficiently quantified to draw a useful comparison at this time.

There are other economic impacts and risks that can be monetized that are not included in the cost calculations discussed in Section 7.1.4.4. These are accident impacts on the facility itself that result in added costs to the public, i.e., ratepayers, taxpayers, and/or shareholders. These are costs associated with decontamination of the facility itself and costs for replacement power.

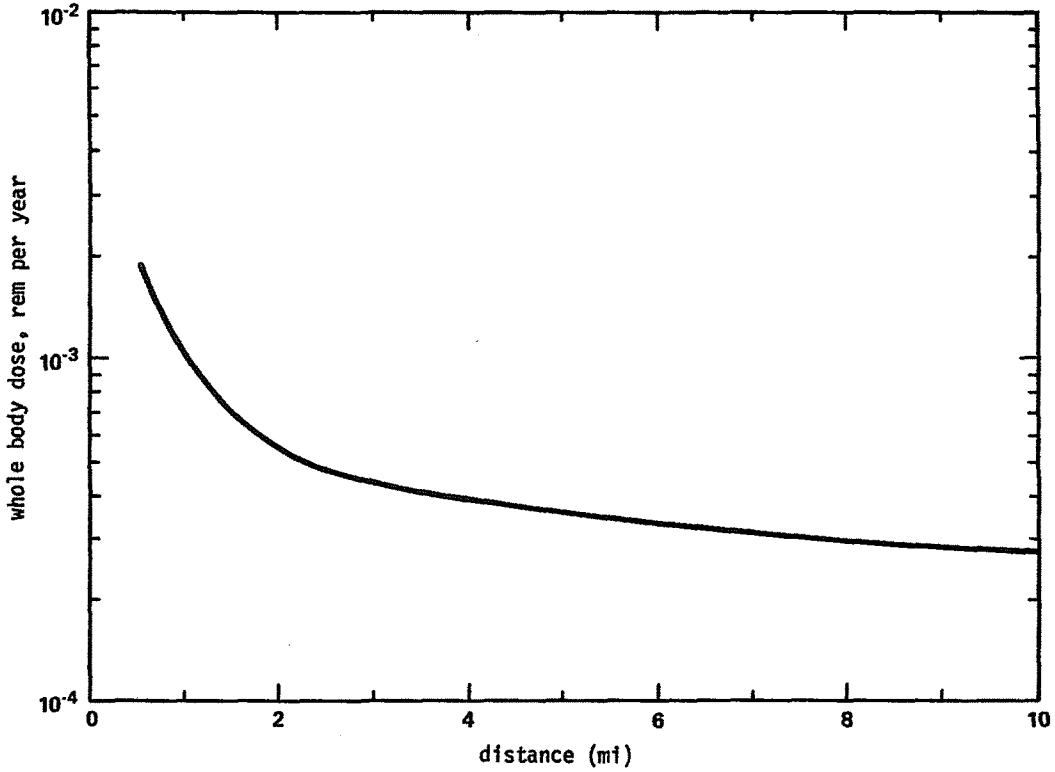

Figure 7.7 Individual risk of dose as a function of distance. (To convert mi to km, multiply by 1.6.)

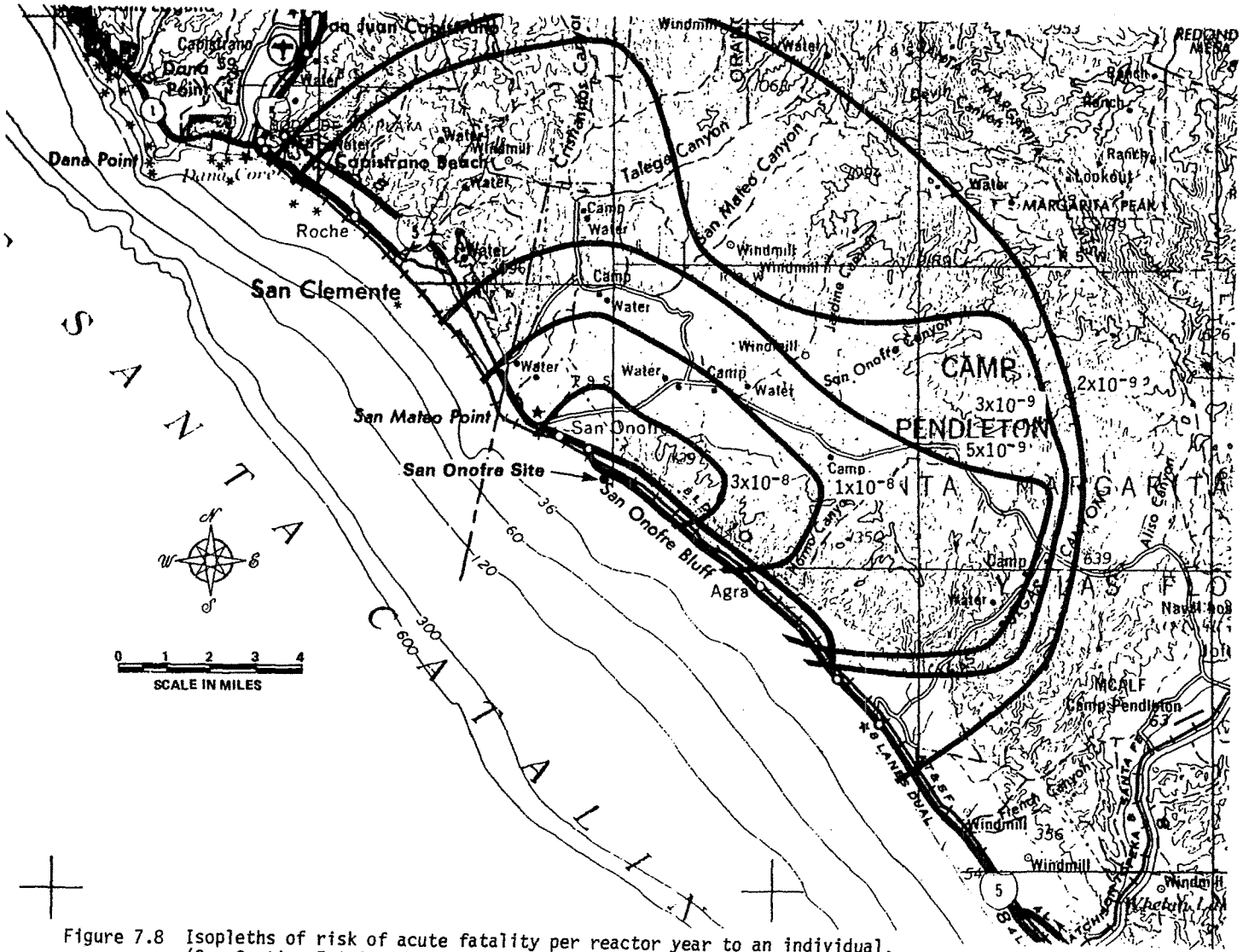

Figure 7.8 Isopleths of risk of acute fatality per reactor year to an individual, (See Section 7.1.4.6 for a discussion of uncertainties in risks estimates.) (To convert miles to kilometers, multiply by 1.6.)

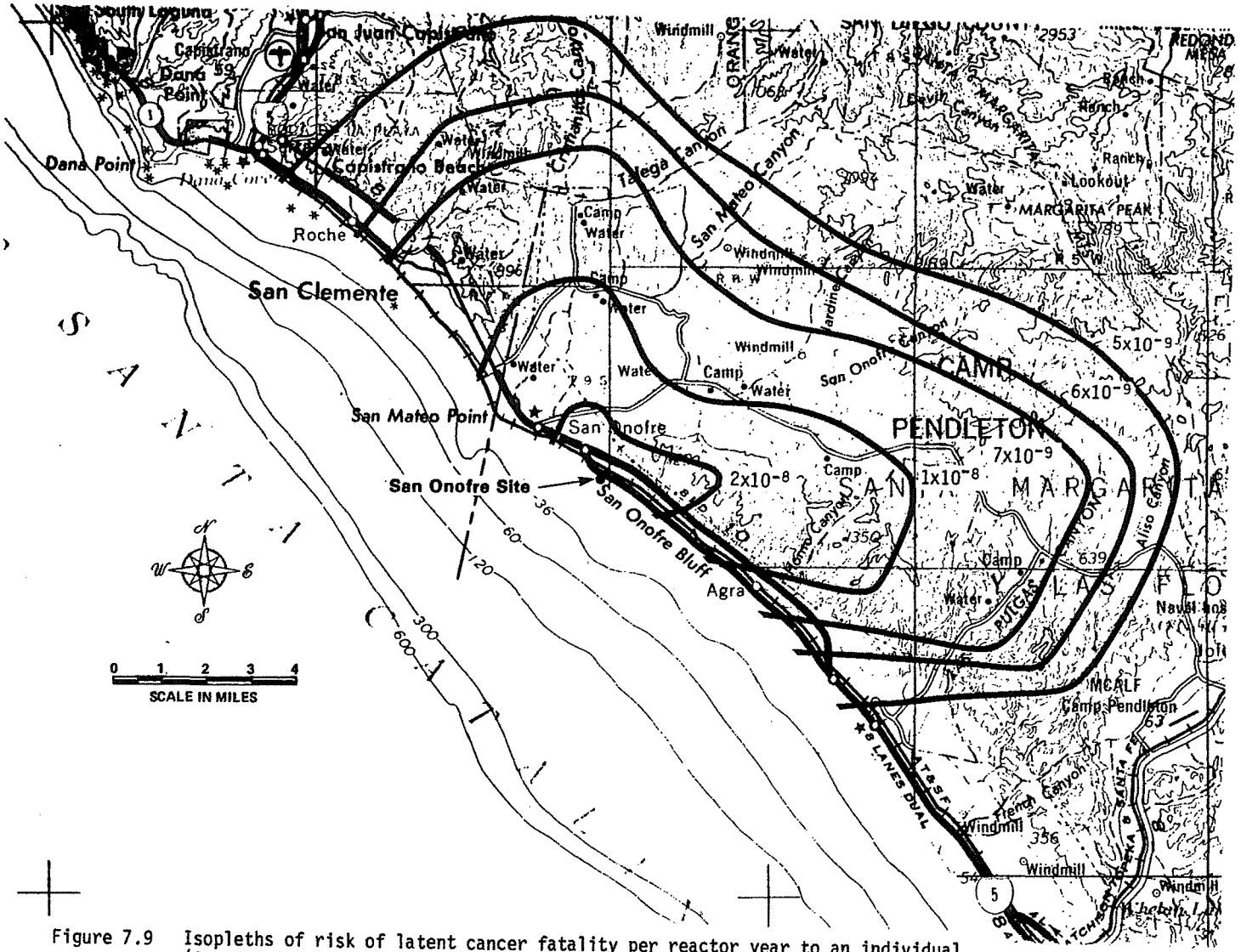

Figure 7.9 Isopleths of risk of latent cancer fatality per reactor year to an individual. (See Section 7.1.4.6 for a discussion of uncertainties in risks estimate.) (To convert miles to kilometers, multiply by 1.6.)

No detailed methodology has been developed for estimating the contribution to economic risk associated with cleanup and decontamination of a nuclear power plant that has undergone a serious accident toward either a decommissioning or a resumption of operation. Experience with such costs is currently being accumulated as a result of the Three Mile Island accident. It is already clear, however, that such costs can approach or even exceed the original capital cost of such a facility. As an illustration of the possible contribution to the economic risk, if the probability of an accident serious enough to require extensive cleanup and decontamination is taken as the sum of the nine categories in Table 7.3, i.e., about 5 chances in 10,000 per year, and if the "average" decontamination cost for these nine categories is assumed to be one billion dollars, then the estimated economic risk would be about $500,000 per year.

Other costs, besides damage to or loss of the facility, result from accidents. The major additional costs are replacement power and replacement of the capacity. These costs are affected by the point in the lifetime of the plant at which an accident might occur. The present worth cost is highest for an accident occurring at the beginning of the plant operating life and decreases over the plant life. It is assumed for these calculations that one unit of San Onofre 2 or 3 is permanently lost and replaced by new capacity after eight years and the undamaged unit is shut down for three years before restart. For illustrative purposes, the costs and economic risk have been estimated for a "worst case" situation for the approximately 2200-megawatt (electric) San Onofre Units 2 and 3 complex by postulating a total loss of one of the units in the first year of a projected 30-year operating life. Net replacement power cost of 45 mills/kWh is assumed (nearly all fossil units in southern California are oil-fired). Using a 60% capacity factor, the annual cost of replacement power would be $520 million for the two units in 1980 dollars. The additional capital costs as a result of having to construct a new facility are $60 million per year, again in 1980 dollars.

If the probability of sustaining a total loss of the original facility is taken as the probability of the occurrence of a core melt accident (approximately by the sum of probabilities for the categories PWR-1 through 7 in Table 7.3, i.e., about 5 chances in 100,000 per year), then the average contribution to economic risk that would result from a loss early in the operating life of a San Onofre unit is about $29,000 for each of the first three years until the undamaged plant is returned to service, then $16,000 per year until the damaged unit is replaced, and $3000 per year additional capital costs for the assumed remaining 22 years of plant service.

7.1.4.7 Uncertainties

The foregoing probabilistic and risk assessment discussion has been based upon the methodology presented in the Reactor Safety Study (RSS),[10] which was published in 1975.

In July 1977, the NRC organized an Independent Risk Assessment Review Group to (1) clarify the achievements and limitations of the Reactor Safety Study Group, (2) assess the peer comments thereon and the responses to the comments, (3) study the current state of such risk assessment methodology, and (4) recommend to the Commission how and whether such methodology can be used in the regulatory and licensing process. The results of this study were issued September 1978.[11] This report, called the Lewis Report, contains several findings and recommendations concerning the RSS. Some of the more significant findings are summarized below.

(1) A number of sources of both conservatism and nonconservatism in the probability calculations in RSS were found, which were very difficult to balance. The Review Group was unable to determine whether the overall probability of a core melt given in the RSS was high or low, but they did conclude that the error bands were understated.

(2) The methodology, which was an important advance over earlier methodologies that had been applied to reactor risk, was sound.

(3) It is very difficult to follow the detailed thread of calculations through the RSS. In particular, the Executive Summary is a poor description of the contents of the report, should not be used as such, and has lent itself to misuse in the discussion of reactor risk.

On January 19, 1979, the Commission issued a statement of policy concerning the RSS and the Review Group Report. The Commission accepted the findings of the Review Group.

The accident at Three Mile Island occurred in March 1979 at a time when the accumulated experience record was about 400 reactor years. It is of interest to note that this was within the range of frequencies estimated by the RSS for an accident of this severity (ref. 4, p. 533). It should also be noted that the Three Mile Island accident has resulted in a very comprehensive evaluation of reactor accidents like that one, by a significant number of investigative groups both within NRC and outside of it. Actions to improve the safety of nuclear power plants have come out of these investigations, including those from the President's Commission on the Accident at Three Mile Island, and NRC staff investigations and task forces. A comprehensive "NRC Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, Vol. I, May 1980 collects the various recommendations of these groups and describes them under the subject areas of: Operational Safety; Siting and Design; Emergency Preparedness and Radiation Effects; Practices and Procedures; and NRC Policy, Organization and Management. The action plan presents a sequence of actions, some already taken, that will result in a gradually increasing improvement in safety as individual actions are completed. The San Onofre plant is receiving and will receive the benefit of these actions on the schedule indicated in NUREG-0660. The improvement in safety from these actions has not been quantified, however, and the radiological risk of accidents discussed in this chapter does not reflect these improvements.

7.1.5 Conclusions

The foregoing sections consider the potential environmental impacts from accidents at the San Onofre facility. These have covered a broad spectrum of possible accidental releases of radioactive materials into the environment by atmospheric and groundwater pathways. Included in the considerations are postulated design basis accidents and more severe accident sequences that lead to a severely damaged reactor core or core melt.

The environmental impacts that have been considered include potential radiation exposures to individuals and to the population as a whole, the risk of near- and long-term adverse health effects that such exposures could entail, and the potential economic and societal consequences of accidental contamination of the environment. These impacts could be severe, but the likelihood of their occurrence is judged to be small. This conclusion is based on (a) the fact that considerable experience has been gained with the operation of similar facilities without significant degradation of the environment; and (b) a probabilistic assessment of the risk based upon the methodology developed in the Reactor Safety Study. The overall assessment of environmental risk of accidents, assuming protective action, shows that it is roughly comparable to the risk for normal operational releases although accidents have a potential for acute fatalities and economic costs that cannot arise from normal operations. The risk of acute fatalities from potential accidents at the site are small in comparison with the risk of acute fatalities from other human activities in a comparably-sized population.

The staff has concluded that there are no special or unique features about the San Onofre site and environs that would warrant special or additional engineered safety features for the San Onofre plants.

REFERENCES

1. Statement of Interim Policy, "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969," 45 Federal Register 40101-40104, June 13, 1980.*

2. "Final Safety Analysis Report (FSAR), San Onofre Nuclear Generating Station Units 2 and 3, Docket Numbers 50-361 and 50-362," Southern California Edison Company and San Diego Gas and Electric Company, December 1, 1976, as amended.*

3. "Safety Evaluation Report related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3 Docket Numbers 50-361 and 50-362," NUREG-0712, February 1981, as supplemented.**

4. "Energy in Transition 1985 - 2010," Final Report of the Committee on Nuclear and Alternative Energy Systems (CONAES), Chapter 9, pp. 517-534, National Research Council, 1979 (available in public technical libraries) (also C.E. Land, Science 209, 1197, September 12, 1980).

5. "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Advisory Committee on the Biological Effects of Ionizing Radiations (BEIR), National Academy of Sciences/National Research Council November 1972.***

6. "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Committee on the Biological Effects of Ionizing Radiations (BEIR), National Academy of Sciences/National Research Council, July 1980.***

7. H.W. Bertini and others, "Descriptions of Selected Accidents that Have Occurred at Nuclear Reactor Facilities," Nuclear Safety Information Center, Oak Ridge National Laboratory, ORNL/NSIC-176, April 1980;*** also, "Evaluation of Steam Generator Tube Rupture Accidents," L.B. Marsh, USNRC Report NUREG-0651, March 1980.**

8. "Three Mile Island - A Report to the Commissioners and the Public," Vol. I, Mitchell Rogovin, Director, Nuclear Regulatory Commission Special Inquiry Group, January 1980, Summary Section 9.*

9. "Report of the President's Commission on the Accident at Three Mile Island," October 1979, Commission Findings B, Health Effects.*

10. "Reactor Safety Study," WASH-1400, USNRC Report NUREG-75/014, October 1975.**

11. H. W. Lewis and others, "Risk Assessment Review Group Report to the U.S. Nuclear Regulatory Commission," NUREG-CR-0400, September 1978.**

12. "Overview of the Reactor Safety Study Consequences Model," USNRC Report NUREG-0340, October 1977.**

13. "Liquid Pathway Generic Study," USNRC Report NUREG-0440, February 1978.**

14. Dana Isherwood, "Preliminary Report on Retardation Factors and Radionuclides Migration," Lawrence Livermore Laboratories, UCID-A3.44, August 5, 1977 (available in public technical libaries).

15. San Onofre Nuclear Generating Station Units 2 and 3, Applicant's Environmental Report, Operating License Stage, Volume 2, November 1976.*

*Available for inspection and copying for a fee in the NRC Public Document Room, 1717 H St. N. W., Washington, DC 20555.
**Available from the NRC/GPO Sales Program, Washington, D. C. 20555 and the National Technical Information Service, Springfield, VA, 22161.
***Available from NTIS only.

8. NEED FOR THE STATION

8.1 RESUME

The ownership of Units 2 and 3 of the San Onofre Nuclear Generating Station is divided among Southern California Edison Company (SCE), 76.55%; San Diego Gas & Electric Company (SDG&E) 20%; the City of Riverdale, California, 1.79%; and the City of Anaheim, California, 1.66%. This section presents an analysis of the need for the station based on the energy demands of the applicant's service areas, the potential for production cost savings, and the potential for increasing the reliability of the applicant's systems.

8.2 APPLICANT'S SERVICE AREAS AND REGIONAL RELATIONSHIPS

8.2.1 Applicant's service areas

Southern California Edison Company's service area extends over a 15-county area of southern and central California, covering about 130,000 km^2 (50,000 mi^2) and containing a population in excess of 7.5 million. In 1978, SCE served 2.95 million customers, over 88% of which were residential. San Diego Gas & Electric Company supplies electricity to about 700,000 customers in San Diego County and in portions of Orange and Imperial counties. The boundaries of the service area enclose a 10,630-km^2 (4105-mi^2) area. The cities of Anaheim and Riverside serve their respective municipalities. A map of the applicant's service area is presented in Figure 8.1.

8.2.2 Regional relationships

SCE and SDG&E are members of the Western Systems Coordinating Council (WSCC) and the California Power Pool (CPP). The WSCC is the regional reliability council for the interconnected power network that serves the states west of the Rockies and parts of British Columbia. Established in 1967, the WSCC's primary function is to facilitate coordinated planning among its member systems and to provide technical support. In relation to these duties, the WSCC compiles load and resource data for the region, performs reliability studies, and recommends minimum reserve criteria. The California Power Pool, whose members are Pacific Gas & Electric Company (PG&E), SCE, and SDG&E, was formed in 1964 to provide for the continuous interconnected operation of the member utilities' power supply systems. This interconnected operation allows the utilities to make more efficient, and therefore more economical use of their generation resources and increases the overall reliability of electric service.

8.3 BENEFITS OF STATION OPERATION

8.3.1 Minimization of production costs

To minimize energy production costs, it is necessary to use the most economical mix of generation resources. The impact of the operation of SONGS 2 & 3 on the applicant's total cost of generation will be a major factor in determining the desirability of such operation. In assessing this impact, it is important to note that the fixed costs of each facility, such as the sunken capital investment and the fixed portion of the operating and maintenance costs, are irrelevant to the choice of which generation resources will be used to meet a given load, precisely because these costs are fixed and will not vary with an altered mode of system operation.

To assess the impact of station operation on the applicant's overall production costs, the staff first reviewed the latest production costs reported by the applicants for their electric generation stations. These data, presented in Tables 8.1 and 8.2, show that all oil/gas- and oil-fired facilities that are listed as base and/or intermediate units had production costs ranging from $29.2 to $56.7 per MWh, whereas Unit 1 of the San Onofre Nuclear Generating Station had a production cost of $9.0/MWhr. In determining how the additional units of the San Onofre Station would compare with these figures, the staff estimated the 1983 fuel cost for these units to be $10.8/MWhr.[1] Because SCE's and SDG&E's installed capacity is predominately oil- and oil/gas-fired, the staff concludes

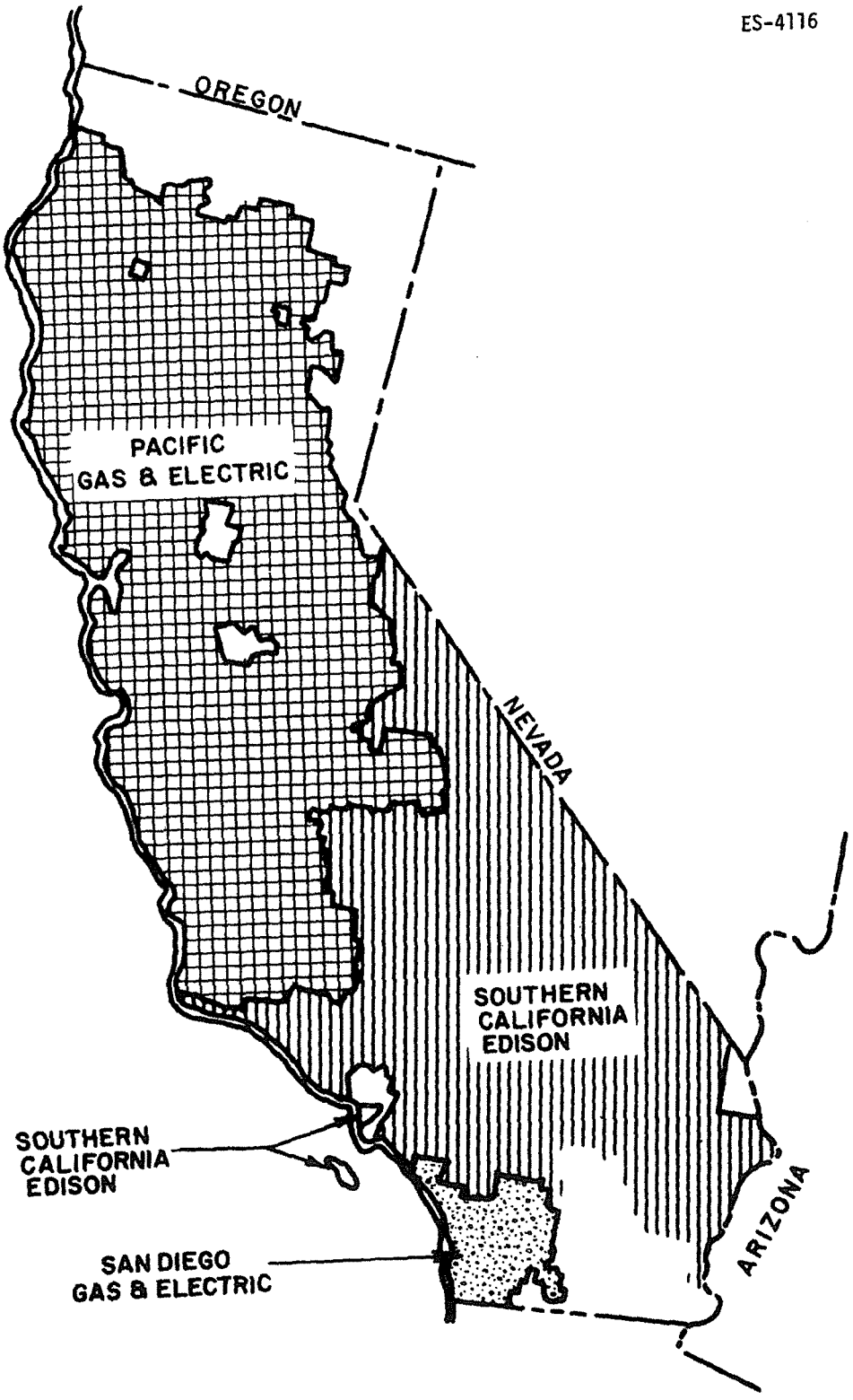

Fig. 8.1. Service areas of the member utilities of the California Power Pool. Source: ER, p. S.2-193.

Table 8.1. Southern California Edison Co. thermal-electric generating stations and production costs

Station Name	On-line dates for first and last unit	Function	Fuel type	Total station capacity (MW)	1980 Production cost (dollars/MWh)*
Long Beach	1928-1977	P	Oil/gas	156	77.9
				530	38.1
Redondo Beach	1948-1967	B, I	Oil/gas	642	41.5
					31.8
Huntington Beach	1958-1969	I, P	Oil/gas	870	39.3
				114	49.2
Mandalay	1959-1970	I, P	Oil/gas	430	44.0
				117	94.7
Ormond Beach	1971-1973	I	Oil/gas	1,500	50.6
Alamitos	1956-1969	B, I, P	Oil/gas	990	41.6
				960	45.5
				114	80.7
El Segundo	1955-1965	I	Oil/gas	1,020	41.8
Etiwanda	1953-1969	I, P	Oil/gas	904	42.2
				108	71.8
Mohave	1971	B	Coal	885	11.8
Four Corners	1969-1970	B	Coal	768	4.6
San Onofre Unit 1	1967	B	Nuclear	349	9.0
Coolwater	1961-1978	I	Oil/gas	146	29.2
				482	56.7
Highgrove	1952-1955	P	Oil/gas	154	50.5
San Bernardino	1957-1958	P	Oil/gas	126	35.0
Garden State	1967	P	Oil/gas	12	67.0
Ellwood	1974	P	Oil/gas	48	61.6

Note: B = base, I = intermediate, and P = peaking.
*Fuel only.
Source: Letter from K. P. Baskin, Southern California Edison Co., to Frank Miraglia, USNRC, undated; received by USNRC on February 25, 1981.

Table 8.2. San Diego Gas & Electric Co. thermal-electric generating stations and production costs

Station Name	On-line dates for first and last unit	Function	Fuel type	Total station capacity (MW)	1979 Production cost (dollars/MWh)
Station "B"	1923-1941	P	Oil/gas	90	188.8
Silver Gate	1943-1952	I	Oil/gas	230	48.9
Encina	1954-1978	B	Oil/gas*	917	33.7
Encina GT	1968	P	Oil/gas	16	98.6
South Bay	1960-1971	B	Oil/gas	706	33.7
South Bay GT	1966	P	Jet Fuel	18	233.4
San Onofre Unit 1	1967	B	Nuclear	87**	9.3
El Cajon	1968	P	Oil/gas	17	62.2
Kearny	1969	P	Oil/gas	147	77.5
Division	1968	P	Oil	16	97.6
Naval Training Center	1968	C	Oil/gas	16	46.0
Miramar	1972	P	Oil/gas	38	53.1
North Island	1972	P/C	Oil	41	43.7
Naval Station	1976	C	Oil/gas	26	41.0
Rohr	1979	C	Oil	1	75.8

Note: P = peaking, I = intermediate, B = base, and C = Cogeneration.
*Encina Unit 5 (320 MW) oil only.
**SDG&E's 20% share.
Source: Letter from K. P. Baskin, Southern California Edison Co., to V. A. Moore, USNRC, dated April 11, 1980.

that the operation of SONGS Units 2 and 3 would tend to reduce reliance on these facilities with corresponding savings in production costs.

To quantify the magnitude of the production cost savings, the staff made a comparison between the fuel cost that would be incurred in 1983 (the first full year in which both units are scheduled for full operation) if the two nuclear units were operated at a combined capacity factor of 50%, and the fuel cost that would be incurred if an oil-fired facility produced the same amount of electricity. In this comparison, the staff assumed a nuclear fuel cost of $10.8/MWhr in 1983, an oil cost of $4.4 per million Btu in 1983, and an oil-fired plant conversion ratio of 9,000 Btu/kWhr. These assumptions lead to an oil cost of $39.6/MWhr. All costs have been adjusted by the Producers Price Index to reflect costs in 1980 dollars. The results show that operating the nuclear units will save $270 million in fuel costs during 1983. Lowering the assumed plant capacity factor to 40% resulted in a fuel cost savings of $210 million, and raising the capacity factor to 60% gave a cost savings of $320 million. The cost of nuclear fuels would have to rise by a factor of about 3-1/2, and the price of oil would have to remain the same for the fuel savings of operating the nuclear units to disappear. These results, coupled with the information presented in Tables 8.1 and 8.2, clearly indicate that the applicant's production costs will be reduced significantly by the operation of SONGS 2 & 3.

8.3.2 Energy demand

Table 8.3 presents SCE's forecasts of peak demand, energy requirements, installed generating capacity, and reserve margins through 1985. These projections indicate that without SONGS 2 & 3 reserve margins fall below 13% from 1982-84 and dip to 7.1% in 1985. From 1980-85 SCE forecasts peak demand to grow at an average annual rate of 2.8%. A comparison with the State Level Electricity Demand[2] (SLED) forecasting model developed at Oak Ridge National Laboratory indicates that over the same period the electrical energy demand in California is forecasted to grow at an average annual rate of 4.5%. SCE's projected reserve margins without SONGS 2 & 3 clearly indicates a need for this capacity to maintain system reliability. The comparison of the applicant's forecasts of demand with the SLED forecasts reinforces the need for the additional capacity and reserve margins provided by SONGS 2 & 3.

Table 8.3. Southern California Edison Co. forecasts of peak demand, energy requirements, installed generating capacity, and reserve margins through 1985[a]

Year	Area peak demand (MW)	Growth[b] (%)	Total energy requirements kWh × 10^6	Growth[b] (%)	Installed Capacity (MW)		Reserve Margin (%)	
					With SONGS 2 & 3	Without SONGS 2 & 3	With SONGS 2 & 3	Without SONGS 2 & 3
1976	11292		59428		14071	14071	24.6	24.6
1977	11564	2.4	63345	6.6	14278	14278	23.5	23.5
1978	12159	2.9	63877	0.8	14966	14966	23.1	23.1
1979	12662	4.1	66217	3.7	15071	15071	19.0	19.0
1980	12841	1.4	65459	-1.1	15504	15504	20.7	20.7
1981	13274	3.4	67120	2.5	15471	15471	16.6	16.6
1982	13647	2.1	67910	1.2	16184	15304	18.6	12.1
1983	13895	1.8	70220	3.4	17446	15686	25.6	12.9
1984	14305	3.0	72590	3.4	17837	16077	24.7	12.4
1985	14735	3.0	75130	3.5	17535	15775	19.0	7.1

[a]Per November 18, 1980 Resource Plan.
[b]Percentage increase over previous year. 1976 through 1980 is recorded.
Source: Letter from K. P. Baskin, Southern California Edison Co., to Frank Miraglia, USNRC, undated, received by USNRC on February 25, 1981.

Table 8.4 provides analogous projections of electricity demand, installed capacity, and reserve margins for SDG&E. Without SONGS 2 & 3 reserve margins drop below 15% in 1984 and below 10% in 1985. The average annual growth in peak demand has been forecast at 1.3% which is significantly below the 4.5% rate forecast by SLED[2] for electrical energy demand in the State of California. Reserve margins forecast by SDG&E indicate a need for

Table 8.4. San Diego Gas & Electric Co. forecasts of peak demand, energy requirements, installed generating capacity, and reserve margins through 1987

Year	Area peak demand[a] (MW)	Growth[b] (%)	Energy requirements kWh × 10^6	Growth[b] (%)	Installed Capacity (MW)[c]		Reserve Margin (%)[c]	
					With SONGS 2 & 3	Without SONGS 2 & 3	With SONGS 2 & 3	Without SONGS 2 & 3
1978[d]	1981	13.5	10053	7.8	2030	2030	2.5	2.5
1979[d]	2019	1.9	10548	4.9	2363	2363	17.0	17.0
1980[d]	2050	3.7	10403	-1.4	2401[e]	2401[e]	17.1	17.1
1981	1975	-3.7	10738	3.2	2366	2366	19.8	19.8
1982	2004	1.5	10824	0.8	2586	2366	29.0	18.1
1983	2033	1.4	11108	2.6	2806	2366	38.0	16.4
1984	2077	2.2	11407	2.7	2806	2366	35.1	13.9
1985	2184	5.2	11762	3.1	2806	2366	28.5	8.3
1986	2272	4.0	12244	4.1	2806	2366	23.5	4.1
1987	2361	3.9	12763	4.2	2806	2366	18.8	0.0

[a] 1981–1987 SDG&E CFM III Forecast adopted by California Energy Commission in December 1980.
[b] Percentage increase over previous year.
[c] Excludes purchased capacity.
[d] 1978 through 1980 are recorded.
[e] July net rating.
Source: Letter from K. P. Baskin, Southern California Edison Co., to Frank Miraglia, USNRC, undated, received by USNRC on February 25, 1981.

SONGS 2 & 3 to maintain system reliability. Once again comparing the applicant's forecasts to the SLED forecasts reinforces the need for the additional capacity and reserve margins provided by SONGS 2 & 3.

The staff concludes on the basis of the analysis of the applicant's projected reserve margins that operation of SONGS 2 & 3 will be needed to ensure reliability within the time frame that operation is anticipated to begin. Furthermore, the analysis of cost savings due to a shift from oil-fired to nuclear generation (Sect. 8.3.1) makes operation of SONGS 2 & 3 economically desirable independent of load forecasts.

REFERENCES

The documents references below are available from the NRC/GPO Sales Program, Washington, DC 20555 and the National Technical Information Service, Springfield, VA 22161.

1. J. O. Roberts, S. M. Davis, and D. A. Nash, "Coal and Nuclear: A Comparison of the Cost of Generating Baseload Electricity by Region," U.S. Nuclear Regulatory Commission Report NUREG-0480, December 1978.

2. W. S. Chern, J. W. Dick, C. A. Gallagher, B. D. Holcomb, R. E. Just, and H. D. Nguyen, "The ORNL State-Level Electricity Demand Forecasting Model," Oak Ridge National Laboratory Report ORNL/NUREG-63, July 1980.

9. CONSEQUENCES OF THE PROPOSED ACTION

9.1 ADVERSE EFFECTS THAT CANNOT BE AVOIDED

The staff has reassessed the physical, social, and economic impacts that can be attributed to SONGS 2 & 3. The identification of adverse effects that cannot be avoided, given in Chap. 8 of the FES-CP, remains valid. The major effects identified were the destruction of a small amount of wildlife habitat in the area occupied by the plant buildings and the loss of fish and other marine organisms that will be entrained in the circulating cooling water system. In addition, construction has resulted in the excavation of about 16.4 ha (40.5 acres) of the San Onofre Bluffs, and operation of the plant will result in the removal of approximately 1.4 km (0.85 mile) of beach from unrestricted public use.

9.2 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The assessment of the short-term uses and long-term productivity contained in Chap. 9 of the FES-CP remains valid. About 21 ha (52 acres) of the total of 36 ha (90 acres) comprising all three units will be devoted to the production of electrical energy for the next 30 to 40 years. If, at the end of this period, the site is no longer needed for the production of electrical energy, it could be used for other purposes (see Sect. 9.4, below).

9.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There has been no change in the staff's assessment of these commitments since the earlier review (FES-CP, Chap. 10) except that the continuing escalation of costs has increased the dollar values of the materials used for construction and for fueling the plant. The staff has, however, expanded and updated the discussion on uranium fuel availability. This updated discussion is presented below.

9.3.1 Replaceable components and consumable materials

Uranium is the principal natural resource irretrievably consumed in facility operation. Other materials consumed, for practical purposes, are fuel-cladding materials, reactor-control elements, other replaceable reactor core components, chemicals used in processes such as water treatment and ion-exchanger regeneration, ion-exchange resins, and minor quantities of materials used in maintenance and operation. Except for the uranium isotopes U-235 and U-238, the consumed resource materials have widespread use; therefore, their use in the proposed operation must be reasonable with respect to needs in other industries. The major use of the natural isotopes of uranium is for production of useful energy.[1]

The reactor will be fueled with uranium enriched in the isotope U-235. After use in the plant, the fuel elements will still contain U-235 slightly above the natural fraction. This slightly enriched uranium, if separated from plutonium and other radioactive materials (separation would take place in a chemical reprocessing plant), would be available for recycling through the gaseous diffusion plant if required. Scrap material containing valuable quantities of uranium may also be recycled through appropriate steps in the fuel production process. Should chemical reprocessing of spent fuel be effected in the future, the fissionable plutonium recovered is potentially valuable for fuel in power reactors.

In view of the quantities of materials in natural reserves, resources, and stockpile and the quantities produced yearly, the expenditure of such material for the power facility is justified by the benefits from the electrical energy produced. A detailed discussion of uranium supply and demand follows.

9.3.2 Uranium resource availability

This section reviews information available from the Department of Energy (DOE) on the domestic uranium resource situation and the outlook for development of additional domestic supplies, availability of foreign uranium, and the relationship of uranium supply to planned nuclear generating capacity.

Analysis of uranium resources and their availability has been carried out by the government since the late 1940's. The work was carried out for many years by the Atomic Energy Commission (AEC). The activity was made part of the Energy Research and Development Administration (ERDA) when the agency was created in early 1975[1] and was subsequently transferred to the DOE when it was formed October 1, 1977.

9.3.2.1 U.S. resource position

To establish some basic terminology, a review of resource concepts and nomenclature would be worthwhile. Figure 9.1 defines resource categories based on varying geologic knowledge. Resources designated as ore reserves have the highest assurance regarding their magnitude and economic availability. Estimates of reserves are based on detailed sampling data, primarily from gamma ray logs of drill holes. DOE obtains basic data from industry from its exploration effort and estimates the reserves in individual deposits. In estimating ore reserves, detailed studies of feasible mining, transportation, and milling techniques and costs are made. Consistent engineering, geologic and economic criteria are employed. The methods used are the result of over 30 years of effort in uranium resource evaluation.

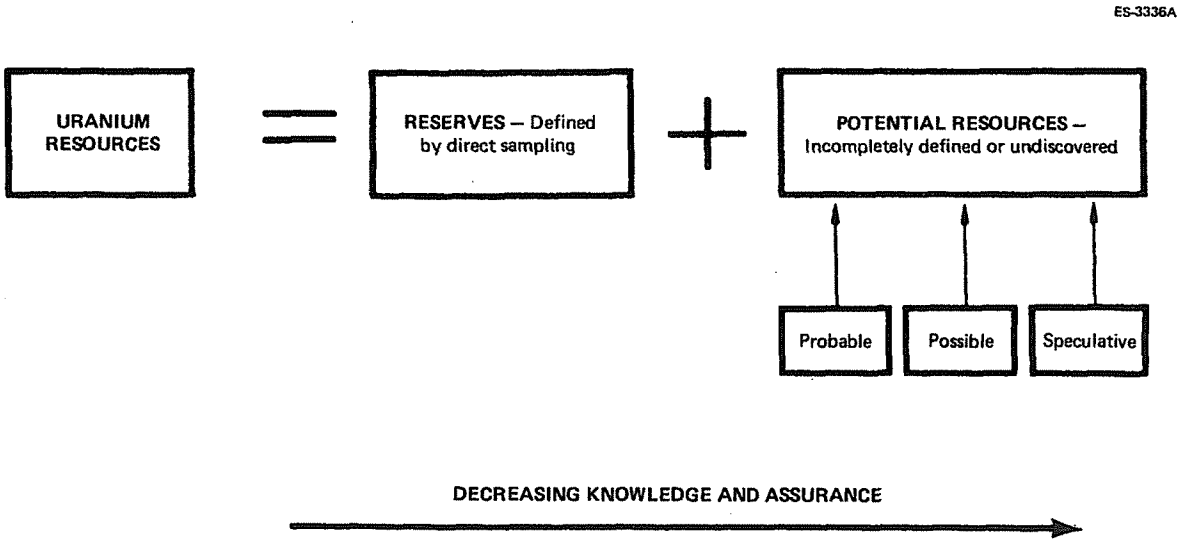

Fig. 9.1. DOE uranium resource categories.

Resources that do not meet the stringent requirements of reserves are classed as potential resources. For its study of resources, DOE subdivides potential resources into three categories: probable, possible, and speculative.[2] Probable potential resources are those contained within favorable trends, largely delineated by drilling, within productive uranium districts, i.e., those having more than 10 tons of U_3O_8 production and reserves. Quantitative estimates of potential resources are made by considering the extent of the identified favorable areas and by comparing certain geologic characteristics with those associated with known ore deposits.

Possible potential resources are outside of identified mineral trends but are in geologic provinces and formations that have been productive. Speculative resources are those estimated to occur in formations or geologic provinces which have not been productive but which, based on the evaluation of available geologic data, are considered to be favorable for the occurrence of uranium deposits.

Because any evaluation of resources is dependent upon the availability of information, the estimates themselves are, to a large degree, a scorecard on the state of development of information. Thus, appraisal of U.S. uranium resources is heavily dependent on the completeness of exploration efforts and the availability of subsurface geologic data. Since the geology of the United States as it relates to mineral deposits can never be completely known in detail, it will not be possible to produce a truly complete appraisal of domestic uranium resources. It is likely that the total resource picture will eventually prove larger than currently estimated given the nature and status of estimation methodology. The key factor may be the timeliness with which resources are identified, developed, and produced.

Conceptually, a resource, whether uranium or other mineral commodity, would initially be in the potential category. Development of additional data and clarification of production techniques and economics would be required to delineate and understand specific ore deposits to a degree that they could be categorized as reserves.

We can expect a dynamic balance between anticipated markets and prices and the extent to which exploration and reserve delineation will be done. There is no economic incentive for industry to expand reserves if the additional uranium will not be needed for many years ahead, and especially if the long-term market outlook is uncertain. This has been true for uranium. The mining companies are concentrating on markets for the next 5 to 15 years. The utilities and government are concerned with the outlook for the next 30 to 40 years.

Conversion of the currently estimated potential resources into ore reserves will take many years and will cost several billion dollars. It would be difficult to economically justify accelerating such an effort to delineate ore reserve levels equal to lifetime requirements of all planned reactors covering some 30 to 40 years in the future simply to satisfy planners. Supply assurance through continued timely additions to reserves and maintenance of a resource base adequate to support production demands, coupled with carefully developed information on potential resources, is considered to be adequate and a more realistic and economic approach. The conversion of potential resources to ore reserves and expansion of production facilities can be accomplished when needed as markets expand and production is needed.

All uranium resource estimates made by DOE and its predecessor agencies before 1979 were single estimates of tons of ore and grade for various cost categories. The estimtes were made by experienced geologists and engineers according to standard procedures, and represented a reasonable measure of resources. The current procedures for estimating uranium resources provide both mean values and distributions to characterize the reliability of the estimates at specific confidence levels. All available geologic information and the expertise of the estimators are fully utilized. These procedures are standardized and documented to minimize personal biases and to facilitate reviews and revisions as new information is acquired.

The estimates of resources in the United States are developed from a data base accumulated during the past three decades of Government and industry activities and enhanced by National Uranium Resource Evaluation program investigations of the past five years. Data acquired to support resource assessment have been extensive and varied. The assessment includes the evaluation of several hundred thousand industry-drilled holes; aerial radiometric surveys; sampling and geochemical analyses of groundwater, stream water, and stream sediment; selective drilling to fill voids in subsurface information; and extensive geologic field examinations. These data have been evaluated to determine those areas favorable for uranium occurrences. Evaluation criteria have been developed from studies of uranium deposits throughout the world. In favorable areas, the uranium endowment, material greater than 0.01 percent U_3O_8, is estimated, and subsequently economic factors are applied to assess the potential resources available at selected costs.

The costs used to calculate uranium resources are forward costs which consider both operating and capital costs, in current dollars, that would be incurred in producing the uranium. These costs include power, labor, materials, royalties, payroll, severance and ad valorem taxes, insurance, and applicable general and administrative costs. All previous expenditures (before the time of the estimate) for such items as property acquisition, exploration, mine development, and mill construction are excluded. Also excluded are income taxes, profit, and the cost of money. The resources assigned to the various cost categories are independent of the market price at which the uranium might be sold.

There are two major methodologies in uranium assessment; one is used for the estimation of reserves based on sample results from drill holes on specific properties; the second involves the use of a variety of geologic information to subjectively estimate potential resources. Reserves are calculated individually for properties throughout the United States using data voluntarily provided by the uranium companies to DOE. The data consist primarily of radiometric drill hole logs and maps. Parameters evaluated include thickness and tenor of mineralized rock; depth and spatial relationships, mining methods, ore dilution, and recovery; and amenability of ores to processing. The amounts of uranium that could be exploited at the forward cost levels are calculated according to conventional engineering practices utilizing available engineering, geologic, and economic data.

A regional reserves distribution estimate is obtained by mathematically combining the estimates of individual distributions for each property. These regional distributions are then combined to provide a total for the United States. Estimates include all material over a selected minimum thickness with a uranium content above 0.01% U_3O_8. A recovery factor is applied, after rate procedures are used for properties on which solution mining is in progress or is planned.

Potential resource estimates are based on geologic analogy. Geologic characteristics related to uranium potential in the area being investigated are compared with those in an area with similar characteristics, that is, a control area that contains uranium deposits for which the frequency distribution of grades and tonnages in the deposits has been developed. The analogy-based methodology is made feasible by DOE's extensive data base from which detailed characterizations of the distribution of uranium have been developed. From systematic comparison with an appropriate control area, an estimate is developed of the total amount of uranium, above 0.01% U_3O_8, that might be present in an area being evaluated. Uranium endowment factors, such as surface area, fraction underlain by endowment, grade, and tonnage are estimated at three confidence levels, i.e., a modal value which is considered as most likely, and a low and high estimate corresponding respectively to a 95 and 5% probability that the factor is at least that large. The endowment estimate is analyzed to determine the portions that are producible at various cost categories within stated confidence levels.

Table 9.1 provides the mean reserve and potential resource estimates for each cost category, as well as estimates at the 95th and 5th percentile. The 95th percentile value provides an estimate for which there is a 95% confidence that at least that amount exists. The 5th percentile provides an estimate for which there is a 5% probability that it will be exceeded. Due to the correlation of the individual estimates that are aggregated to generate the regional and national totals, the estimates at the 95th and 5th percentile are not directly additive; however, the mean values are additive.

Table 9.1. Uranium resources of the United States[a]

Reserves as of January 1, 1980
Other Resources as of October 1, 1980
Tons U_3O_8
Probability distribution values

Forward-cost category	Mean	95th percentile	5th percentile
At \$15 per pound of U_3O_8[c]			
Reserves	225,000	190,000	260,000
Probable	295,000	185,000	448,000
Possible	87,000	42,000	156,000
Speculative	74,000	30,000	162,000
Totals	681,000	447,000	1,026,000
At \$30 per pound of U_3O_8[b,d]			
Reserves	645,000	567,000	729,000
Probable	885,000	659,000	1,161,000
Possible	346,000	194,000	530,000
Speculative	311,000	155,000	600,000
Totals	2,187,000	1,731,000	2,748,000
At \$50 per pound of U_3O_8[b,e]			
Reserves	936,000	821,000	1,060,000
Probable	1,426,000	1,102,000	1,802,000
Possible	641,000	346,000	973,000
Speculative	482,000	251,000	890,000
Totals	3,485,000	2,771,000	4,313,000
At \$100 per pound of U_3O_8[b,f]			
Reserves	1,122,000	971,000	1,291,000
Probable	2,080,000	1,646,000	2,573,000
Possible	1,005,000	521,000	1,526,000
Speculative	696,000	378,000	1,225,000
Totals	4,903,000	3,875,000	6,056,000

[a] Uranium resources are estimated quantities recoverable by mining.
[b] Includes lower cost resource categories.
[c] \$6.80 per kilogram.
[d] \$13.60 per kilogram.
[e] \$22.65 per kilogram.
[f] \$45.30 per kilogram.
(To convert pounds to kilograms, multiply by 0.454; to convert tons to tonnes, multiply by 0.907.)

Most of the uranium resources are located in a few areas in the Colorado Plateau of New Mexico, Arizona, Colorado, and Utah, in the Wyoming Basins, and in the Texas Gulf Coastal Plain, Figs. 9.2 and 9.3. It should be noted that the reserve estimates in Table 9.1 were as of January 1, 1980, and the lower cost reserves have undoubtedly decreased since that date because of continuing rising costs.

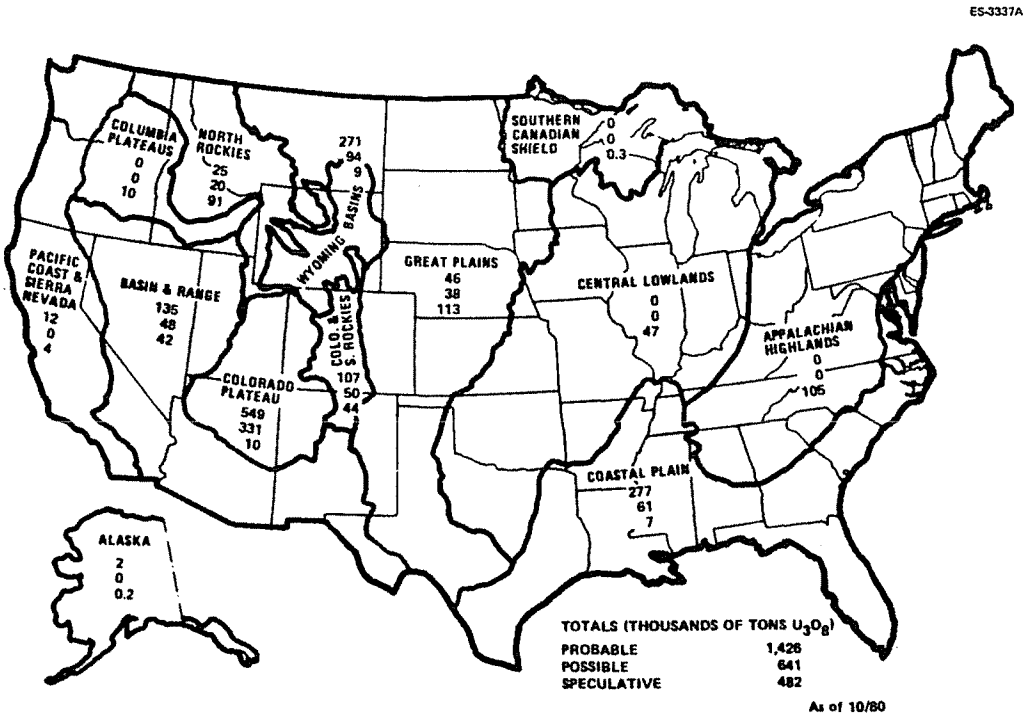

Fig. 9.2. Potential uranium resources by region ($22.65 per kilogram ($50 per pound) of U_3O_8).

9.3.2.2 Uranium exploration activities

Uranium exploration in the United States reached its all time high in 1978 as measured by the principal exploration indicator, surface drilling. Data provided to DOE by the exploration companies indicated a total of 14.6 million meters (48 million feet) of drilling in 1978. In 1979, however, drilling declined to 12.5 million meters (41 million feet), and during 1980 the downward trend steepened with drilling estimated to be approximately 8.5 million meters (28 million feet) for the year (see Figure 9.4).

Annual gross additions to reserves, a measure of exploration success, have been at high levels for the higher cost, i.e., $13.60 to $22.65 per kilogram ($30 and $50 per pound) U_3O_8 categories, but have been decreasing for lower cost levels. Costs have increased significantly in recent years raising the quality of resources needed to produce at a given cost level and reducing the quantities available at that level. For example, in 1979 only 907 tonnes (1000 tons) were added to $6.80 ($15) cost revenues, but 47,164 tonnes (52,000 tons) were removed, largely because of inflation, and an additional 12,698 tonnes (14,000 tons) were depleted by production. Hence, in 1979, $6.80 ($15) reserves decreased from 263,030 to 204,075 tonnes (290,000 to 225,000 tons). This trend continued in 1980. On the other hand, in 1979 some 84,351 tonnes (93,000 tons) were added to $22.65 ($50) reserves and 69,839 tonnes (77,000 tons) removed for a net increase of 14,512 tonnes (16,000 tons) U_3O_8. Thus, while exploration has been successful, the costs of producing the resources found are high in comparison with current prices and concurrently the cost of producing previously found resources has also increased.

The sharp rise in exploration resulted from the increase in prices in the 1974 to 1976 period, the active procurement activity of utilities, and the optimistic projections of future growth in uranium demand. Many new companies became active in exploration. Over 150 companies were involved in exploration in 1979. Considering the drop in requirement projections the level of activity reached probably was in excess of real needs. Therefore, some reduction of effort more in line with future needs is not detrimental.

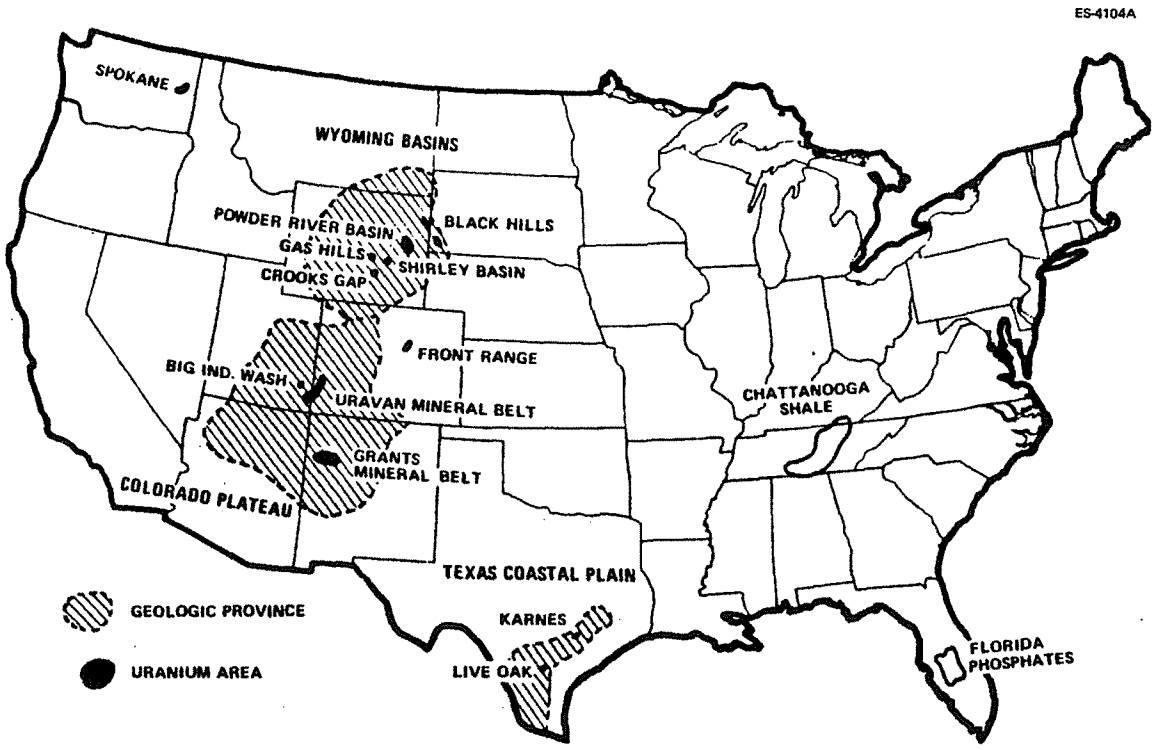

Fig. 9.3. Uranium areas of the United States.

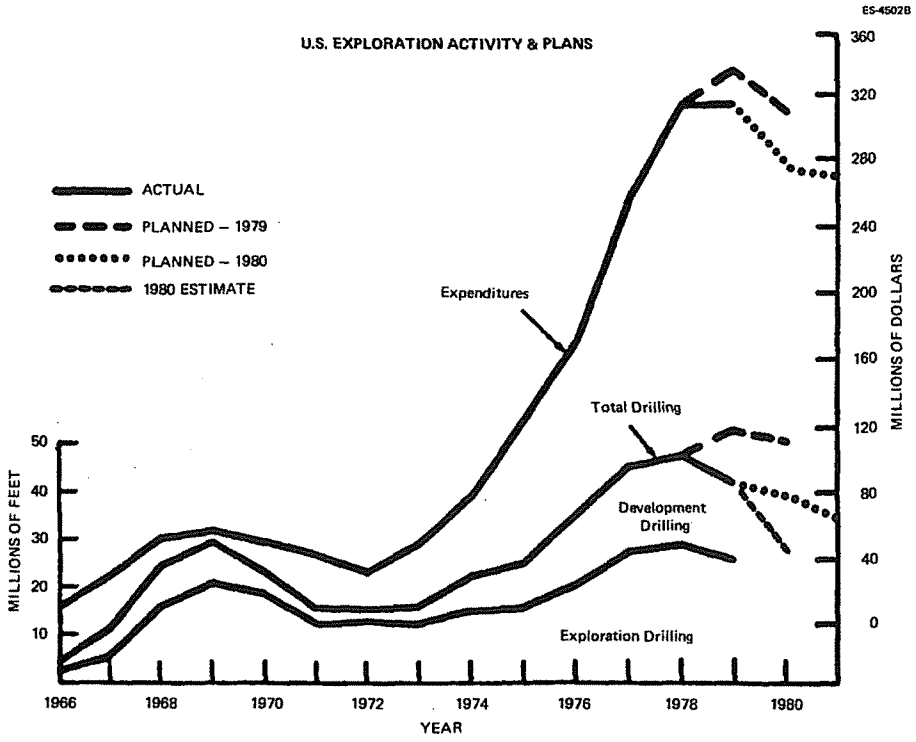

Fig. 9.4. U.S. exploration activity and plans. (To convert feet to meters, multiply by 0.3048.)

9.3.2.3 Domestic uranium production and capability

Domestic uranium production in 1980 was 19,573 tonnes (21,850 tons) U_3O_8 in concentrate. This represents a 15% increase over 1979 and is the highest U.S. production level for any single year. Production in recent months has been at record rates; the equivalent of over 19,954 tonnes (22,000 tons) U_3O_8 per year. This production comes from conventional mine-mill operations as well as nonconventional sources such as solution mining and byproduct recovery from processing of other minerals. The high production levels are in response to prior sales contracts. Buyers are actually receiving uranium in excess of their currently scheduled needs.

Several new uranium processing facilities are under construction or planned which could bring the total national capacity to around 27,000 tonnes (30,000 tons) per year by the mid-1980s.

Despite the increases in ore throughput and uranium production in 1980, a widespread curtailment of uranium mining and milling activities is underway. Production at some operating mines has been reduced and some planned mill expansions and construction are being postponed. The reduction in mine output will not be reflected in decreased uranium production until mine and mill ore stockpiles are reduced.

Studies have been conducted on attainable uranium production levels from uranium reserves in the United States and related costs. The uranium production capability projections should not be construed as being estimates of actual future supply, but simply as potential production which may be available to meet whatever demand eventually exists.

Using the "production center" concept, U.S. uranium production capability has been projected from ore reserves estimated as of January 1980, to be available at forward costs of $13.60 to $22.65 per kilogram ($30 and $50 per pound) U_3O_8 or less. The production centers consist of operating (Class 1), committed (Class 2), planned (Class 3) uranium extraction and processing facilities, and projected (Class 4) facilities based on probable potential resources. The study included conventional mills supplied by open pit and/or underground mines; solution mining and heap-leach operations; and operations where uranium is recovered as a byproduct of phosphate, copper, or beryllium mining and processing activities.

Projections are based primarily on operating conditions – average ore grades, mill recoveries, and operating and capital costs – similar to those currently prevalent in the uranium mining and milling industry. Specific information on company plans, costs, and operating methods has been considered.

Figure 9.5 shows the total projected production capability for $13.60 ($30) resources by resource category. Figure 9.6 shows the capability for $22.65 ($50) resources. Projected uranium demand and current sales commitments are also shown. Domestic demand is based on the DOE's Office of Uranium Resources and Enrichment 1980 nuclear power growth projections, assuming no reprocessing and a 0.20% U-235 enrichment tails assay.

9.3.2.4 Domestic reactor requirements

The outlook for uranium requirements is closely related to the growth of nuclear power. On December 1, 1980, there were 75 nuclear power reactors licensed to operate in the U.S., concentrated mostly in the East and Midwest. These plants have an electrical generating capacity of 55 Gigawatts (GWe). In addition to operating plants, there are under construction 86 plants with a total rated capacity of 95 GWe. Some of the plants are at such an early construction stage that they may be deferred or cancelled completely. An additional 17 reactors with 20 GWe capacity are on order. Together the group aggregates 170 GWe of capacity. However, the future for some of the ordered reactors is questionable.

Latest projections of nuclear power growth by the DOE's Office of Uranium Resources and Enrichment (URE) and the Energy Information Administration (EIA), Table 9.2, show an increase in nuclear power licensed to operate from 55 GWe at the end of 1980 to 96 GWe in 1985, 129 GWe in 1990, 155 GWe in 1995, and 180 GWe in 2000. EIA also projected a low case of 160 GWe and a high case of 200 GWe in 2000.

There are alternative views on U.S. power growth. The DOE's Office of Planning and Analysis has projected nuclear growth to the year 1990 at 125 GWe and to the year 2000 at 150 GWe, based on historic delays to nuclear power growth. The DOE Office of the Assistant Secretary of Nuclear Energy has projected 400 GWe, based on energy demand, growth, nuclear competitiveness, and industry construction capability. All of these values are sharply reduced from the projected growth of the nuclear industry of just a few years ago. For example, in 1976 U.S. nuclear capacity in the year 2000 had been projected to be 500 GWe, and in 1978 it had been projected to be 320 GWe.

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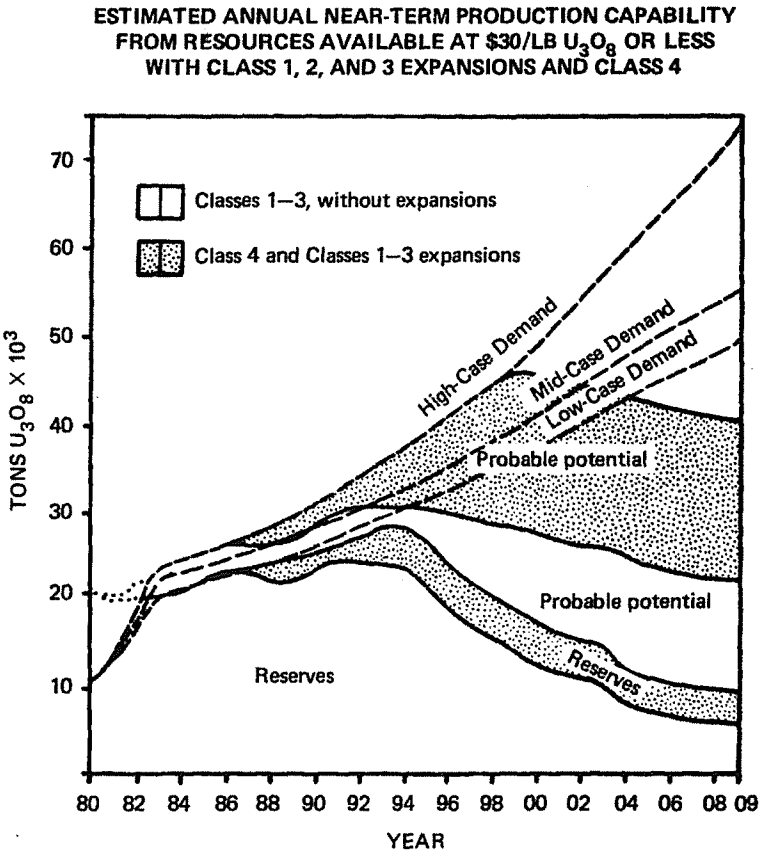

Fig. 9.5. Estimated annual near-term production capability from resources available at $13.60 per kilogram ($30 per pound) of U_3O_8 or less with Class 1, 2, and 3 expansions and Class 4. (To convert tons to tonnes, multiply by 0.907.)

Even at the more conservative estimates, nuclear capacity still is expected to expand substantially and to provide a significant portion of future domestic electric capacity. Current methods of projecting nuclear growth and uranium requirements are based on estimates of reactor startup dates considering construction and licensing times, and systems power requirements. Accurate forecasts have proven to be difficult.

The uranium needed to be delivered by uranium concentrate-producing plants as fuel for the nuclear plants will also increase over time; for the URE mid-case, from 12,063 tonnes (13,300 tons) U_3O_8 in 1981 to 21,405 (23,600) in 1985, 26,212 (28,900) in 1990, 31,745 tonnes (35,000 tons) in 1995, and 36,280 tonnes (40,000 tons) in 2000, if the enrichment plants are operated at 0.20% U-235 tails assay. Cumulative uranium requirements through the year 2000 range from 462,570 to 562,340 tonnes (510,000 to 620,000) tons U_3O_8 with 516,990 tonnes (570,000 tons) U_3O_8 for the mid-case.

Uranium requirements are based on normal lead times for fuel cycle steps and current technology for enrichment and for reactor design and operation. There are possible improvements in enrichment which would allow use of lower tails assays which would reduce uranium requirements. There are also possible improvements to reactor design and operation that could reduce uranium requirements. These factors are not likely to have a significant impact on uranium demands until at least well into the 1990s.

9.3.2.5 Uranium inventories

Buyers' inventories of uranium have been increasing for several years as actual deliveries have been in excess of needs. Inventories at the beginning of 1980 totalled 32,742 tonnes (36,100 tons) of natural uranium (Table 9.3), with 25,033 tonnes (27,600 tons) held by utilities. In 1980, U.S. utilities sent an

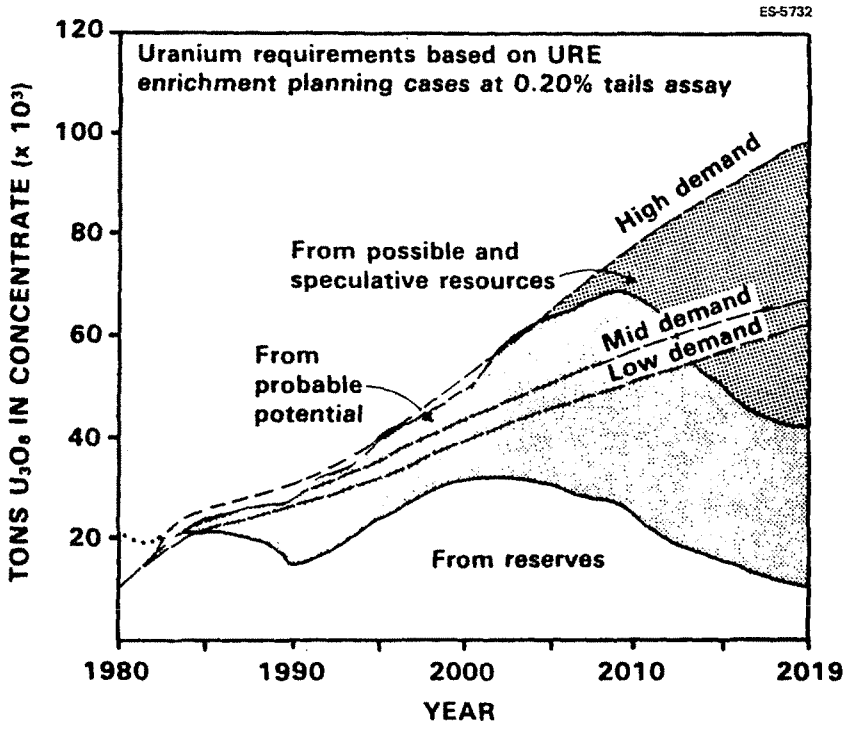

Fig. 9.6. Annual production capability from resources available at $22.65 per kilogram ($50 per pound) of U_3O_8 or less projected to meet nuclear power growth demand. (To convert tons to tonnes, multiply by 0.907.)

Table 9.2. U.S. nuclear power growth projections (June 1980)

End of year	Power Range [GW(e)]		
	Low	Mid	High
1985	85	96	105
1990	125	129	140
1995	142	155	165
2000	160	180	200

Table 9.3. Buyers' inventories of natural uranium (Tons U_3O_8)

Beginning of year	Domestic origin	Foreign origin	Total
1976	22,600	1,100	23,700
1977	25,800	3,500	29,300
1978	25,100	3,600	28,700
1979	28,000	5,200	33,200
1980	30,800	5,300	36,100

(To convert tons to tonnes, multiply by 0.907.)

equivalent of 15,691 tonnes (17,300 tons) U_3O_8 to the DOE gaseous diffusion plants for enrichment. Thus, the 25,033 tonnes (27,600 tons) inventory level amounted to 1.6 years of U.S. utilities' needs. Of those U.S. utilities who have responded to questions on inventory levels, most have indicated that they desire a level amounting to about one year's needs, although some have reported inventory levels as small as three month's needs, while others desire inventories as great as two year's needs. Producers also had inventories of about 2,177 tonnes (2,400 tons) U_3O_8 at the beginning of 1980, which is about a normal working inventory. The outlook is for a continuing buildup of buyers' inventories, as current contracted deliveries are in excess of actual needs.

9.3.2.6 Analysis of production capability and reactor capacity

Study of attainable production capability from currently estimated $13.60 ($30) U.S. ore reserves and probable potential resource, previously referenced, indicates that production levels of 40,815 tonnes (45,000 tons) U_3O_8 per year can be achieved with aggressive resource development and exploitation including both mining and milling. Although the level may be achieved by use of domestic $13.60 ($30) ore reserves and probable resources alone, development and utilization of $30 possible and speculative categories and use of $22.65 ($50) ore reserves and potential resources would provide added assurance that the levels could be attained and sustained. Considering the use of $22.65 ($50) resource, a level of 54,240 tonnes (60,000-tons)/year supply is achievable from currently estimated resources. Such a level could be reached by the early 1990s. Imported uranium and inventories would add to the supply from these projections.

The level of nuclear generating capacity supportable with 54,240 tonnes (60,000 tons)/year of uranium, will vary with enrichment tails assay and recycle assumptions. Without recycle of uranium or plutonium and with a 0.30% U-235 enrichment tails assay, about 260,000 MWe could be supported. Without recycle and at 0.20% tails assay, about 310,000 MWe could be supported. With recycle of uranium and plutonium and a 0.20% tails assay, about 520,000 MWe could be supported. All the levels of supportable capacity are above the 170,000 MWe of capacity in operation (55,000 MWe), under construction (95,000 MWe), and on order (20,000 MWe), as of late 1980. Thus, currently estimated resources can provide adequate uranium supplies for a sizable expansion to U.S. nuclear generating capacity.

The cumulative lifetime (30 years) uranium requirements for all of the above reactors (170,000 MWe) would be about .907 million tonnes (1.0 million tons) U_3O_8 at 0.20% enrichment tails with no recycle, compared to the 1.45 million tonnes (1.6 million tons) mean value in $13.60 (($30) or the 2.27 million tonnes at $22.65 (2.5 million tons at $50)) ore reserves, by-product, and probable potential resources. Evaluation of long-term fuel commitments on the basis of ore reserves and probable potential resources is considered a prudent course for planning. The lifetime commitment would be less than one-third of currently estimated $22.65 ($50) domestic resources, including the possible and speculative categories (see Table 9.1).

9.3.2.7 Uranium resource recovery

In regard to the availability of estimated uranium resources considering recoveries in mining and ore processing, estimates of U.S. uranium resources represent the quantity of uranium estimated to be minable expressed as tons of U_3O_8 of ore in the ground. These estimates are a reflection of the information available to DOE at the time of the estimate and thus are dependent on the extent of exploration. In view of the considerations involved in preparing the resource estimates and the uranium resource outlook, no adjustment for losses is warranted.

U.S. mining practice results in recovery of high percentages of the uranium contained in a deposit. DOE resource estimation procedures consider the capabilities and requirements of mining systems currently in use so that the estimates are a realistic appraisal of what is minable. Because deposits frequently are not fully delineated before they are developed, it is not unusual for more uranium to be recovered from deposits than was included in ore reserves before such deposits were put into production. Mining company practice seeks to recover as much of the contained mineral content as possible before abandoning a mine. A strong incentive for such practice is the increase in financial returns. In the processing of uranium ores, recoveries generally are over 90%. In 1980, mill recovery averaged about 93%. Higher recoveries are usually possible if economically justified.

9.3.2.8 High cost resources

An alternative to identification of additional low-cost resources is the utilization of higher cost resources. The highest cutoff cost category included in DOE resources in Table 9.1, is $45.30 per kilogram ($100 per pound) of U_3O_8. This level is an upper range of what might be of interest for utilization in light water reactors over the next few decades.

The increased price of oil and coal in the last few years has been a contributing factor to the increased price of uranium economically acceptable in light water reactors. This impact results from the relative insensitivity of nuclear electric power costs to increases in uranium prices. The cost of fuel is a very small fraction of the cost of power from a nuclear plant. In turn, the cost of natural uranium is only a small fraction of the fuel cost; enrichment, fabrication, reprocessing, and carrying charges make up the balance. As a result, large increases in uranium prices result in comparatively small increases in power costs. As pointed out in Section 9.3.2.6, nuclear capacity currently in operation, under construction, and on order, is expected to have adequate supplies of U_3O_8 at prices much lower than $45.30 per kilogram ($100 per pound) in 1980 dollars.

Knowledge of U.S. resources in the above $22.65 ($50) category is meager, largely because of the lack of past economic interest. There has been virtually no industry activity to search for or to develop such resources. Prospects for discovery of higher cost resources in the United States are considered promising at this stage of U.S. exploration. The principal large, very low-grade deposits that have been studied in some detail in the past are the shales and phosphates. The Chattanooga shale in Tennessee is of particular interest because of its large size. This deposit was extensively drilled, sampled, and studied in the 1950s. The higher grade part of the Chattanooga shale has an average uranium content of about 60 to 80 ppm compared to 1500 ppm in present-day ores. It contains in excess of 4.5 million tonnes (5 million tons) of U_3O_8 that may be producible at a cost of $45.30 or more per kilogram ($100 or more per pound) of U_3O_8. Additional work to develop production technology will be needed.

If Chattanooga shale were mined to fuel an 1150-MWe reactor, assuming recycle of uranium (but not of plutonium) and a 0.3% enrichment tail, about 11,428 tonnes (12,600 tons) of shale would have to be processed each day; with uranium and plutonium recycle (should that be practiced) and 0.20% enrichment tails, about 7,710 tonnes (8500 tons) per day would have to be processed. An average of about 10,250 tonnes (11,300 tons) of coal would have to be burned each day if 20 MJ/kg (8700 Btu/lb) of coal were used to produce power equivalent to that produced by a 1150-MWe reactor.

Utilization of the very low-grade resources such as Chattanooga shale would, of course, involve mining and processing very much larger quantities of ore than is currently mined to produce the same amount of uranium. From an environmental as well as from an economic point of view, identification and utilization of additional higher grade ores would be preferable. However, the shales are available if their use should become necessary.

9.3.2.9 Prices

During the period 1973-1979, the average delivery price per kilogram (pound) of U_3O_8 for sales from domestic producers to domestic buyers, in year-of-delivery dollars, increased from $3.22 to $10.80 ($7.10 to $23.85), as shown in Table 9.4.

Table 9.4. Historical trend of average uranium prices

(Dollars[a] per pound of U_3O_8)

Year	Final Price
1973	$ 7.10
1974	7.90
1975	10.50
1976	16.10
1977	19.75
1978	21.60
1979	23.85

[a] Year-of-delivery dollars.

(To convert dollars per pound to dollars per kilogram, multiply by 0.453.)

Future prices for material under contract as of July 1, 1980, as reported to DOE, is shown in Table 9.5. Also shown are the percentages of material under contract price arrangements covering the price data presented. The remainder is in market price contracts or in captive production.

9.3.2.10 Foreign uranium resource position

The most reliable source of information on world uranium resources is that compiled by the Working Party on Uranium Resources sponsored jointly by the Nuclear Energy Agency (NEA) and the International Atomic

Table 9.5. Average contract prices and settled market price contracts for uranium July 1, 1980

(Dollars[a] per pound of U_3O_8)

Year	Price	Percentages of procurement under contract price contracts
1980	26.00[b]	66
1981	28.70[b]	55
1982	34.80	47
1983	41.40	43
1984	43.45	35
1985	43.45	32
1986	46.85	16
1987	43.55	18
1988	42.70	22
1989	51.85	23
1990	53.25	16

[a] Year-of-delivery dollars.
[b] These years include settled market price contracts. Market price contract prices are determined sometime before delivery, based on prevailing market prices.

(To convert dollars per pound to dollars per kilogram, multiply by 0.453.)

Energy Agency (IAEA). This group has been gathering and publishing uranium resource estimates since 1965 and includes most of the significant uranium resource countries. In compiling its estimates this group classifies resources as Reasonably Assured resources (roughly comparable to ore reserves in the usual mining industry sense) and Estimated Additional resources (roughly comparable to DOE's probable potential resources). Resources in the world outside of the centrally planned economies area (WOCA) are tabulated by continents and major countries in Table 9.6.

Almost 80% of these resources are concentrated in three continents: North America, Africa, and Australia. Six countries within those continents – U.S., Canada, South Africa, Namibia, Niger, and Australia - have about three-quarters of the Reasonably Assured resources. This geographic concentration is a reflection of the geologic favorability of these areas as well as the extent of exploration and resource appraisal efforts to date.

9.3.2.11 Foreign production capacity and plans

Studies by the NEA and the IAEA have also provided reliable information on world production capacity. The current production capacity of existing non-U.S. plants (Class 1) is about 34,466 tonnes (38,000 tons) U_3O_8 annually, as shown in Table 9.7. This production is primarily in Canada, France, Namibia, Niger, and South Africa.

Construction of new plants (Class 2) with a capacity of about 7,256 additional tonnes (8,000 tons) is taking place, primarily in Australia and Canada. Plants that are planned (Class 3), could increase total annual production by another 32,652 tonnes (36,000 tons) U_3O_8 for a total of 76,188 tonnes (84,000 tons) U_3O_8 by 1990. Since needs for uranium are well below attainable production capacity levels, and prices would not justify all operations, it is likely that many of the projected plants will be built on a deferred schedule. It is also possible that some new plants will replace existing operations. Countries of particular significance in future production expansion are Australia and Canada, which have 82% of capacity under construction and 70% of the planned additional capacity.

9.3.2.12 Foreign reactor requirements

The uranium requirements in non-Communists foreign countries have been projected by the Energy Information Administration based on the reactors planned and timing of construction. Table 9.8 shows three cases of power plant growth which, by the year 2000, range from 300 GWe to 400 GWe of nuclear power in operation. The mid-case is taken as the most likely one. However, nuclear power growth projections have been subject to continual downward revision in the last several years.

Table 9.6. World uranium resources by continent[a]

(World outside centrally planned economies area)
(thousand tons U_3O_8)

	Reasonably assured		Estimated additional	
	$30/lb	$50/lb[b]	$30/lb	$50/lb[b]
North America				
U.S.	645	940	885	1,430
Canada	280	305	480	945
Other	9	44	44	65
Total	930	1,290	1,410	2,440
Africa				
South Africa	320	508	70	180
Niger	210	210	69	69
Namibia	152	173	39	69
Other	109	115	2	22
Total	790	1,000	180	340
Australia				
Total	380	390	165	180
Europe				
France	51	72	34	60
Spain	13	13	11	11
Sweden	1	390	0	4
Other	22	31	19	53
Total	90	510	60	130
Asia				
India	39	39	1	31
Other	13	21	0	0
Total	50	60	0	30
South America				
Brazil	96	96	117	117
Argentina	30	36	5	12
Other	0	0	7	8
Total	130	130	130	140
Worldwide total (rounded)	2,400	3,400	1,900	3,300

[a]Modified from "Uranium Resources, Production and Demand" OECD, Nuclear Energy Agency (NEA), and the International Atomic Energy Agency (IAEA), December 1979.

[b]Includes resources at $30 per pound of U_3O_8.

(To convert tons to tonnes, multiply by 0.907; to convert $ per pound to $ per kilogram, multiply by 0.453.)

In order to supply these nuclear plants, EIA has estimated the amount of uranium required assuming 0.20% U-235 enrichment plant tails and no recycle of uranium or plutonium. Table 9.8 gives the annual tons U_3O_8 from 1980 to 2000 for high-, mid-, and low-cases.

For the mid-case, foreign requirements increase from 16,689 tonnes (18,400 tons) U_3O_8 in 1980, to 23,763 tonnes (26,200 tons) U_3O_8 in 1985, and to 49,069 tonnes (54,100 tons) U_3O_8 in the year 2000. Cumulative requirements through the year 2000 total 650,319 tonnes (717,000 tons) U_3O_8.

If all the planned foreign mine-mill production came on-stream as currently projected, there would be considerable excess capacity. If only operating mills or those under construction were available by the late 1980s, production capacity would cover annual demands through the late 1990s.

Table 9.7. Foreign uranium production capability

(Thousand tons U_3O_8)

Year	Australia			Canada			France			Namibia			Niger			S. Africa			Other[b]			Foreign Total		
	1[a]	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1980	1.3	0	0	9.8	0	0	4.5	0	0	5.3	0	0	5.2	0	0	8.3	0	0	4.1	0	0	38.5	0	0
1981	1.8	1.1	0	9.8	1.4	0	4.5	0.2	0	5.3	0	0	5.2	0	0	8.3	0	1.2	4.1	0	0.8	39.0	2.7	2.0
1982	1.8	3.3	0	9.8	1.9	0	4.5	0.5	0	5.3	0	0	5.2	0	0	8.3	0	2.9	4.1	0	3.0	39.0	5.7	5.9
1983	1.8	3.3	0	10.5	1.9	2.0	4.5	0.7	0	5.3	0	1.2	5.2	0	0	8.3	0	4.6	4.1	0	4.1	39.7	5.9	11.9
1984	1.8	3.3	0	11.0	2.9	4.0	4.5	0.7	0	5.3	0	1.2	5.2	0	0.7	8.3	0	5.2	4.1	0	4.4	40.2	6.9	15.5
1985	1.8	3.3	6.5	12.0	2.9	5.0	4.5	0.7	0	5.3	0	1.2	5.2	0	2.5	8.3	0	5.5	4.1	0	5.1	41.2	6.9	25.8
1986	1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.6	4.1	0	5.1	40.6	7.6	35.8
1987	1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.6	4.1	0	5.2	40.6	7.6	35.9
1988	1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.5	4.1	0	5.3	40.6	7.6	35.9
1989	1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.5	4.1	0	5.4	40.6	7.6	36.0
1990	1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.2	4.1	0	5.5	40.6	7.6	35.8
Total																								84.0

[a] Class: 1. Currently operating plants
2. Plants under construction
3. Planned plants

[b] Includes: Argentina, Brazil, CAR, Gabon, India, Italy, Mexico, Portugal, Spain, Yugoslavia. Based on "Uranium Resources, Production and Demand," December 1979.

(To convert tons to tonnes, multiply by 0.907.)

Table 9.8. Foreign nuclear capacity and uranium requirements

	Capacity [GW(e)]			Requirements (tons U_3O_8)[a]		
	Low	Mid	High	Low	Mid	High
1980	66	68	77	17,300	18,400	19,800
1985	117	124	128	24,000	26,200	29,200
1990	165	181	201	27,500	31,600	32,700
1995	229	252	280	34,600	41,500	47,800
2000	300	350	400	42,700	54,100	64,300

[a] 0.20% U-235 tails assay.

(To convert tons to tonnes, multiply by 0.907.)

Additional projections of WOCA nuclear growth and uranium requirements were developed during the International Nuclear Fuel Cycle Evaluation (INFCE). While the projections are now considered as high by many, they do provide an additional, more optimistic, viewpoint on future nuclear growth. The INFCE low case – modified to exclude the U.S. – indicated a growth in foreign (WOCA) nuclear capacity from 82 GWe at the end of 1980 to 217 GWe in 1990 and 580 GWe in the year 2000. Corresponding foreign uranium requirements would be 19,047 tonnes (21,000 tons) in 1980, 45,350 tonnes (50,000 tons) in 1990 and 108,840 tonnes (120,000 tons) in 2000. Such projections indicate a much larger possible growth in future uranium demands

9.3.2.13 Foreign competition and the domestic industry

The concentration of world uranium resources and production has, in past periods of low prices and ore production, fostered attempts to form cartel-like organizations seeking to restrict the free movement of uranium and influence pricing. The concentration of uranium production in a few countries will continue for some time, though there is an increasing diversity of supply sources. The opportunity for future foregin cartel-like activities will continue, particularly if uranium producer country governments are involved, which has been the case in the past. However, the severe criticism of such practice and the legal actions that have resulted in the United States might operate to discourage such activities in the future. Since the U.S. has the capability of producing a large portion – or all – of its uranium needs, and since the U.S. uranium buyers historically have shown a strong preference for domestic uranium, the U.S. is not expected to develop a large dependence on foreign uranium. These factors would tend to reduce the susceptibility of the U.S. to direct impacts of any cartel-like activity.

9.3.2.14 Conclusions

In conclusion, DOE assessment of uranium resources indicates that currently estimated ore reserves and probable potential resources at forward costs up to $13.60 per kilogram ($30 per pound) U_3O_8 total over 1.36 million tonnes (1.5 million tons), and at forward costs up to $22.65 per kilogram ($50 per pound) U_3O_8 total almost 2.17 million tonnes (2.4 million tons). The 2.17 million tonnes (2.4 million tons) U_3O_8 will support 390 GWe of nuclear power generating capacity, assuming a 30-year life for the reactors, no spent fuel reprocessing and an enrichment plant tails assay of 0.20% U-235. Under the latest DOE forecast for nuclear generating capacity in the post-2000 period, these resources should support U.S. nuclear power growth, including SONGS 2 and 3, well into the next century. However, meeting the uranium requirements for an expanding U.S. nuclear power industry will require extensive industry efforts to sustain exploration, and success in discovering and developing the potential uranium resources.

Foreign uranium resources are substantial and have been growing. Some of the more recently discovered deposits, especially in Canada and Australia, will have comparatively low-cost uranium production. The staff, therefore, concludes that there will be sufficient nuclear fuel available for SONGS 2 and 3.

9.4 DECOMMISSIONING

A license to operate a nuclear power plant is issued for a period of 40 years, beginning with the issuance of the construction permit. At the end of the 40-year period the operator of a nuclear power plant must renew the license for another time period or apply for termination of the license and for authority to dismantle the facility and dispose of its components.[8] If prior to the expiration of the operating license, technical, economic, or other factors are unfavorable to continued operation of the plant, the operator may elect to apply for license termination and dismantle authority at that time. In addition, at the time of applying for a license to operate a nuclear power plant, the applicant must show that he possesses "or has reasonable assurance of obtaining the funds necessary to cover the estimated costs of permanently shutting the facility down and maintaining it in a safe condition."[9] These activities, termination of operation and plant dismantling, are generally referred to as "decommissioning."

NRC regulations do not require the applicant to submit decommissioning plans at the time the construction permit and operating license are obtained; consequently, no definite plan for the decommissioning of the station has been developed. At the end of the station's useful lifetime, the applicant will prepare a proposed decommissioning plan for review by the Nuclear Regulatory Commission. The plan will comply with NRC rules and regulations then in effect.

The decommissioning of reactors is not new. Since 1960, five licensed nuclear plants, four demonstration nuclear power plants, six licensed test reactors, 28 licensed research, and 22 licensed critical facilities have been or are in the process of being decommissioned.[10] The primary methods of decommissioning consist of mothballing, entombing, dismantling, or a combination of these three alternatives. The primary methods are defined below in terms of the definitions provided in Regulatory Guide 1.86.[11]

Mothballing is the process of placing a facility in a nonoperating status. The reactor may be left intact except that all reactor fuel, radioactive fluids, and nonfixed radioactive wastes such as ion exchange resins, contaminated scrap materials, and contaminated chemicals are removed. The existing license is amended to a "possession only" status and continues in effect until residual radioactivity decays to levels acceptable for release to unrestricted access or until residual radioactivity is removed. The "possession only" license is a reactor facility license that permits a licensee to possess the facility but prohibits operation of the facility as a nuclear reactor.

Entombment consists of removing all fuel assemblies, radioactive fluids, and wastes followed by the sealing of remaining radioactive material within a structure integral with the biological shield or by some other method to prevent unauthorized access into radiation areas. A program of inspection, facility radiation surveys, and environmental sampling is required for a licensed facility that has been entombed.

Dismantling is defined as removal of all fuel, radioactive fluids and waste, and all radioactive structures. Surface contamination levels, established in Table 1 of Regulatory Guide 1.86, must be met prior to termination of the facility license. In addition to meeting the surface contamination levels, the acceptability of the presence of materials which have been made radioactive by neutron activation would be evaluated on a case-by-case basis prior to termination of the license. If the facility owner so desires, the remainder of the reactor facility may be dismantled and all vestiges removed and disposed of.

For a single nuclear reactor, the mothballing alternative costs about $2.45 million initially plus an annual maintenance and surveillance cost of $167,000. If a 24-hr manned security force is not required (e.g., a site with continuing operations), the annual cost could be reduced to $88,000. Translating these costs into unit cost of generating electricity, the 30-year levelized unit cost* would be about 0.04 mills/kWhr and if a manned security force is not required about 0.03 mills/kWhr.[12]

The entombing alternative costs about $7.58 million initially for a single unit facility plus an annual maintenance and surveillance cost of $58,000 for the duration of the entombment period.[13] These costs, when translated to a 30-year levelized unit cost* basis, amount to about 0.06 mills/kWhr.

The dismantling alternative for a single nuclear power reactor costs about $33.3 million to remove the radioactive structures associated with NRC requirements for terminating a possession only license.[12] An additional $4.8 million would be needed to remove the nonradioactive structures (cooling towers, administration buildings, etc.) to below grade.[13] There are no annual costs associated with this alternative. When the dismantling costs are translated to a 30-year levelized unit cost* basis, this amounts to about 0.17 mills/kWhr.

Combinations of mothballing and delayed (about 100 years) dismantling have 30-year levelized unit costs that are about the same as the mothballing alternative costs. Likewise, the costs for the entombing delayed dismantling combinations are about the same as the entombing cost. In both instances the annual maintenance cost for mothballing and entombing alternatives, on a present value basis, is sufficient to cover all the delayed dismantling cost for the mothballing alternative and about 80% for the entombing alternative.

Although the above costs are for a one-unit station, the savings associated with multiunit stations are small; thus, the unit cost (mills/kWhr) is essentially the same for a single unit station or multiunit station. For the San Onofre Nuclear Generating Station Units 2 and 3 the decommissioning costs would be about double that indicated for all of the decommissioning one-unit alternatives.

Studies of social and environmental effects of decommissioning large commercial power generating units have not identified any significant impacts.[13]

Also, studies indicate that occupational radiation doses can be controlled to levels comparable to occupational doses experienced with operating reactors through the use of appropriate work procedures, shielding, and remotely controlled equipment.[13]

The applicant may retain the site for power generation purposes indefinitely after the useful life of the station. The degree of dismantlement would be determined by an economic and environmental study involving the value of the land and crop value versus the complete demolition and removal of the complex. In any event, the operation will be controlled by rules and regulations in effect at the time to protect the health and safety of the public.

SONGS 2 and 3 are designed to operate for about 30 years, and the end of their useful life will occur approximately in the year 2011. The applicant has made no firm plans for decommissioning, but assumes that the following steps would be taken as minimum precautions for maintaining a safe condition:

1. All fuel would be removed from the facility and shipped offsite for disposition.

2. All radioactive wastes – solid, liquid, and gas – would be packaged and removed from the site insofar as practical.

A decision as to whether the station would be further dismantled would require an economic study involving the value of the land and scrap value versus the cost of complete demolition and removal of the complex. However, no additional work would be done unless it is in accordance with rules and regulations in effect at the time.

In addition to personnel required to guard and secure the station, concrete and steel would be used to prevent ingress into any building, particularly the radioactive areas.

Since the San Onofre site is located on U.S. Marine Corps property, the applicant must, if desired by the government, remove all of the improvements installed on the site at the end of the applicant's lease arrangement. This requirement could potentially entail complete removal and dismantling of the plant (ER Section 5.8).

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*Based on a 1200-MWe generating unit beginning operation in 1958, a capacity factor of 60%, an escalation rate of 5%, and a discount rate of 10%. A more complete analysis of decommissioning costs can be found in Appendix B of NUREG-0480.[6]

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* Available for inspection and copying for a fee in the NRC Public Document Room, 1717 H Street, N.W. Washington, D.C. 20555.
** Available from NRC/GPO Sales Program, Washington, D.C. 20555, and the National Technical Information Service, Springfield, VA 22161.
*** Available from NTIS only.

10. BENEFIT-COST SUMMARY

10.1 RÉSUMÉ

There have been minor changes in the benefit-cost analysis of station operation since the issuance of the FES-CP in March 1973. The most significant changes are that the staff has revised the economic cost estimates upwards to reflect the rapid escalation seen during the last few years and has included among the benefits of station operation the fuel oil savings that will be made possible by having additional non-oil-fired, base-load capacity available in the California Power Pool. There have been essentially no significant changes in the staff's assessment of the environmental costs of operating SONGS 2 & 3; however, a broadening of the review process has occurred and is reflected in Table 10.1.

10.2 BENEFITS

The primary benefits of station operation will be the 9.3 to 13.0 billion kWhr of electricity produced by the two additional units each year (assuming a range of capacity factors of 50 to 70%), the increase in the reliability of electric service resulting from the addition of 2114 MWe of generating capacity, and an estimated regional decrease in the consumption of fuel oil of 13.2 million to 18.5 million barrels of oil per year (again assuming a range of capacity factors of 50 to 70%).

The staff also notes that operation of SONGS 2 & 3 will result in the generation of local revenues through property taxes and state sales and use taxes (annual property taxes will be approximately $13 million while state sales and use taxes resulting from station operation are estimated to be $3 million per year) and will increase local employment (over 300 new jobs will be directly created, with the average income of station workers being approximately $30,000 per year in 1980 dollars). However, these considerations are not included in the staff's benefit-cost analysis because from a societal viewpoint these local benefits are in actuality transfer payments from those using the electricity generated by the station to the recipients of the tax and employment benefits.

10.3 ECONOMIC COSTS

Since the issuance of the FES-CP the fuel, operating, and maintenance costs of nuclear plant operation have escalated more rapidly than anticipated by the staff in 1973. Based on more recent information, the staff now estimates the 1983 costs of station operation to be as follows: fuel costs — $120 million per year; operating and maintenance costs — $45 million per year; and decommissioning costs — $2.7 million per year.

10.4 ENVIRONMENTAL COSTS

Since the issuance of the FES-CP the applicants have accumulated additional environmental data and have made modifications in the station design. The staff, on making a reassessment of the environmental costs of station operation based on this new information, has found that the conclusions reached in the FES-CP are still valid. Table 10.1 summarizes the staff's assessment of the environmental impacts of station operation.

10.5 SOCIAL COSTS

The restriction in public use of 1.4 km (0.85 mile) of the San Onofre Beach is a significant cost of operation of the station. The number of personnel needed to operate SONGS 2 & 3 is a small fraction of the expected population growth in the communities near the station. As a result, the extra cost of providing public services to station personnel who relocate in the area is not likely to be discernible in these communities.

Table 10.1. Benefit-cost summary for the operation of SONGS 2 & 3[a]

Primary impact and population or resource affected	Unit of measure	Magnitude of impact
DIRECT BENEFITS		
ENERGY (50–70% capacity factor)	kWhr/yr X 10^6	9,300–13,000
CAPACITY	kW X 10^3	2,114
REDUCED FUEL OIL CONSUMPTION (50–70% capacity factor)	bbl/yr X 10^6	13.2–18.5
ECONOMIC COSTS		
OPERATING (1980 dollars, 60% capacity factor)		
Fuel	$/year	120,000,000
Operation and maintenance	$/year	45,000,000
DECOMMISSIONING (annualized value)	$/year	1,100,000
ENVIRONMENTAL COSTS		
IMPACT ON LAND		
Land use		Insignificant
Terrestrial ecology		Negligible
IMPACT ON WATER		
Fresh water consumption	gal/day	1,066,000
Salt water consumption		Insignificant
Heat discharge to natural water body		
Aquatic biota		Insignificant
Migratory fish		Insignificant
Chemical discharge to natural water body		
People		Not discernible
Aquatic biota		Not discernible
Water quality		Not discernible
Radionuclide contamination of natural surface water body		
All except tritium	Ci/year/unit	1.1
Tritium	Ci/year/unit	300
Chemical contamination of groundwater		
People		Not discernible
Plants		Not discernible
Radionuclide contamination of groundwater		
People		Not discernible
Plants and animals		Not discernible
Effects on natural water body of condenser cooling system operation		
Primary producers and consumers		Small
Fisheries		Small
Natural water drainage		
Flood control		No damage
Erosion control		Insignificant
IMPACT ON AIR		
Chemical discharge to ambient air		
Air quality, chemical		Negligible
Air quality, odor		Negligible
Radionuclides discharged to ambient air		
Noble gases	Ci/year/unit	8,800
Radioiodines	Ci/year/unit	0.195
Carbon-14	Ci/year/unit	8
Argon-41	Ci/year/unit	25
Tritium	Ci/year/unit	1,100
Particulates	Ci/year/unit	0.34
Fogging and icing		None
TOTAL BODY DOSES TO U.S. POPULATION		
General public, unrestricted area	Man-rem/year	442
SOCIETAL COSTS		
OPERATIONAL FUEL DISPOSITION		
Fuel transport (new)	Trucks per year	11
Fuel storage		In-building storage
Waste products (spent fuel)	Trucks per year	200
PLANT LABOR FORCE		Insignificant

[a]See Appendix C for calculations and explanations of table entries.

(To convert gal to liters, multiply by 3.7.)

10.6 ENVIRONMENTAL COSTS OF THE URANIUM FUEL CYCLE AND TRANSPORTATION

The staff has evaluated the environmental impacts of the uranium fuel cycle as presented in Table 5.8 and has found these impacts to be sufficiently small so that when superimposed upon the other environmental impacts assessed against the operation of the station, they do not alter the overall benefit-cost balance.

10.7 SUMMARY OF BENEFIT-COST

As the result of this second review of potential environmental, economic, and social impacts, the staff has been able to forecast more accurately the effects of station operation. The higher economic costs identified by the staff would not alter the staff's previous conclusion as to the overall balancing of the benefits of the station versus the environmental costs, whereas the benefit from the reduction in the regional consumption of fuel oil is felt to add significantly to the total benefits of station operation. Additional environmental costs have been identified as: (1) removal of approximately 1.4 km (0.85 mile) of beach from unrestricted public use, (2) possible destruction of at least a portion of the San Onofre Kelp Bed during the summer months by the heated water discharge, (3) occupation of about 7.2 ha (17.8 acres) of land by new towers, access roads, and switchyards associated with new transmission facilities, (4) environmental effects of the uranium fuel cycle as enumerated in Table 5.8, and (5) environmental impacts of transportation of fuel and waste to and from nuclear power plants as indicated in Table 5.7. Consideration of these additional costs together with those identified in the FES-CP does not alter the position taken in the FES-CP that the environmental and social costs are acceptable and that these costs are outweighed by the primary benefits of operating SONGS 2 & 3.

11. DISCUSSION OF COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL STATEMENT

Pursuant to 10 CFR Part 51, the Draft Environmental Statment and a supplement to the Draft Environmental Statement related to the operation of the San Onofre Nuclear Generating Station, Units 1 and 2, were transmitted, with a request for comments, to:

Department of Agriculture

Department of Army (Corps of Engineers)

Department of Commerce

Department of Energy

Department of the Interior

Department of Health, Education, and Welfare

Department of Housing and Urban Development

Department of Transportation

Environmental Protection Agency

Federal Energy Regulatory Commission

Advisory Council on Historic Preservation

California Department of Health (Water Pollution Control Commission, Air Pollution Control Commission, Occupational Health Office)

California Department of Natural Resources

California Department of Parks and Recreation

In addition, the NRC requested comments on the Draft Environmental Statement and its supplement from interested persons by a notice published in the Federal Register on December 6, 1978 (43 FR 25183) and January 13, 1981 (46 FR 7435), respectively. In response to the request referred to above, comments were received from:

Draft Environmental Statement

U.S. Department of Agriculture, Science and Education Administration (DASEA)
U.S. Department of Agriculture, Economics, Statistics and Cooperative Services (DAESC)
U.S. Department of Agriculture, Soil Conservation Service (DASCS)
Department of Housing and Urban Development (HUD)
Department of the Army, Corps of Engineers (COE)
Federal Energy Regulatory Commission (FERC)
U.S. Department of the Interior (DOI)
Rourke and Woodruff Law Offices (RWL)
U.S. Department of Commerce (DOC)
Department of Health, Education, and Welfare (HEW)
Southern California Edison Company (SCE)
U.S. Environmental Protection Agency (EPA)
Mr. Marvin I. Lewis (MIL)
Richard J. Wharton (RJW)

Supplement to the Draft Environmental Statement

U.S. Dearptment of Agriculture, Economics, Statistics and Cooperative Services (DAESC)
Federal Energy Regulatory Commission (FERC)
U.S. Department of the Interior (DOI)
U.S. Environmental Protection Agency (EPA)
Union of Concerned Scientists (UCS)
Richard J. Wharton (RJW)
Southern California Edison Company (SCE)
Frank H. Grundel (FHG)
San Diego Association of Governments (SAG)
U.S. Department of Agriculture, Soil Conservation Service (DASCS)

The comments are reproduced in this statement as Appendix A. The staff's consideration of the comments received and its disposition of the issues involved are reflected in part by changes in the text in the pertinent sections of this Final Environmental Statement and in part by the discussion in Section 11. The comments are categorized by subject and are referenced by the use of the abbreviations indicated above. The pages in Appendix A on which copies of the respective comments appear are indicated by each subject title relating to the comment, and in the index to Appendix A.

11.1 EROSION CONTROL (DASCS, A-4)

The applicant's erosion control plans are briefly discussed and referenced in Sections 6.2.2 and 6.3.2. In addition, the treatment of disturbed areas is addressed in the FES-CP. Such discussions are beyond the scope of the OL review.

11.2 LOSS OF PRIME LANDS (DASCS, A-4)

The discussion of prime lands lost to access roads and transmission towers, which is presented in Appendix E of the DES, is based on available information as a result of staff discussions with Mr. Jack Smith and Mr. Ted Thee of the Soil Conservation Service (SCS) Escondido Field Station and Mr. Jon Christianson of the SCS Tustin Field Office.

11.3 RECREATION RESOURCES (DOI, A-5; RJW, A-48)

The original plan to allow recreational use in the beach area immediately adjacent to the nuclear plant was altered in the course of hearings before the ASLB and ASLAB based on safety considerations. The staff reasserts its judgment that, while significant, the impact of beach closure is not sufficient to warrant denying the applicant an Operating License for SONGS 2 & 3. While the 1.4 km (0.85 mile) of beach to be closed must be considered a valuable recreational resource, there are approximately 5.6 km (3.5 miles) of State Beach immediately south of this area and almost 1.1 km (0.7 miles) immediately north which remain open to the public. Of those three parcels of beach, the one to be closed gets substantially less use than the other two and is directly adjacent to the SONGS complex, where the natural aesthetics of the area have been altered by plant development. Finally, while the 30 years of beach closure is clearly a long time, it does not represent an "irreversible and irretrievable commitment of resources" as the intervenors contend. For these reasons, it is the judgment of the staff that the closure of this stretch of beach, while significant, is not sufficiently adverse to warrant forbidding plant operations.

11.4 RADIOLOGICAL IMPACTS (HEW, A-10; SCS, A-30; EPA, A-40/A-42; MIL, A-45; RJW, A-50)

The NRC staff agrees it is appropriate to note that dose commitments to any individual will also meet EPA regulation 40 CFR 190 which requires that such doses will not exceed 25 mrem/year to any individual.

The recent AIF study* referred to in this comment was an effort to provide the potential impact of lowering the exposure limit to 500 millirems per year. The data were developed to fit the model that the AIF developed to evaluate the impact of the exposure limit reduction. The exposure data were meant to portray the type of exposure situations which occur at PWR's but are not likely to occur every year at each plant. (See Section 5.5.1.4 for staff consideration of occupational radiation exposures.)

Table 5.8 is based on NRC Table S-3, from 10 CFR Part 51, and is a generic discussion of impacts for the balance of the uranium fuel cycle. The staff is bound by the Commission standard as shown in Table 5.8. A discussion of alternative handling of HLW or TRU wastes is therefore inappropriate for considerations of licensing SONGS 1 & 2.

*"A Preliminary Assessment of the Potential Impacts on Operating Nuclear Power Plants at a 500 millirem per Year Occupational Exposure Limit," J. Vance, C. Weaver, E. Lepper, AIF, April 1978 (unpublished).

The staff has made its own independent and reasonably conservative estimates of potential doses to maximum individuals as a result of the operation of SONGS 2 & 3. Considering the uncertainties involved in such calculations, the staff finds a factor of 3 difference to be in very good agreement. Therefore, the staff rejects the request that Table 5.4 of the DES be revised in order to be consistent with applicant's estimated doses.

The staff calculation was for sport fish taken in the mixing zone, not 0-10 miles from the outfall, and is an independent and a reasonably conservative estimate of doses to a maximum individual. It is true that doses would be much less at greater distances from the outfall. However, the staff rejects the suggestion that Tables 5.6 (and 5.2 and 5.3) are in need of revision in order to be consistent with the applicant's estimates, particularly when both sets of estimates are orders of magnitude below the Appendix I design objective doses.

The staff agrees that the DES contains relatively little information regarding beach use at the SONGS site. Detailed discussion is presented in the Applicant's ER (e.g., pp. 2.1-4 to 2.1-7, and 5.2-1 through 5.2-54). In addition, more information regarding the staff conclusions and assumptions relating to doses to transient populations at the beach is presented in response to EPA comments.

The dose to individual users of the beach was not calculated for the following reasons:

1. The prevailing wind direction generally carries radioactive effluents away from the beach, thereby lowering potential exposures.

2. The beach is part of the exclusion area of the plant site, and public use (e.g., sunbathing and picnicking) is not permitted (e.g., see p. 2.105 of the applicant's ER).

3. The walkway connecting the south and north beaches is at the bottom of a 28-ft seawall which effectively shields passerbys from any direct radiation from the plant.

4. Although the dose rates at the site boundaries are expected to be low, annual doses to individuals would be even lower due to limited exposure times in transit between beaches.

Doses to individuals at the visitor center (0.1 mi E) were calculated, but occupancy factors result in much lower annual doses than calculated from permanent residents assumed living year-around at the WNW site boundary (0.36 mi) reported in the DES. As noted in Section 5.5.1.4, direct radiation (other than from the gaseous plume) from SONGS 2 & 3 is expected to be very low at the beach area. When coupled with limited exposure periods for transients, and shielding from the 28-ft-high seawall, the potential annual doses would be insignificant.

Population doses included transient populations by sector within 10 miles of the site. Transient populations were added to the projected resident populations for the year 2000 by assuming each transient spent one full day (24 hours) visiting during each year.

10 CFR Part 20 (10 CFR 20.105a) has been modified to include the provisions of 40 CFR Part 190. Also, the SONGS 2 & 3 technical specifications will require a demonstration to show compliance with 40 CFR Part 190 considering the operation of three reactors at the SONGS site.

Section 5.5.3 of the FES has been modified to include the long-term environmental effects associated with carbon-14, krypton-85, and tritium releases of the fuel cycle excluding the reactor releases. These modifications were added to the earlier discussion which focused largely on the radon-222 impacts.

Staff estimates of the longer term effects of carbon-14, tritium, krypton-38, and releases of the reactor contribute less than 30% of the total fuel cycle impacts presented in Section 5.5.3 of the FES. Health effects reported in the FES on a "per reactor year" basis can be multiplied by the reactor operating time (i.e., 30 years) to obtain the total or integrated estimate.

Nevertheless, the staff is in the process of modifying its calculation methodology to automatically consider the radiological impacts of effluent releases of the entire nuclear fuel cycle.

It is important to note that the FES results conservatively include the impacts of both uranium and plutonium recycle even though such operations are not currently permitted. Thus, the FES results are conservative for any recycle option, especially the "throw-away" cycle, the option currently allowed.

The NRC staff has reevaluated the proposed preoperational radiological environmental monitoring program for SONGS 2 and 3. The proposed program is based on the existing SONGS 1 operational program. That program will be revised in the near future to meet the Appendix I (10 CFR Part 50) requirements now being incorporated into the Environmental Technical Specifications for Unit 1, thereby updating the preoperational program for Units 2 and 3.

Response to specific EPA comments are as follows:

1. Current NRC criteria require collection and measurement of I-131 only, since it is the radioiodine which accounts for essentially all of the radioiodine environmental dose commitment (nearly all of which is through food pathways). The reason the applicant specified a maximum of 8 days was to be certain that the samples can be collected, transported to a laboratory (often at a considerable distance), and analyzed "within 8 days" under difficult circumstances (e.g., storms, trucking strikes, etc.). In most cases the elapsed time will be much less.

2. The intent of the air sampling program is to monitor continuously at all sites. However, experience has shown that occasionally air sampling equipment fails during a 7-day period, and the samples are of no value. The same experience indicates the applicant can almost always achieve 75-80% reliability.

   That is the only reason for mention of "a minimum of 10 samples per quarter" by the applicant.

3. The staff agrees that it might be desirable to have a TLD station along the walkway below the seawall. However, as noted in response to the previous comment, the walkway is 28 ft below the top of the seawall and there is no line-of-sight between the beach and any radiation sources on the site. The beach in front of the site is part of the exclusion area (i.e., no sunbathing, picnicking, etc. is permitted). Therefore, there is no possibility of any member of the public receiving a measurable radiation dose since individual exposure times would be very small.

4. The NRC has included U.S. population dose commitment estimates in Section 5.5 for a few years (see, for example, Table 5.5). In addition, the staff has been including discussion of the Rn-222 question since mid-1978 (see Section 5.5.3).

Table 5-8 says Rn-222 releases are "Presently under reconsideration by the Commission," and in footnote a, "These issues which are not addressed at by this table may be subject to litigation in individual licensing proceedings." The results of generic testimony by the staff at other hearings is summarized briefly on pp. 5-36 to 5-40. Contrary to Mr. Lewis' assertion, NEPA does not require quantification of the impacts of Rn-222 releases over the "full period of toxicity" (presumably he is referring to Th-230, the parent of Rn-222). The staff feels the conservative evaluation in Section 5.5.3 probably accounts for the releases and potential doses resulting from Rn-222 releases over periods of many millenia. In addition, the FES will provide a revised Section 5.5.3 which also includes potential impacts of C-14 over periods up to 1,000 years into the future.

The staff agrees that stabilization of surface tailings piles cannot be assured "forever." However, numerous options, including deep burial in worked-out open pit mines or underground mines, are being voluntarily used by some applicants and may be used increasingly in the future by others. It should be noted that if such tailings are exposed by acts of God (e.g., glaciation), the potential long-term impacts could be lower than for the natural uranium ore since milling will remove over 90% of the U-235 (the parent of Th-230).

Environmental releases from "nuclear waste materials, including the interim storage of spent fuel, on site" are so small relative to normal operational releases as to be inconsequential. Such releases and potential impacts have been estimated* and do not significantly change the estimated impacts presented in the DES for normal operations. In that sense, the releases have been included in the DES assessment of environmental impacts.

11.5 METEOROLOGY (SCE, A-16)

The onshore tracer test results indicated that measured ground-level centerline one-hour average concentrations were less than concentrations estimated from the usual staff calculations. But a reduction for annual average values would not be the same.

*Draft Generic Environmental Impact Statement on "Handling and Storage of Spent Light Water Power Reactor Fuel," NUREG-0404, U.S. Nuclear Regulatory Commission (March 1978).

Over a long period of time, such as a year, the wind direction within a sector should be randomly distributed, and thus the path of the plume should be randomly distributed. The time that any part of the plume is over a point within the sector contributes to the annual average at that point. This time integration and random path of plume have the net effect of uniformly distributing an effluent horizontally within a sector. Any enhanced dispersion due to additional horizontal plume spreading would not reduce the annual average concentration. In the staff calculations it was assumed that the effluent was uniformly distributed horizontally over the sector.

The ground-level annual average concentration would be dependent on the wind frequency and on the vertical distribution of the effluent within the plume. No direct measurements of vertical plume distributions were made during these onshore tests or the tests referenced in NUS-1927. Without a more definitive description of the vertical distribution of the plume, it has been the staff position not to adjust annual average dispersion estimates.

11.6 THERMAL ANALYSIS (SCE, A-20/A-21)

The air temperatures used by the staff in its thermal model are too high and, therefore, the staff's ambient temperature predictions are too high. However, nonlinear effects of the air temperature on the water temperature are negligible so that the staff's excess temperature predictions are correct despite the systematically high ambient air temperatures used in the mathematical model.

Higher near-shore predicted ambient water temperatures appear as a result of the depth-averaged format of the predictions. The near-shore region is shallow, resulting in near homogeneous vertical temperature structure. In deeper water, strong stratification is present so that the depth-averaged water temperatures are lower due to the presence of cool bottom water. The staff's actual ambient surface temperature predictions show no variation in the offshore direction. Ambient temperatures based on field measurement have been used in Section 5.4 of the FES.

A brief discussion of the applicant's error analysis is given in Section 5.3.1.1 of the FES.

Errors in the staff's mathematical model can be introduced in several ways. First consider the accuracy of the numerical method. The TEMPTWO algorithm is consistent and stable. The use of direct upwind differencing can produce numerical dispersion when the Courant Number is not equal to 1. To minimize this error, the staff used a time-step that produced a Courant No. of 1 near the diffusers. This essentially eliminated numerical dispersion error around the discharge areas. Far from the discharges, numerical dispersion exists; however, this makes the predictions less conservative. To correct for this, the staff could raise the predicted excess temperatures in the far field. The staff believes that inaccuracies due to numerical dispersion are slight and, therefore, corrections of such inaccuracies are unnecessary.

Errors could also have been introduced through the methods used to represent turbulent transport and surface heat transfer. In developing the model, an effort was made to incorporate formulations which are universal; that is, to create a model that requires no adjustment of coefficients on a site-specific basis. The TEMPTWO model has been applied to other plants and results have compared favorably with available data. Thermal predictions for the Peach Bottom Plant and the Anclote Plant, including comparison with field data, are shown in Figures 11.1 through 11.8. The Peach Bottom Plant is on an impoundment of a river in Pennsylvania and the Anclote Plant is located on the Gulf of Mexico. The success of the TEMPTWO model at two quite different sites indicates that the submodels for turbulent transport and surface heat transfer can confidently be applied to San Onofre.

The staff's model did not include plant-induced densimetric flows. The staff performed a scale analysis and determined this effect to be insignificant at the San Onofre site.

Individual jet mixing is not calculated within the staff's model. However, this effect was included based on the applicant's near-field results.

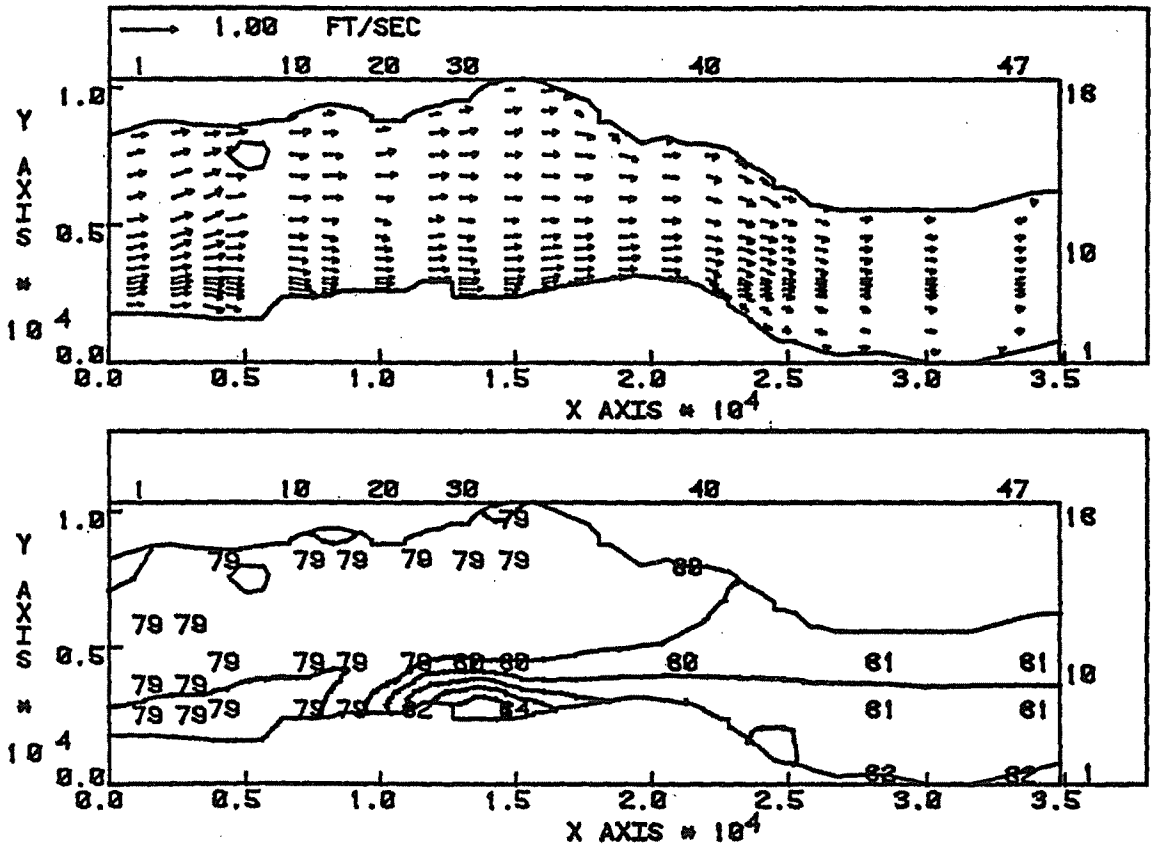

Figure 11.1 Computer simulation results for the two-dimensional depth-averaged (with self-similar vertical variation) flow conditions and temperature conditions (isotherms with 1°F gradation (1/1.8°C) in the Conowingo Pond Reservoir in the vicinity of the Peach Bottom Atomic Power Station at 9 a.m. on July 18, 1974, during reservoir conditions: downstream low flow after slack water.

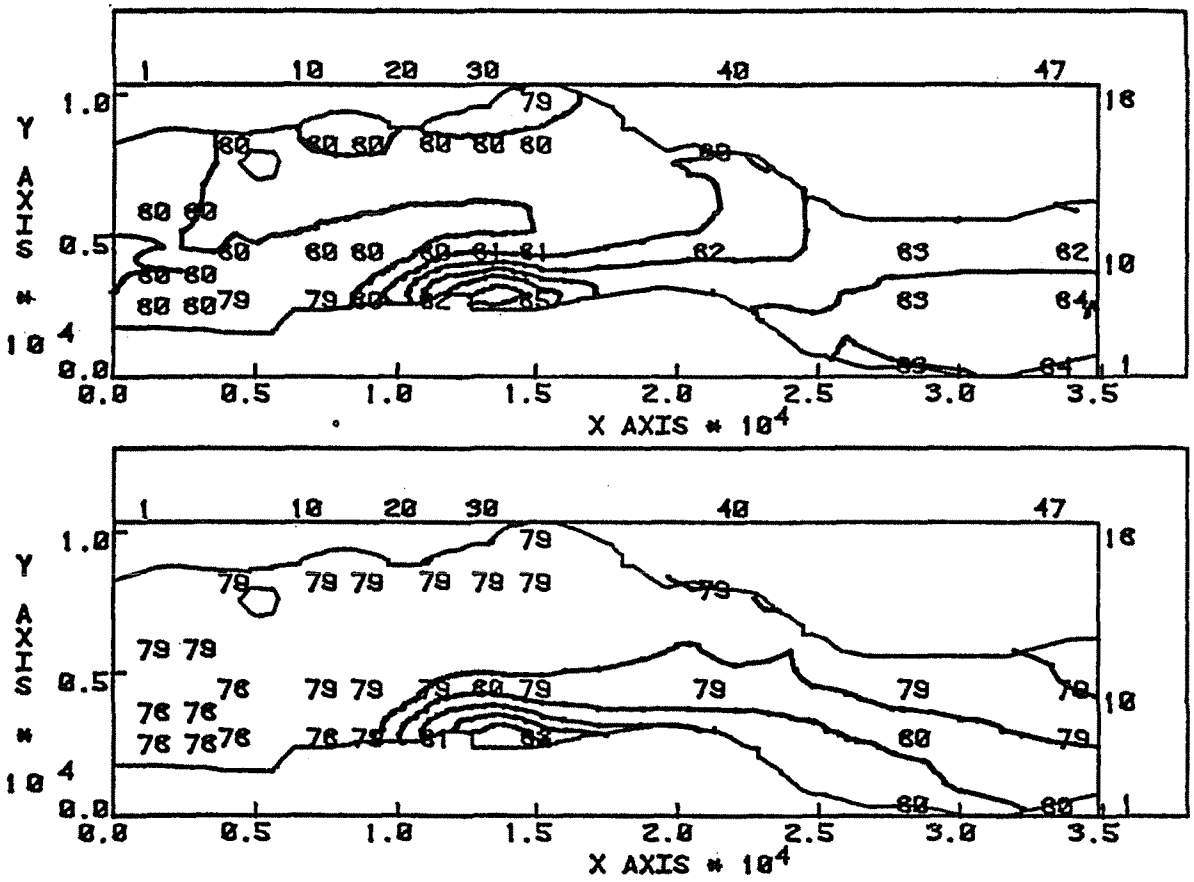

Figure 11.2 Computer simulation results for the surface and bottom temperature conditions (isotherms with 1°F gradation (1/1.8°C) in the Conowingo Pond Reservoir in the vicinity of the Peach Bottom Atomic Power Station at 9 a.m. on July 18, 1974, during reservoir conditions: downstream low flow slack water.

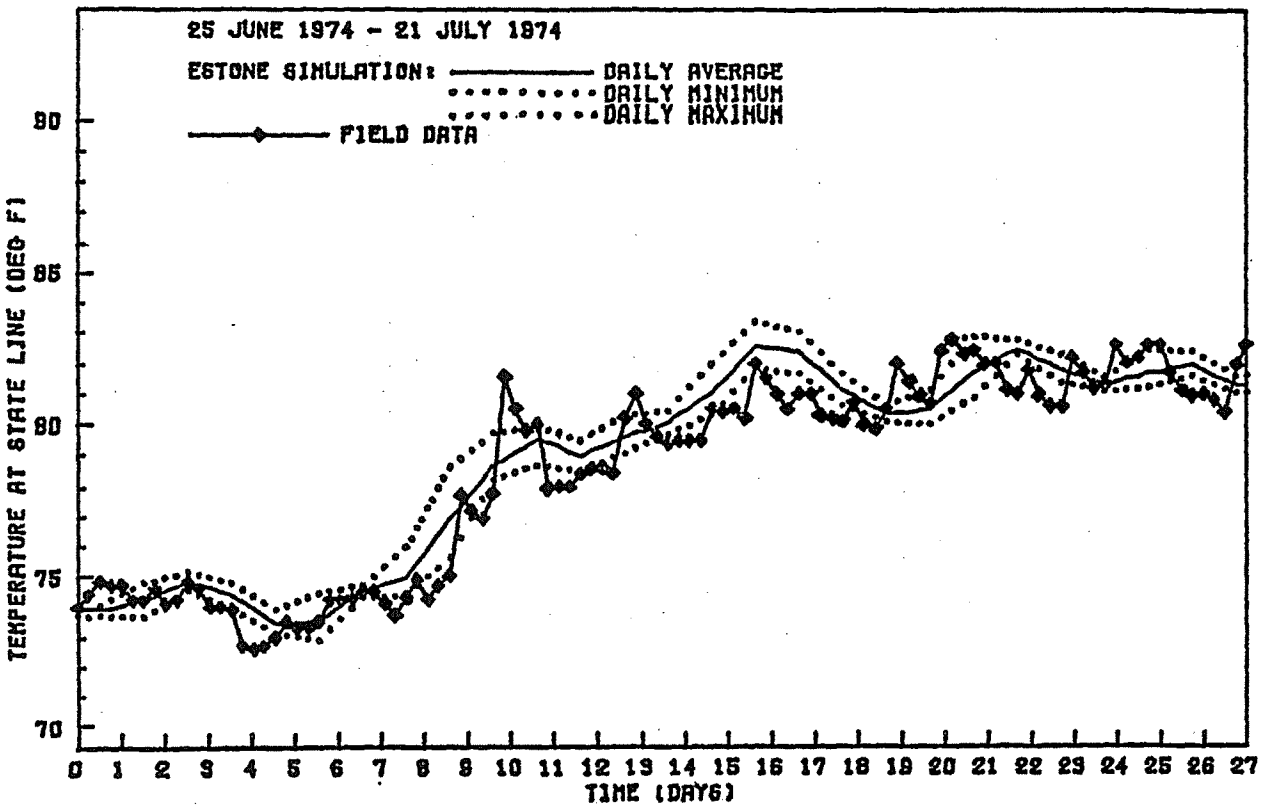

Figure 11.3 Estone simulation June 25, 1974 through July 21, 1974.

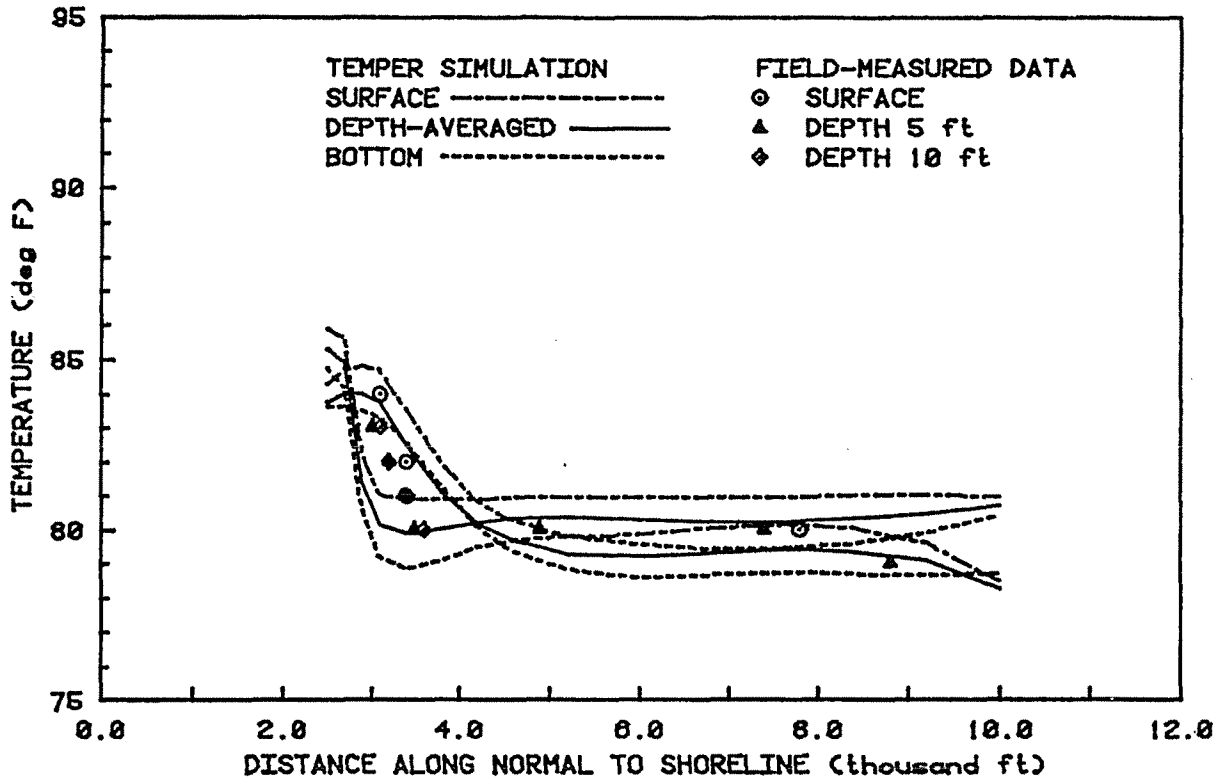

Figure 11.4 Comparison of the computer simulation results and the field-measured data for the temperature conditions along a transect at 1200 ft downstream from the discharge location of the Peach Bottom Atomic Power Station in the Conowingo Pond Reservoir from 8 a.m. to 1 p.m. on July 18, 1974.

(To convert ft to m, multiply by .3048.)

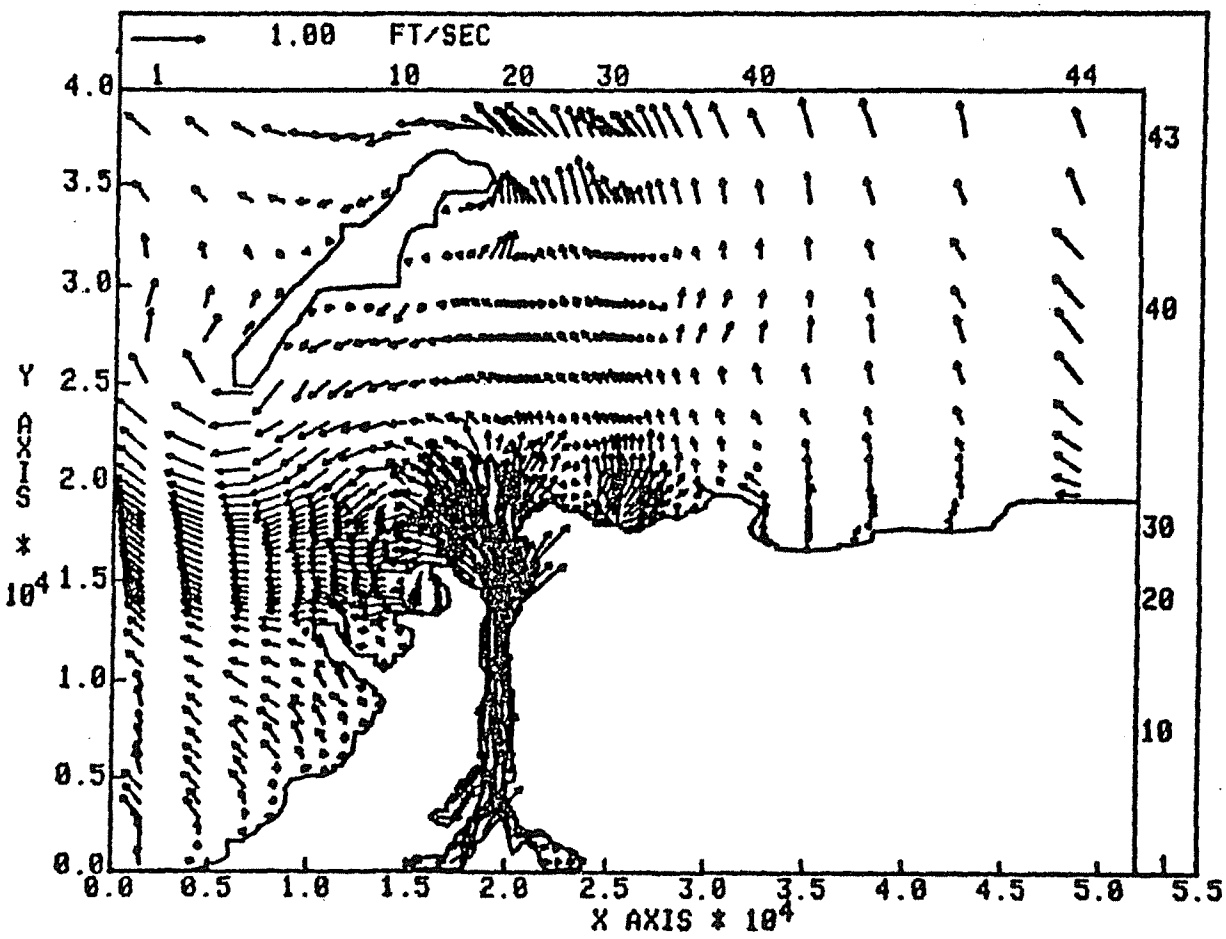

Figure 11.5 Computer simulation results for the two-dimensional depth-averaged flow velocity conditions in the Anclote Anchorage region for the actual Unit 1 operation of the Anclote Power Plant at 3 p.m. on June 25, 1975, during tidal stage: approximate maximum ebb.

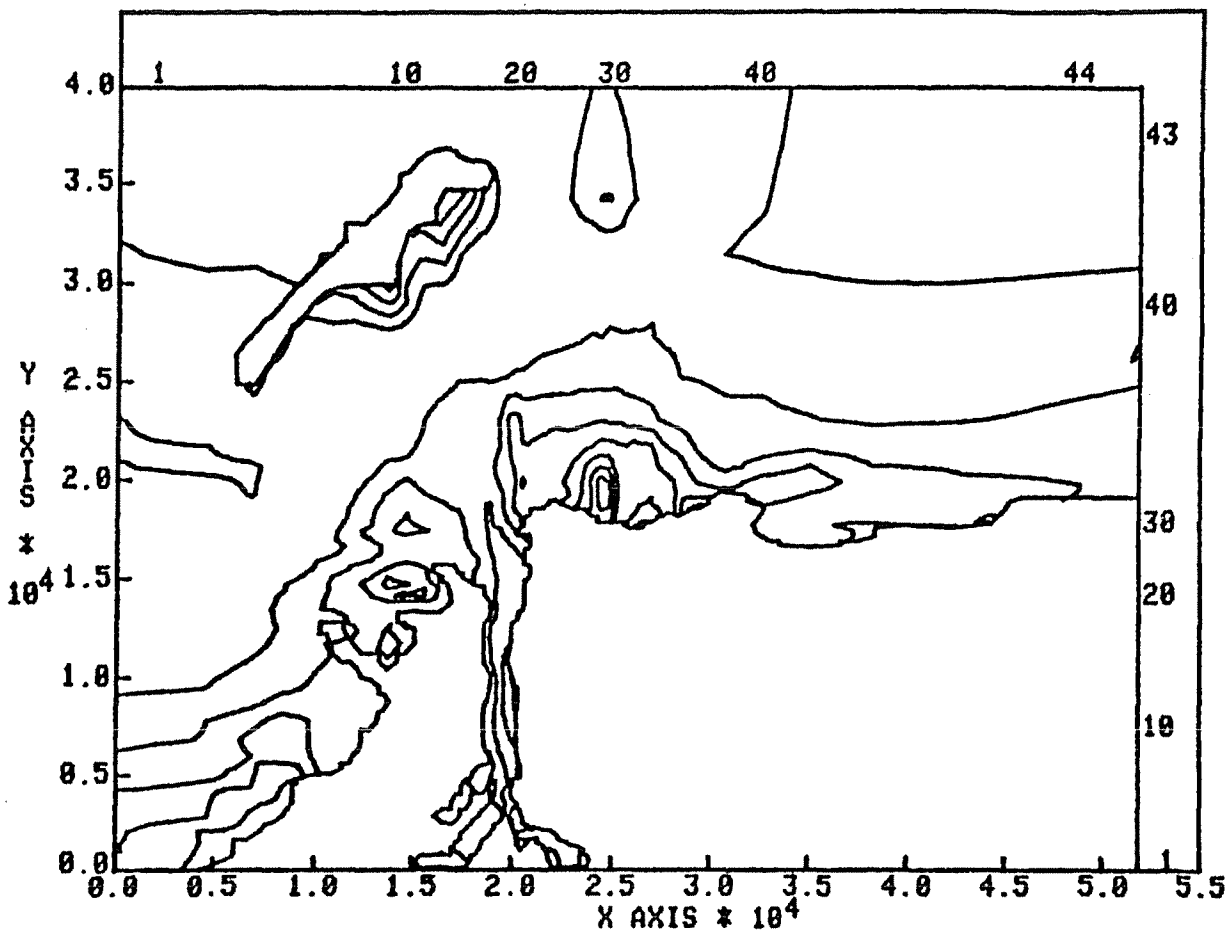

Figure 11.6 Computer simulation results for the two-dimensional depth-averaged water temperature conditions (isotherms with 1 F (1/1.8 C) gradation between minimum 84 F(28.9 C) and maximum 92 F(33.3 C)in the Anclote Anchorage region for the actual Unit 1 operational condition of the Anclote Power Plant at 3 p.m. on June 25, 1976, during tidal stage: approximate maximum ebb.

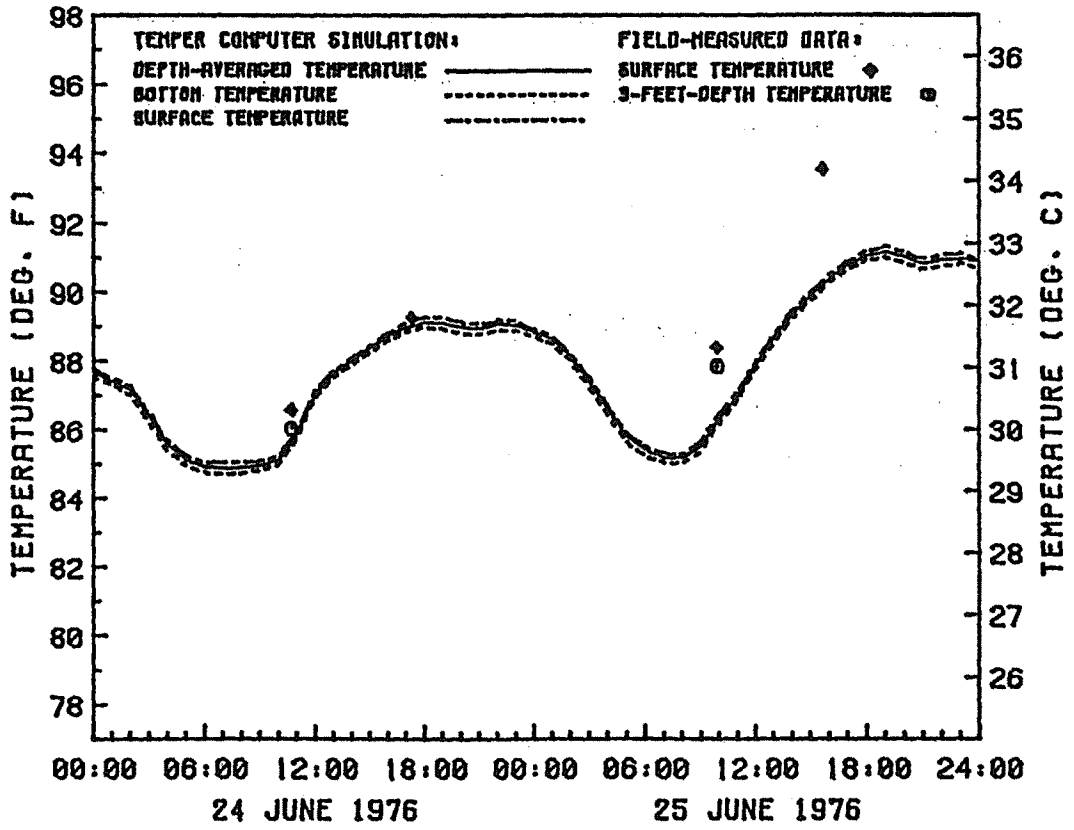

Figure 11.7 Comparison of the computer simulation results for the water temperature conditions (as continuous hourly variations) and the available field-measured water temperature data (intermittent) in the Anclote Anchorage region during the 2-day period June 24-25, 1976, at the field-sampling station 25.

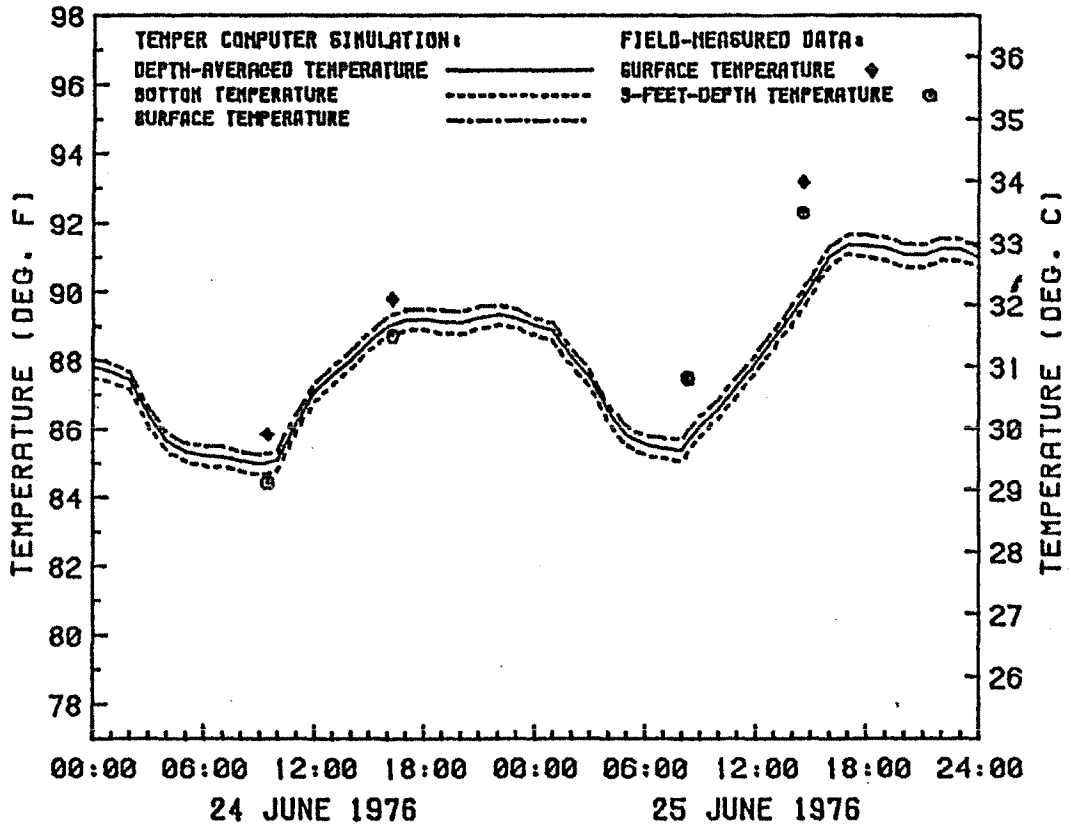

Figure 11.8 Comparison of the computer simulation results for the water temperature conditions (as continuous hourly variations) and the available field-measured water temperature data (intermittent) in the Anclote Anchorage region during the 2-day period June 24-25 1976, at the field-sampling station 1.

11.7 THERMAL EFFECTS (SCE, A-14, A-24/A-25)

It is true that the ambient temperature data supplied by the applicant (Attachment T) indicate the presence of lower ambient temperatures, at both the surface and the bottom, within the region of the San Onofre Kelp Bed than those predicted by the model. Typically, the discrepancy between the maximum values reported by the applicants and from the thermal model (for both surface and bottom) during the late summer is on the order of 4-5°C (7-9°F). However, the recently supplied values are for a period of record which spans only a few years (1975-1978). Thus, it is not possible to know if some of these data were collected during a period of time in which the waters are naturally warmer than long-term average. In evaluating the potential impacts of a long-lived facility such as SONGS (which will operate for up to 30 years), a worst-case evaluation is usually made to determine the effects which might occur under extreme conditions. Without knowledge of the relationship between the data supplied by the applicant and worst-case temperature conditions, these data cannot be relied upon for an assessment of the impacts on the kelp.

If the assumption is made that these data do include an interval in which there are temperatures which are warmer than usual (e.g., the warmest values reported in the last 15-20 years), then the conclusions of the applicant regarding the effects on kelp are probably correct. That is, the incremental temperature increase due to the operation of SONGS will not result in an adverse impact to the community, even under worse-case conditions.

The staff does not concur that the bottom water will necessarily remain unaffected.

The staff does not feel that the ambient temperature data available are complete enough for use in a worst-case analysis. Because such an analysis (based on the temperature data generated by the model) concluded that the impact to the benthic community will be insignificant (overall), it is clear that the effect under average conditions will likewise be insignificant. If the model does predict maximum temperatures which are unrealistically high, the conclusions based on such data provide additional assurances that the impacts will be negligible.

11.8 BIOLOGICAL RESOURCES (DOC, A-8/A-9; SCE, A-25/A-30; RJW, A-47)

The statement was not meant to imply that the only relationship between kelp beds and the commercial fishes is through the kelp detritus. Certainly, several of the commercially important species inhabit the beds (at least part of the time) for food-seeking activities and refuge. The paragraph was intended to portray, in brief, the ecological and commercial importance of kelp beds. Additional information on this subject is contained in the FES-CP.

Any revision to station design or operation for the express purpose of mitigating nonradiological impact to aquatic biota will be accomplished through procedures under the NPDES Permit Program administered by the California Water Quality Control Board. NRC is working closely with this Board and with other State resource agencies in the review of monitoring programs.

The cost-benefit analysis for the potential loss of biological resources due to the operation of SONGS 2 and 3 is addressed in the SONGS FES-CP, March 1973, Sections 13.2.4 and 13.4, and in Section 10 of this FES.

Technically, the statement is still correct. Although man-induced thermal effects may not be documented, their occurrence is likely in some areas.

It is true that the association of decreased kelp "health" with turbidity was made in conjunction with observations on the effects of sewage outfalls. However, the effect of turbidity on light attenuation is not a function of the source or type of the turbidity, except that a certain type of turbidity may not produce the same light reduction, at a given concentration, as another type of turbidity (e.g., as in the case of fine sand particles vs. suspended clay). Reference 15 includes a statement on the reduction of kelp "health" as a function of reduced available light for photosynthesis. It is reasonable to assume, therefore, that kelp "health" can be affected by many different types of turbidity.

It is true that nutrient depletion has been implicated in kelp canopy deterioration. It is also true that the exact mechanisms of kelp deterioration are not well known. Most studies have attributed cause-effect relationships between temperature and kelp demise, but the operating factors may well be complex, and may involve, for example, synergisms between several factors. To reflect this uncertainty, the text has been changed as per the suggested revision.

The study cited (number 13) gives one indication of the importance of kelp beds to fish communities. The relative importance of kelp for fish rearing, refuge, etc. may be disputed. However, for purposes of a worst-case analysis, it must be assumed that a more conservative interpretation is correct. It should be noted that the subject paragraph does not state that kelp beds are the most important fish habitat. Rather, it indicates that the community does have some unspecified importance.

The ecotypic variability of kelp temperature to tolerance is not well documented, though it may occur. Without definite knowledge, the more conservative values should be used in a worst-case analysis.

As stated earlier (see response to SCE, A-2), the ambient temperature data supplied by the applicants do not appear to be entirely adequate for an analysis.

Increased survace nutrient levels from outfall induced upwelling have not been adequately demonstrated, though the phenomenon may occur.

The discharge for SONGS will be more or less continuous (except during shutdowns and power reductions), although it is true that when the plume reaches the kelp bed it is not likely to impinge the bed for a long period of time. This is acknowledged in the text and is one major reason why the conclusion was reached that the effect on the kelp bed is not likely to be severe (p. 5-27, paragraph 5). To avoid ambiguity, the subject statement has been revised.

The reference to Sect. 5.3.1 as the basis for the 19°C figure has been deleted. It is, however, based on results of the staff's thermal model. If this temperature represents the extreme high end which occurs during an average year, then it may well represent a temperature which could occur over an extended period of time during a "warm year." Because the values from the model are conservative, the word "typical" has been deleted from that sentence.

The staff's thermal analysis (Sect. 5.3.1) does not support the conclusion that increases in bottom temperatures are unlikely. The statement remains valid, even if the turbid water is discontinuous and relatively low in suspended solids; i.e., the presence of any increased turbidity will add to the probability of detrimental effects occurring to the kelp bed.

The analysis of the effect of the operation of SONGS on the closest kelp bed (San Onofre) was based on the latest thermal-hydraulic predictions made by our staff. The staff agrees that if this assessment of temperature configurations proves to be inaccurate that the analysis of kelp bed effects would have to be reassessed.

The granting of a 316(a) exception for normal operation, if such is needed, will not affect the operating characteristics of the facility; thus, the pedicted impacts remain valid. If a 316(a) type process becomes required by the State which results in operational changes, the impacts of that altered operating mode will have to be assessed when such conditions are known.

11.9 WATER QUALITY (EPA, A-38/A-40)

Section 5.3.1.1 and Fig. 5.3 are based on the applicant's thermal analysis. Section 5.3.1.2 is a description of the staff's thermal analysis. This analysis includes all three units operating at 100% capacity and the ambient temperature is defined as the water temperature in the absence of all units. The possibility of recirculation among all units is an integral part of the staff's model. The results described in Section 5.3.1.2 address all aspects of the State thermal standards including excess temperatures at the surface of ocean substrates.

Additional information on the effects of the operation of the facility are found in the FES-CP, although in some cases the modification of operational characteristics since the CP stage has necessitated a reevaluation of the impacts. Such reanalyses are found in this document.

In the staff's opinion, the two documents (the FES-CP and FES-OL) provide "state-of-the-art" evaluations of how the acquatic ecosystem will be affected. In most cases, too little information is available to quantitatively predict the areal extent of an effect on a given species. For this reason, operational monitoring programs are required which are designed to detect significant changes which may occur so that mitigation can be instituted.

The terms "minimal," "acceptable," and "not significant" relate to a judgment made regarding the predicted impacts of the facility on the environment. A possible effect is termed insignificant if, for example, the impact is predicted to only occur locally in a nonunique, or widespread, population community of organisms, etc. When it is not possible to reach a firm conclusion regarding the significance of a projected impact (even under worst-case conditions), mitigation is either recommended immediately or an extensive monitoring program is stipulated.

The study report concerning use of the heat treatment process addresses a matter beyond the NRC's purview in accordance with the Federal Water Pollution Control Act Amendments of 1972. Thus, while the NRC must evaluate and consider the environmental impacts attributable to use of such heat treatment process, such consideration is limited to a determination of the impacts and their significance in terms of the cost-benefit analysis for this facility; any changes in the system or its use must be directed by the California Regional Water Quality Board and/or the Environmental Protection Agency. The applicant will provide the study report directly to those agencies, as well as to the NRC, when available.

For the foregoing reasons, we do not believe that the report itself is an integral part of the Draft Environmental Statement. Of course, as noted above, the NRC will consider the impacts attributable to the heat treatment process in the Final Environmental Statement as stated in Section 5.4.2.1. In this connection, the staff considers it to be no different than any other report of a study or analysis performed by a license applicant in support of its application. The staff is aware of no legal requirement which would give the report independent status such as EPA suggests, in the context of the NRC's licensing review. The status of this report in terms of the determination to be made under Section 316(a) of the FWPCA is a matter left to that agency charged with making that determination.

Sect. 5.4.2.2 concludes that significant impacts are unlikely, even under worst-case conditions. The effluent characteristics of SONGS must conform to the State standards prevailing at the time of the operation of the facility.

It is not the purpose of the staff analysis, as provided in the DES, to make rulings regarding statutory requirements, but rather to assess the impacts of proposed operation. In making this analysis it is not assumed that standards will be satisfied and, therefore, the environmental consequences of any violations resulting from the proposed plant operation is inherent in the staff's conclusions.

11.10 NEED FOR PLANT (MIL, A-45)

Table 2.2 of the FES relates to projected population growth within 16 km of the San Onofre site for the period 1976 to 2020.

Tables 8.3 and 8.4 are related to the electrical growth projected within the service areas of Southern California Edison Company and San Diego Gas and Electric Company for the periods 1976-1985. The combined annual growth rates for peak demand and energy for this period is 4.3 and 4.6%, respectively.

Population within 16 km of the site does not necessarily reflect electrical growth in the applicant's service areas.

11.11 SEISMOLOGY (EPA, A-40; MIL, A-45; RJW, A-49)

The staff's review and evaluation of the geological and seismological aspects of the San Onofre Nuclear Generating Station Units 2 and 3 is presented in the staff's Safety Evaluation Report, published December 1980. Included in the SER is a discussion of the potential for and nature of seismic activity at the site and its vicinity as well as of the design and construction measures taken by the applicants to prevent damage to the facility and its component parts. The staff considers that its assessment of the environmental impact of postulated accidents presented in Chapter 7 adequately accounts for the consequences of any accident caused by seismic activity. This chapter discusses the consequences of accidents regardless of cause.

Regarding the potential for affecting water quality and for offsite radiological contamination, to the extent such impacts are the result of airborne transportation of radionuclides, the consequences are included in the discussion in Chapter 7. The liquid pathway, because of the hydrological environment at the site, does not present a viable transport mechanism which could impact water quality or would otherwise result in offsite radiological consequences.

11.12 URANIUM PRICES (RJW, A-49)

The cost-benefit analysis in the DES is based on 1976 data, at which time the price of uranium was $18.10/kg ($40/lb) U_3O_8. Presuming SCE used the then existing U_3O_8 price in their cost-benefit analysis for SONGS 2 and 3, they would be using a price that reflected the rapid increase in prices in the 1973-1976 period. To extrapolate future prices on the basis of the 1973-1976 price increase would be erroneous in that uranium prices decreased 9% in real terms during 1977. Thus, it is inappropriate to consider a price escalation which is not even valid for a 5-year period of the uranium market for a cost-benefit analysis which covers the 30-year lifetime of a reactor. It would be just as appropriate (or inappropriate) to extrapolate the recent 9% decrease in uranium prices for use in the analysis. Many factors must be carefully investigated to estimate future uranium prices, and simplistic methods cannot be justified.

Long-term contracts are not generally tied to market prices at time of delivery or a 7% per year escalation, whichever is greater, based on current data. In fact, most long-term uranium requirements are not under contract, so it is inappropriate to make any generalization about the nature and terms of those contracts. Even if future contracts were based on the greater of market price or 7%/year escalation, it does not follow that fuel costs will increase to prohibitively high levels. If future prices were related to market prices and market prices do not increase substantially (it has not been established that they will), then the uranium cost component of fuel costs would not increase very much. And, if prices increase at 7%/year, they would probably just be keeping pace with inflation and thus not be relevant to a constant dollar analysis.

The cost of purchasing uranium is only one component of nuclear fuel costs, the other being, for example, separative work, UF_6 conversion, and fabrication. Thus, overall nuclear fuel costs would not escalate in proportion to the increase in uranium prices.

11.13 ACCIDENTS (HEW, A-10; MIL, A-45; RJW, A-49)

These comments were addressed to the Accident Section (Section 7) published in the Draft Environment Statement (DES), dated November 1978. In January 1981, the staff revised Section 7 and issued it for comment as a supplement to the DES. The January 1981 Supplement is included as Section 7 of this Final Environmental Statement (FES). The staff believes FES Section 7 is responsive to those accident comments previously addressed to the DES.

(FHA, A-53)

Part 50.13 of 10 CFR does not require a licensee "to provide for design features or other measures for the specific purpose of protection against the effects of (a) attacks...by an enemy of the United States...or (b) use or deployment of weapons incident to U.S. defense activities." The staff recognizes that acts of war would likely produce severe environmental impacts wherever they might take place.

(RJW, A-56, A-59)

The supplement is based on site-specific data, as described in Section 7.1.4.2. While not specifically stated in the supplement, U.S. average, year 2000 estimated, population data were used beyond 560 km (350 miles). The site-specific meteorological data used included lid heights to account for vertical mixing characteristics.

(RJW, A-58)

Both the staff and SAI used very similar methodologies in their analysis, and they both represent improvements over the Reactor Safety Study. There are some differences, however, in assumptions and data used in each study that lead to the variabilities or uncertainties that are inherent in such calculations. These differences appear in:

- accident release characteristics - probabilities and magnitudes;
- emergency response assumptions;
- meteorological data; and
- demographic data.

Specific consequence values that commentors quote from the SAI-OES report cannot be directly compared with those reported in the staff's draft supplement since the former are not associated with specified probability levels while the latter are. The staff has not made a

detailed comparison of the results of the two reports but judges that they are in agreement within the estimated bounds of uncertainties and assumptions associated with the current state of probabilistic risk assessments.

(RJW, A-58, A-59, A-60)

The studies of the San Onofre site relative to earthquake potential is extensively discussed in Section 2.5 of the Safety Evaluation Report (NUREG-0712, December 1980). The staff's position is that the safe shutdown earthquake is correctly determined for this site. A discussion of natural phenomena as initiators of accidents has been added to Section 7.1.4.2.

(RJW, A-58, A-59)

If Unit 1 had a meltdown, the staff agrees that it would impact the operation of Units 2 and 3. However, the ability to shut down both units following an accident at Unit 1 would not be impaired.

(RJW, A-59)

The reactor vessel was installed with its reference mark 180 degrees from the desired location. As discussed in the Safety Evaluation Report (Section 5.3.4), the flow skirt, which is not symmetrical, was installed in the direction to agree with the vessel's orientation and procedures for fuel handling, which reference the vessel orientation, were modified. No rewiring was necessary as a result of the error.

(RJW, A-59)

The dewatering well cavities were discussed in the Safety Evaluation Report in Section 2.5. It was determined that there would be no impact on seismic Category I structures.

(RJW, A-59)

The beach visitors were specifically addressed (e.g., Sections 7.1.3.2 and 7.1.4.6 and Table 7.1.4-5).

(RJW, A-60)

The staff has concluded that acts of sabotage, as initiating events, do not contribute significantly to the probability of accidents due to the Commission's safeguards requirements. Section 7.1.4.2 has been modified to discuss this point.

(RJW, A-60)

While it is true that one-half of the population of the State of California lies within 160 km (100 miles) of the San Onofre site, the staff does not consider this to be a relevant observation. The staff's focus on demographic data for site suitability and site comparison purposes has been traditionally within 80 km (50 miles) of plant sites.

The discussion in Section 7.1.4.3 indicates that most of the accident impacts occur within 50 miles of the site. The staff has compared the total population within 50 miles of the site with the total population within 80 km (50 miles) of other nuclear plant sites and has found that San Onofre does not have a uniquely large population. Moreover, it is important to note that, as stated in Section 7.1.4.2, the site-specific population projected to the year 2000 both in magnitude and distribution has been used in the calculations through all regions to 160 km (100 miles) and beyond. Those fractions of the consequences which take place up to 16, 48, 80, 160 km (10, 30, 50, 100 miles) or beyond, are accounted for in the results presented. The site does not have a uniquely large population contained within any of the above mentioned distances.

(RJW, A-60)

The San Onofre Units 2 and 3 at 3390 MWt are typical of the upcoming generation of reactors. The power level of each plant was specifically used in determining the inventory of the core for the risk calculations. Salem 1 is presently operating at a comparable power level of 3338 MWt.

(RJW, A-60)

The production of farm and dairy products is specifically considered in the calculation. Differences among the states (and countries) potentially impacted are taken into account.

(RJW, A-60)

The impacts within the Mexican borders were included in the evaluation. The method of determination of data for Mexican agricultural products is discussed in Section 7.1.4.2. Although not explicitly stated, the population within the Mexican border was included on a site-specific basis out to 560 km (350 miles) from San Onofre.

(RJW, A-61)

The staff recognizes the potential efficacy of drugs in mitigating consequences of offsite exposures. However, in the case of potassium salts of stable iodine, the staff does not require provision for distribution to the public.

(RJW, A-61)

Section 7.1.4.4 discusses that the condemning of foodstuffs was specifically considered and the interdiction of contaminated property "...until it is either free of contamination or can be economically decontaminated" was assumed.

(RJW, A-61)

The subject of filtered venting systems for the containment is being addressed in rulemaking, as discussed in NUREG-0660, 2.B.8. The whole subject of TMI-2-related improvements and the fact that no credit would be taken for them is discussed in the last paragraph of the section cited.

(RJW, A-61)

It is the staff's position that such a "worst case accident" is much too remote and speculative to require analysis under NEPA.

(UCS, A-63)

The staff believes that its treatment of a multiplicity of possible accident scenarios represents a reasonable and appropriate implementation of the guidance provided in the Commission's Statement of Interim Policy.

(UCS, A-63)

The probabilities of occurrence of releases in the nine categories are explicitly given in Table 7.3 and the probabilities of occurrence of specific levels of environmental consequences are given in Table 7.4. The staff judges that this is within the intent of the quoted part of the sentence and the additional directive in the Interim Policy which states: "The environmental consequences of releases whose probability of occurrence has been estimated shall also be discussed in probabilistic terms." See also the staff's answer to Joint Intervenors RJW, A-58.

(UCS, A-64)

The staff has presented a measure of individual risk in Figures 7.7 and 7.8. Table 7.4 and its associated figures and Table 7.5 provide group information. The discussion of relative susceptibility of various sub-groups of the population is given in Section 7.1.1.3. The staff judges that this conforms to the further directive that the discussion be "...in a manner that fairly reflects the current state of knowledge regarding such risks."

(EPA, A-66)

The Supplement is a replacement for Chapter 7 in the existing Draft Environmental Statement for the Operating License stage (November 1978). It is not a replacement for the accident sections of the Construction Permit stage Environmental Statements of 1973.

(EPA, A-66)

Nine tables could have been provided to show the impact contributions of the nine categories. It is the staff's judgment, however, that the summary table, reflecting sums of the contributions from all of the categories, is sufficient. Information regarding the relative contributions of the release categories is available in the Reactor Safety Study, WASH-1400.

(EPA, A-66)

The Design Basis Accidents are included because they are used in the Safety Evaluation Report to assess the adequacy of the performance of certain engineered safety features. In the SER, the DBAs are compared to the suitably small fractions of 10 CFR 100 for those accidents that are considered likely (infrequent accidents).

(EPA, A-66)

The DBAs are judged not to be significant contributors to environmental risks and have not been subjected to the same kind of probabilistic analysis as the more severe accidents that are treated.

(EPA, A-66)

The staff believes that it is more informative to discuss the environmental risks associated with accidents separated from those attributable to normal operations. Both may be found in the Final Environmental Statement. Risks associated with the operation of both Units 2 and 3 are, to a first approximation, the sum of the risks associated with each unit individually.

(EPA, A-67)

We agree certain biological changes in children and adults may be detected occasionally at doses as low as 10 rem (e.g., slight, temporary reductions in circulating lymphocytes). However, at doses of 25 rem or greater, such effects become measurable in nearly all exposed persons. In addition, although such changes have no physiologically significant impact, they can be clinically measured. We selected 25 rem as a point above which potentially serious effects due to radiation exposure (e.g., prodromal vomiting) become apparent to physicians and a point below which no difference between exposed and unexposed populations is apparent in terms of latent cancer incidence.

(EPA, A-67)

The NRC State Liaison Officer has informed us that the Region IX RAC has completed its review of the local plans for the environs of San Onofre. The licensee has transmitted to the NRC copies of emergency plans for the following:

San Onofre, San Clemente and Daheny State Park and Beach Areas

San Juan Capistrano City

Camp Pendleton

Orange County

Unified San Diego County

Interagency Agreement between San Diego County, Orange County, City of San Clemente, City of San Juan Capistrano; Marine Corps, Camp Pendleton; State Department of Parks, Pendleton Coast Area.

The staff preliminary review of these documents affirms its judgment that the plans are, in fact, in an advanced stage of development even though they have not been submitted for formal review. A full-scale exercise for the San Onofre site and its environs is scheduled for May 13, 1981.

(EPA, A-67)

The NRC staff Safety Evaluation Report, dated February 1981, states that the San Onofre onsite emergency plan, when revised in accordance with the applicant's commitments, will provide an adequate planning basis for an acceptable state of emergency preparedness, and will meet the requirements of 10 CFR Part 50 and Appendix E, thereto. This is still the staff's conclusion.

The SER states that the plan must be revised to address the final criteria and implementation schedule for the emergency centers and their functions, emergency manpower levels, and upgraded meteorological program, and to address the impact of earthquakes on emergency plans for the site and its environs. The NRC staff position is that the emergency plans are sufficiently complete to justify the estimates of parameters used in the consequence model.

It is true that the State of California does not use the U.S. EPA Protective Action Guides (PAGs). The State of California has elected to base its Protective Action Guides on the concept that no member of the general public should receive more than 500 millirem per year. The emergency plans of the local authorities in the environs of the San Onofre plant have followed the State's guidance. This guidance is more conservative than the EPA guidance, i.e., protective actions would be recommended at a lower projected dose. Consequently, it is reasonable to expect that if protective actions were to be taken at a lower value of projected dose, then exposures would be reduced.

(EPA, A-67)

The figure has been revised to present a more meaningful directional risk. The meaning of the new figures is discussed in Section 7.1.4.6. The scale of the figures has been expanded (a smaller distance from the plant shown) and it has been redrawn in an attempt to improve legibility.

(EPA, A-67)

Standard methods for estimating costs of reactor building cleanup and decontamination and replacement power for the economic risk calculations are under development. Reasonable estimates of plant decontamination and replacement power have been made, however, and are discussed in Section 7.1.4.6. Staff conclusions on the benefit cost balance are reported in Section 10 of the FES.

(SCE, A-68)

It is clearly stated in the third paragraph of Section 7.1.4.1 that the evaluations of the limiting faults and infrequent accidents are used to implement the provisions of 10 CFR 100. The conclusions regarding siting are in the Safety Evaluation Report and its supplements.

(SCE, A-69)

Section 7.1.4.2 states that the estimates of the consequences may have as large error bounds as for the probabilities. Any uncertainty in the fractions of nuclides released contributes to the error bounds on the consequences, as well as uncertainties in the meteorological and health effects models. The subject of releases of certain nuclides, mainly the radioiodines, is presently under review by the staff.

APPENDIX A
COMMENTS ON DRAFT ENVIRONMENTAL STATEMENT

APPENDIX A

COMMENTS ON DRAFT ENVIRONMENTAL STATEMENT

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UNITED STATES DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION

OFFICE OF THE DEPUTY DIRECTOR FOR
AGRICULTURAL RESEARCH
WASHINGTON, D.C. 20250

Subject: NRC Draft Environmental Statement

To: William H. Regan, Jr.
U.S. Nuclear Regulatory Commission
Environmental Projects Branch 2
Division of Site Safety and Env. Analysis
Washington, D.C. 20555

We have reviewed the draft environmental impact statement entitled San Onofre Nuclear Generating Station, Units 2 and 3, Southern California Edison Company, San Diego Gas & Electric Company, dated November 1978.

We have no comments to add to the evaluation provided by your staff. We do appreciate the opportunity of reviewing this statement.

H. L. BARROWS
Acting Deputy Assistant Administrator

790103 0193

A-2

U.S. DEPARTMENT OF AGRICULTURE
ECONOMICS, STATISTICS, and COOPERATIVES SERVICE
WASHINGTON, D.C. 20250

December 8, 1978

SUBJECT: Draft Environmental Statement

TO: William H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

We have no comments on the Draft Environmental Statement related to operation of San Onofre Nuclear Generating Station, Units 2 and 3 by Southern California Edison and San Diego Gas and Electric Companies.

MELVIN L. COTNER
Director
Natural Resource Economics Division

781214 0168

50-361
50-362 A

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
AREA OFFICE
2500 WILSHIRE BOULEVARD, LOS ANGELES, CALIFORNIA 90057

REGION IX
450 Golden Gate Avenue
P.O. Box 36003
San Francisco, California 94102

December 19, 1978

IN REPLY REFER TO:

U.S. Nuclear Regulatory Commission
Attention: Director, Division of Site Safety
and Environmental Analysis
Washington, D.C. 20555

Gentlemen:

Subject: San Onofre Nuclear Generating Station
Units 2 and 3
Draft Environmental Statement
Docket Nos. 50-361 and 50-362

We have reviewed the captioned document and have no comments to offer on it. There is no need to send this office a copy of the Final Environmental Statement.

Sincerely,

Roland E. Canfield, Jr.
Area Manager

7901080142

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

50-361P
3620

SPLED-E

2 January 1979

Mr. Wm. H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and Environmental Analysis
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Regan:

This is in response to a letter from your office dated 30 November 1978 which requested review and comments on the Draft Environmental Impact Statement for the San Onofre Generating Station, Units 2 and 3, proposed by Southern California Edison Company and San Diego Gas and Electric Company.

The proposed plan does not conflict with existing or authorized plans of the Corps of Engineers. We have no comments on the environmental statement for the proposed action.

Thank you for the opportunity to review and comment on this statement.

Sincerely yours,

NORMAN ARNO
Chief, Engineering Division

7901170209

A-3

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
2828 Chiles Road, Davis, CA 95616

January 9, 1979

William H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
United States Nuclear Regulatory
Commission
Washington, D. C. 20555

Docket No.: 50-361
and 50-362

Dear Mr. Regan:

We acknowledge receipt of the draft environmental statement for San Onofre Nuclear Generating Station, Units 2 and 3, Southern California Edison Company, San Diego Gas & Electric Company in San Diego County, California, that was addressed to USDA Soil Conservation Service on November 30, 1978, for review and comment.

We have reviewed the above draft and have the following comments.

1) Provisions for erosion control and water management during construction as well as conservation treatment of disturbed areas following construction were inadequately addressed. We suggest that an erosion control plan be developed to adequately address the erosion hazard both during and following construction.

2) Approximately 10 acres of prime land will be lost to access roads and transmission towers. Mitigation or projected impacts from this loss were not adequately discussed. We suggest further discussion in the statement to address the prime land issue.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

FRANCIS C. H. LUM
State Conservationist

A-4

7901260144

C002 ES 1/0

D

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

January 17, 1979 IN REPLY REFER TO:

Mr. William H. Regan
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Regan:

I am replying to your request of November 30, 1978 to the Federal Energy Regulatory Commission for comments on the Draft Environmental Impact Statement for the San Onofre Nuclear Station Units 2 and 3, California. This Draft EIS has been reviewed by appropriate FERC Staff components upon whose independent evaluation this response is based.

The staff concentrates its review of other agencies' environmental impact statements basically on those areas of the electric power, natural gas, and oil pipeline industries for which the Commission has jurisdiction by law, or where staff has special expertise in evaluating environmental impacts involved with the proposed action. It does not appear that there would be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should this action be undertaken.

Thank you for the opportunity to review this statement.

Sincerely,

Jack M. Heinemann
Advisor on Environmental Quality

C002 ES 1/0

7901220093

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

JAN 16 1979

In Reply Refer To:
ER 78/1161

Mr. William H. Regan, Jr.
Chief, Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Regan:

The Department of the Interior has completed its review of the draft environmental statement for San Onofre Nuclear Generating Station Units 2 and 3. We have comments in only two areas of our jurisdictional concern as set forth below.

Recreation Resources

The discussion of recreation impacts states that restrictive use of the beach area was unanticipated at the time issuance of the construction permit was being considered. Since no explanation is given, it is unclear to us how such a significant impact, the loss of recreational and scenic open space, could have been overlooked during the earlier planning stages. The final statement should disclose the reasons which now require restrictions upon beach use.

Although there is now recognition of the impact, we see no attempt being made by the applicant to mitigate the loss of recreation space and opportunity. With respect to the scenic quality of the area, we find the intended plan to construct an eight foot chain-link fence extending over three-fourths of a mile along the beach quite objectionable. Design of the walkway deserves much more attention. Given the fact that this stretch of beach is rather removed from the developed portions of the state park units and therefore receives minimal use and given the scenic nature of the beach area and bluffs it would certainly seem more preferable and perhaps sufficient to consider posting the area as to its restrictive use. If a barrier is still needed, a more aesthetically sensitive, light railing may best fulfill the need to restrict access.

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Cultural Resources

We are pleased that the NRC staff has directed the applicant to consider historic, archeological, and Native American cultural resources in its planning process. We understand that existing and possible new transmission corridors will be surveyed for such resources. However, we strongly urge that the applicant allow enough flexibility in its planning to actually take the results of these surveys into account in its final placement of tower bases, access roads, and proposed substations. This would include allowing the State Historic Preservation Officer enough time to properly evaluate the surveys results and make appropriate recommendations. In addition, any new land used for material storage or other project activities outside the transmission corridors should also be checked for cultural resources.

We hope these comments will assist your efforts in preparing the final environmental statement.

Sincerely,

Larry E. Meierotto
Deputy Assistant SECRETARY

50-361
362

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DANIEL K. SPRAGLIN

January 19, 1979

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Director, Division of Site, Safety and Environmental Analysis

Gentlemen:

Pursuant to the notice published in the Federal Register with respect to comments on the Draft Environmental Statement (DES), the Cities of Anaheim and Riverside, California wish to submit the following comments.

Anaheim and Riverside believe the Final Environmental Statement (FES) should be amended in Section 8, entitled "Need for the Station", to reflect probable ownership by the Cities of a portion of Southern California Edison Company (SCE), 80% interest in Units 2 and 3.

The Applicants and Anaheim and Riverside, entered into a Letter Agreement dated November 1, 1977 which incorporated other proposed Agreements, including a Participation Agreement which provides for Anaheim to acquire 1.66% of SCE's 80% interest in Units 2 and 3, and for Riverside to acquire 1.79% of Edison's 80% interest in Units 2 and 3. The Letter Agreement was entered into by the Parties because a question was raised as to whether SCE or SDG&E would lose the investment tax credit with respect to its ownership share of Units 2 and 3 due to Anaheim and Riverside, public agencies, owning an undivided interest in Units 2 and 3. The Letter Agreement further provides, however, that when this question is satisfactorily resolved in the opinion of each party to said Agreement, the Participation Agreement attached thereto will be executed by the Parties.

The Internal Revenue Service has issued Revenue Ruling 78-268, which holds that undivided ownership in property by exempt and non-exempt entities does not of itself disqualify the portion of the property owned by the non-exempt entity from taking investment tax credit with respect to its share of such property. Moreover, SCE and SDG&E received a private letter ruling, dated August 16, 1978 which holds with respect to San Onofre Nuclear Generating Station, Units 2 and 3, that SCE and SDG&E will not lose investment tax credit with respect to their undivided interest in Units 2 and 3 after the sale of the interest to Anaheim and Riverside. However, that Private Letter Ruling contained language which SCE and SDG&E believe to be ambiguous and therefore on October 27, 1978 they filed a Request for Clarification of the Private Letter Ruling of August 16, 1978. The Request for Clarification is still pending before the Internal Revenue Service, but we believe it will be favorably acted upon in the next several weeks.

Anaheim and Riverside are currently, and have for some years, been wholesale

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customers of SCE. Anaheim and Riverside purchase all of their capacity, and most of their energy requirements from SCE. Anaheim and Riverside have agreements with Nevada Power Company wherein each City purchases economy non-firm energy from Nevada Power Company. These agreements will expire by their own terms in 1980. Anaheim and Riverside do not currently own any generating resources.

In 1978 Anaheim's peak demand was 388 megawatts. The estimated peak demand for 1978 was 394 megawatts. During 1978 Anaheim purchased two billion kilowatt hours of energy. For the period 1979 through 1990 it is estimated the peak demand for Anaheim will increase in differing amounts. The smallest amount of increase for electrical demand in any year during that period is estimated to be 3.1 percent and the highest amount of increase for any year 4.8 percent. It is also estimated for the same period of time that energy requirements for Anaheim will increase with the lowest estimated annual increase being 3.6 percent and the highest estimated annual increase being 5.0 percent.

In 1978 Riverside's peak demand was 278 megawatts. The estimated peak demand for 1978 was 260 megawatts. During 1978 Riverside purchased over one billion kilowatt hours of energy. For the period 1979 through 1990 it is estimated the peak demand for Riverside will increase with the smallest annual increase to be 4.0 percent and the highest annual increase to be 5.4 percent. It is also estimated for the same period of time that the energy requirements for Riverside will increase with the lowest annual increase to be 4.0 percent and the highest annual increase to be 5.4 percent.

The acquisition of an ownership interest in Units 2 and 3 by Anaheim and Riverside does not change the conclusion that the Units are needed to meet the electrical load served by SCE, Anaheim and Riverside. The load forecasts of SCE include the loads served by Anaheim and Riverside. Therefore, whether you include the loads of Anaheim and Riverside in the SCE forecast of loads or break them out and identify them separately, the need for the station is the same.

Very truly yours,

Alan R. Watts

ALAN R. WATTS
Special Counsel

Cities of Anaheim and Riverside

ARW:jm:D:11

cc: Attached Listing

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Mr. Mark Medford
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Wm. H. Regan, Jr.
Environmental Projects Branch 2
Division of Site Safety and Environmental Analysis
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A-7

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-~~3111~~ 4335

50-361
362

January 22, 1979

Director, Division of Site Safety
and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

This is in reference to your draft environmental impact statement entitled "San Onofre Nuclear Generating Station, Units 2 and 3, Southern California Edison Company, San Diego Gas & Electric Company." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you.

We would appreciate receiving 10 copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures from: Gordon G. Lill--National Ocean Survey
Gerald V. Howard--National Marine Fisheries Serv

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
ROCKVILLE, MD 20852

OA/C52x6

JAN 10 1973

TO: PP - Richard L. Lehman

FROM: OA/Cx1 - Gordon G. Lill

SUBJECT: DEIS #7812.06 - San Onofre Nuclear Generating Station, Units 2 and 3

The subject statement has been reviewed within the areas of NOS responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The following comments are offered for your consideration.

Section 2.3.1, Surface-water hydrology, has been found to be very adequate for the purposes intended. The authors are to be commended for the thorough bibliography on the subject.

NOS concurs with and encourages the oceanographic monitoring program described in Section 6.2.2. We feel this program will ensure environmental protection and help allay public concern.

A-8

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

Date : January 8, 1979 FSW33/JJS

To : EC, Office of Ecology and Conservation

Thru : F/, Kenneth R. Roberts, Acting Director, Office of Habitat Protection

From : FSW, Gerald V. Howard, Regional Director, Southwest Region

Subject: Review of DEIS No. 7812.06 - San Onofre Nuclear Generating Station, Units 2 and 3 (NRC)

The subject DEIS which accompanied your memorandum of December 8, 1978, has been reviewed by the National Marine Fisheries Service. The following comments are offered for your consideration:

Specific Comments

5. Environmental Effects of Station Operation

5.4 Environmental Impacts

5.4.2 Impacts on the aquatic environment

Page 5-26, paragraph 7, Kelp

In paragraph 7 little information is included documenting the importance of kelp to coastal commercial fish species. Information available in the California Department of Fish and Game Fish Bulletin 139 (Quast, 1968) provides some insight in that regard.

Data developed by Jay Quast of the then U.S. Bureau of Commercial Fisheries, and included in that publication, indicate that in his studies he found more than twenty commercially important fish species occurring in the kelp beds off southern California. According to those studies the relationship of many of those species to the kelp habitat was more extensive than indicated by the final sentence of the subject paragraph. This should be reflected in the text of the final EIS.

6. Environmental Monitoring

6.3 Operational Monitoring Programs

6.3.3 Aquatic biological monitoring

Page 6-7, paragraph 1

The concept of continuing a kelp study program into the operational stage of SONGS is a good one. However, should those studies determine that significant harm is occurring to that resource, then some method of compensation satisfactory to the National Marine Fisheries Service would need to be developed. This should also apply to the studies being conducted on fish impingement at SONGS 2 and 3.

If such measures are not adopted and adverse impacts do appear the monitoring program may be merely documenting the demise of a valuable coastal resource.

10. Benefit-Cost Summary

10.7 Summary of Benefit-Cost

Page 10-3, paragraph 3

The potential additional cost of compensating for loss of biological resources due to the operation of SONGS 2 and 3 should be addressed.

A-9

LITERATURE CITED

Quast, Jay C. 1968. 8. Observations on the food of the kelp-bed fishes. In: California Department of Fish and Game, Fish Bulletin 139. Pp 109-142.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
ROCKVILLE, MARYLAND 20857

January 25, 1979

Mr. William H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety
and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Regan:

The Department of Health, Education, and Welfare has reviewed the health aspects of Draft Environmental Statement related to operation of the San Onofre Generating Station, Units 2 and 3, Southern California Edison Company and San Diego Gas and Electric Company and has the following comments to offer.

A-10

Section 5.5 Radiological Impacts

The individual doses as identified in Table 5.3 are all within Appendix I, 10CFR50 design objectives and should assure adequate radiation protection of the public for routine releases. However, it should be recognized in this section that 10CFR190 promulgated by EPA became effective in January 1979. A statement should be included indicating that SONG 2 and 3 will also meet this standard.

It is recognized that there are many variables that influence occupational exposure for a specific plant. However, a recent Atomic Industrial Forum study of occupational exposures showed for a PWR a total of 694 man-rem per year as a representative PWR exposure pattern. As a conservative estimate the projected occupational exposure impact of the two-unit San Onofre Station would be 1400 man-rem per year.

The summary of environmental consideration for uranium fuel cycle shown in Table 5.8 appear to be within acceptable radiation protection limits. However, some additional explanation within the test or by a footnote is needed for the disposal of solids. In particular, the statement that TRU and HLW would be buried at a Federal Repository should be modified to indicate alternatives for disposal of these waste in the event the Federal repository is not operational when required by plant operations.

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Page -2- Mr. William Regan

Section 6.2.5 Radiological Monitoring Program

The preoperational monitoring program presented in Section 6.1.5 of the Environmental Report is adequate for meeting the objective stated in this section. The establishment of the radiological monitoring program prior to start of operations should provide the necessary data to verify the effectiveness of in-plant controls and to provide assurance that undetected radioactivity will not build-up in the environment.

Section 7 Environmental Impact of Postulated Accidents

The estimated exposure of the population within a 50 mile radius of the plant shown in Table 7.2 cannot be adequately evaluated without some specific data in the text on the source term. Without such data it is possible to assume that the environmental consequence as a result of a class 8 accident could be more severe than indicated in the unlikely event of such an accident.

There is no indication in this section or previous chapters on emergency response planning to mitigate the consequences of an accident that could impact on the offsite population. A discussion of the arrangement that has been made with State and local authorities should be included in this section.

The discussions in paragraph 4, page 7-2 on the Reactor Safety Study (WASH-1400) relative to discussion with EPA is outdated (1973), and since it discusses scope of the study, and not results, should be removed. More importantly, a statement should be included on the technical review or conclusions that have been provided by EPA, other Federal agencies or independent reviewers. Such a statement would be helpful in accepting the low environmental risks associated with the postulated radiological accidents.

On the basis of this review it is concluded that the San Onofre Nuclear Generating Station, Units 2 and 3 can be operated to meet current radiation protection guidance and provide adequate protection of the public health and safety.

Sincerely yours,

Bernard [signature] for

Charles L. Weaver
Consultant
Bureau of Radiological Health

Southern California Edison Company
P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

J. H. DRAKE
VICE PRESIDENT

TELEPHONE
213-572-2288

February 2, 1979

Director, Office of Nuclear Reactor Regulation
Attention: William H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Gentlemen:

Subject: San Onofre Nuclear Generating Station
Units 2 and 3
Docket Nos. 50-361 and 50-362

In accordance with your request of November 30, 1978, the Southern California Edison Company and the San Diego Gas & Electric Company have reviewed the Draft Environmental Statement (DES) related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3. Enclosed are comments generated from this review.

Should have any questions or require clarification regarding these comments, please contact me.

Very truly yours,

Enclosure

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ATTACHMENTS

A	Figure 6.14, page 61 of Reference (5)
B	Figure 6.29, page 76 of Reference (5)
C	Figure 6.34, page 81 of Reference (5)
D	Figure A-7, page A-15 of Reference (5)
E	Figure 6.8, page 47 of Reference (5)
F	NOAA Climatological Data, July 1975
G	" " , July 1976
H	" " , April and July 1977
I	" " , July 1978
J	Air Temperatures at SONGS
K	Del Mar Current Meter and Temperature Data, May-December 1978
L	San Onofre Area Current and Temperature Data, May-August 1978
M	Pages 103-106 of DES reference 8
N	Figure 1 Surface Isotherms for 0.0 knots
O	Figure 2 " " " 0.1 "
P	Figure 3 " " " 0.25 "
Q	Reference (19)
R	Reference (20)
S	Reference (21)
T	Temperature Data from References (8), (22), (23) and (24)
U	Reference (2)
V	Bottom (30') Water Temperatures at San Onofre, July and Aug. 1976-78
W	Pages 41 and 71 of Reference (16) and page 42 of Reference (17)
X	Revised DES Table 8.1
Y	Revised DES Table 8.3
Z	Revised DES Figure 3.5

A-11

AA Reference (1)
BB " (12)
CC " (13)
DD " (14)
EE " (18)

COMMENTS

BY

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS & ELECTRIC COMPANY

ON THE

DRAFT ENVIRONMENTAL STATEMENT

RELATED TO THE OPERATION OF

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

PREPARED BY THE

U. S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

TABLE OF CONTENTS

INTRODUCTION

The Draft Environmental Statement (DES) has been reviewed by the Southern California Edison Company and the San Diego Gas & Electric Company (hereinafter referred to as Applicants).

Comments resulting from this review are to identify inaccuracies in the data or discussion and provide clarification or correction. The comments follow the organization and numbering in the DES and should be read in conjunction with the referenced section.

SUMMARY AND CONCLUSIONS

Comment A-1

(page iii, item 2)

The DES states, "Each unit will produce up to 3410 MWe and a net electrical output of 1057 MWe".

It should be noted that 1057 MWe as stated in the applicants' ER-OLS* and in the DES was calculated using the Turbine-Generator (T-G) manufacturer's guaranteed output of 1127 MWe, which corresponds to an NSSS output of 3266 MWe, and an estimated in-plant consumption of 70 MWe.

However, when the NSSS is operating at 3410 MWe, and the T-G is at the wide-open valve condition (normal operating condition) the T-G output will be 1181 MWe. Current estimates of in-plant consumption have been revised to 75 MWe. Therefore, it is suggested that the net electrical output value be expressed as being in the range of 1052 MWe to 1106 MWe per unit when the NSSS is operating in the 3266 MWe to 3410 MWe range respectively.

*ER-OLS will be revised to reflect the range of 1052 MWe to 1106 MWe output per unit, in a future amendment.

Comment A-2

(page iii, item 3a)

The applicants do not agree with the conclusion reached by the staff on the possible destruction of at least a portion of the San Onofre kelp bed as a result of the thermal discharge from San Onofre Nuclear Generating Station. The assessment of impacts to the aquatic environment is invalid because of the use of inappropriate data from the staff's numerical model. A reassessment of the impacts is needed using ambient temperatures from actual field data. Actual field data are appended to these comments. Using appropriate ambient temperatures in the assessment, the excess temperature from thermal plume predictions made by either the applicants or staff will not create adverse effects on the San Onofre kelp bed. (Attachment T)

Comment A-3

(page iv, item 6(B)(2))

The preoperational monitoring program outlined in Section 6 goes beyond the applicants' program approved by the NRC by letter dated July 6, 1978, and is apparently based on inappropriate predictions of impact to the San Onofre kelp bed. The operational monitoring program outlined in Section 6 is an extension of the preoperational monitoring program. The operational environmental monitoring programs are under development for Units 2 and 3 Environmental Technical Specifications (ETS) and will be submitted in the near future.

1. INTRODUCTION

1.1 HISTORY

Comment 1-1

(page 1-1, paragraph 2)

The net electrical output for each unit is in the range of 1052 to 1106 MWe. Refer to Comment A-1 for discussion.

2.4 METEOROLOGY

2.4.4 Atmospheric dispersion

Comment 2-1

(page 2-8)

The DES indicates that the onshore tracer test conducted by SCE substantiates the acceptability of data measured on the San Onofre onsite (bluff) tower for use in calculating atmospheric dispersion. However, the DES does not consider the enhanced dispersion estimates derived from the onshore tracer test results. Consideration should be given to the enhanced dispersion estimates derived from the onshore tracer test results.

2.5 SITE ECOLOGY

2.5.2 Aquatic ecology

Comment 2-2

(page 2-9)

Oceanographic data reports from the past have incorrect consultant sources referenced. The first source in the list of three sources should be:

"(1) a thermal effects study performed jointly by Environmental Quality Analysts, Inc. and Marine Biological Consultants, Inc. in 1973 using data and results obtained from 1964-1972 by Bendix Marine Advisors, Inc., and Intersea Research Corporation."

3.2 DESIGN AND OTHER SIGNIFICANT CHANGES

3.2.1 Plant water use

Comment 3-1

(page 3-1, paragraph 2)

Delete the words, "makeup to," in the second sentence.

Comment 3-2

(page 3-1, paragraph 3)

The word, "makeup" should be corrected to "cooling," in the second sentence.

Comment 3-3

(page 3-1, paragraphs 2 and 3)

In the discussion of plant water use, the flushing of traveling bars and screens is incorrectly described. Seawater will be used for the flushing of the traveling bars and screens, not fresh water.

3.2.2 Heat dissipation system

Comment 3-4

(page 3-1)

The discussion should also include a description of the Seismic Category I Auxiliary Intake Structure of the circulating water system. The description of this design change can be found in Section 3.4.1 of the ER-OLS and Section 9.2.5 of the FSAR.

Comment 3-5

(page 3-1, paragraphs 4 and 5)

The seawater used for "cooling" has been incorrectly labeled "makeup." This error appears in the second sentence of paragraph 4 and the first sentence of paragraph 5.

Comment 3-6

(page 3-1, paragraphs 5 and 6)

The word "screenwell" should refer to the intake screenwell structure shown in Figure 3.3 and not the traveling screens. Lines 6 and 7 of paragraph 5 use "screenwells" where "traveling bars and screens" are being described. Also, in the second sentence of paragraph 6 "screenwells" is used instead of "traveling screens" and should be corrected.

Comment 3-7

(page 3-3, Fig. 3.2)

Figure 3.2 has been revised by the applicants to include the design details of the Auxiliary Intake Structure (Comment 3-4) and show the elimination of the manhole on the velocity cap. The revised figure can be found in Section 3.4 of the ER-OLS, Figure 3.4-2.

Comment 3-8

(page 3-5, paragraph 1)

The seawater used for "cooling" has been incorrectly labeled "makeup." This error occurs on lines 2 and 5, and should be corrected.

Comment 3-9

(page 3-5, paragraph 1)

The third sentence should read:
"To achieve the temperature required to control biofouling each unit has a recirculation and crossover gate."

2.3.1 Liquid Radioactive Waste Treatment System

Comment 3-10

(page 3-7, paragraph 7)

The flashed steam is routed to the "third point heater", not the "main condenser hotwell".

Comment 3-11

(page 3-8, Fig. 3.5)

The figure should be changed to reflect the correction identified in Comment 3-10. See revised Fig. 3.5 (Attachment Z).

Comment 3-12

(page 3-11, line 1)

The discussion on steam generator blowdown is incorrect. There are two steam generators for each unit, not four.

Comment 3-13

(page 3-13)

The discussion on the containment ventilation system should include a description of the 2,000 cfm mini-purge system. The description of this design change can be found in Section 9.4.1 of the FSAR.

2.4.1 Chemical Effluents

Comment 3-14

(page 3-16, paragraph 1, line 4)

The statement, "maintain a clean circulating water system," should be changed to read, "maintain a clean condenser system."

Comment 3-15

(page 3-16, paragraph 3, line 11)

The applicants will use a nitrite base compound or potassium chromate (K_2CrO_4) as the corrosion inhibitor for the turbine and component cooling water system. The statement in line 11, "will be treated with Nalco 39 to inhibit corrosion," should be changed to read, "will be treated with a nitrite based compound or potassium chromate to inhibit corrosion."

3.2.5 Transmission Lines

3.2.5.1 SCE Transmission Lines

Comment 3-16

(page 3-19, line 3)

The reference number for the description of retrofitting should be "4" not "1."

Comment 3-17

(page 3-20, Fig. 3.9)

An additional note should be added to the figure as follows:

> "The drawing depicts the four-circuit structure that will be used by SCE. SDG&E will use a similar structure with five circuits."

3.2.5.2 SDG&E Transmission Lines

Comment 3-18

(page 3-20, paragraph 1)

In the discussion of SDG&E's transmission lines, Talega Substation has been misspelled consistently throughout.

3.2.6 Probable Maximum Flood Berm

Comment 3-19

(page 3-23, line 1)

The reference number for the letter to the NRC should be "5" not "4."

5. ENVIRONMENTAL EFFECTS OF STATION OPERATION

5.3 IMPACTS ON WATER USE

5.3.1 Thermal discharges

General Comment Concerning Section 5.3

Applicants and the NRC both have evaluated the thermal effects of the diffuser system proposed for SONGS 2&3. The applicants applied a physical hydraulic model study. The NRC staff applied a depth-averaged numerical model. Applicants' model predicts compliance with all state and federal water quality requirements. The NRC Staff model predicts similar compliance for all realistic conditions but predicts potential violations of state thermal regulations for certain admittedly unrealistic conditions.

For reasons inherent in the input and methodology of the NRC staff model, applicants do not consider the staff's predictions to be valid. Further, applicants' model does not predict violations of the State Thermal Plan even under the unrealistic conditions postulated by NRC staff. Specific comments on DES Section 5.3 are discussed below:

A-19

5.3.1.1 Applicant's thermal analysis

Comment 5-1

(page 5-1, paragraph 6)

In the discussion of the physical model, the temperature difference of the discharged water is reported to be 30°F higher than the surrounding water. The 30°F delta T was necessary to achieve dynamically correct scaling of the actual delta T of 20°F and this fact should be mentioned in the discussion to avoid confusion.

Comment 5-2

(page 5-2, paragraph 3)

The statements are made, "The staff has reviewed the applicant's thermal analysis and believes that the physical model does not adequately represent certain hydrodynamic mechanisms and certain physical features of the prototype. The most significant of these is the limitation of the duration of the simulation by the size of the model basin." and "In fact, for the conditions represented in Figure 5.3,

an increase in simulation time would likely have resulted in predicted excess temperatures that violate state thermal standards." The applicants do not agree with these statements. The assumption that the size of the model basin limits the ability of the model in terms of representing valid results for longer time duration conditions are not considered to be valid. The conditions represented in DES Figure 5.3 represent a worst case condition and it is illustrated in the following paragraph that equilibrium had already been reached. An increase in simulation time would not have changed the predicted results.

In Figure 6.14, page 61 of Reference (5) (Attachment A) it is shown that for the circumstances represented in the DES Fig. 5.3, the hydraulic model had clearly reached an equilibrium peak temperature. The prototype period of time represented in this hydraulic model test of a zero drift situation is in excess of 30 hours of continuous operation at full load. Referring to Attachment A it can be seen that the peak temperature measured in the hydraulic model basin (the upper curve) quickly reaches an equilibrium level in a time of approximately 12 prototype hours. For the subsequent 18 hours of operation at zero drift velocity, the only variation in temperature is that associated with the experimental fluctuations. The behavior is similar for the lower curve, which is the peak temperature measured at a distance equivalent to anywhere beyond 1000 ft. from the point of discharge.

The results given in Attachment A, and the detailed error analysis performed in Reference (5), show quite clearly that there is no basis for the assertion that the hydraulic simulation represented in Fig. 5.3 of the DES, if continued, would lead to a violation of the state thermal standards. To the contrary, it is clear that in a no-drift situation an equilibrium peak temperature of 2.3°F (beyond 1000 ft.) would be reached within about 12 hours and this peak temperature would not be exceeded for longer durations.

The DES further states, "Once the thermal plume reaches a lateral boundary of the tank, the simulation must be terminated. The length of the simulation is thus dictated by the size of the model basin rather than by the natural time scales of the problem."

The tests do not have to stop when the thermal plume reaches a boundary because a large prototype area is represented by the model basin and the maximum temperatures are close to the diffusers. Furthermore, the natural time scale of the problem is that associated with the initial jet mixing and establishment of the steady induced offshore drift of the

thermal field. The time scale associated with the establishment of steady state conditions in the model was found to be 12 hours at the most. The size of the basin does not limit the results until more than 40 hours, as shown in Attachment A. It is also confirmed by the results given in Figures 6.29 and 6.34, pages 76 and 81 of Reference (5) (Attachments B and C). The results shown are for a situation where the hydraulic model was operated for the accelerating current pattern given on Attachment B. The outcome of the model is shown in Attachment C. It can be seen that the peak temperature rapidly reduces as the current velocity increases, showing that the natural time scale or response time is only a few hours. Indeed, it is because of the short time scales of the problem that the hydraulic model is appropriate.

The reason for the short time scale can be seen in Figure A-7, page A-15, of Reference (5) (Attachment D) and in Figure 6.8, page 47, of Reference (5) (Attachment E) which both clearly show a surface layer of warm water overlying a cooler bottom layer. The diluting water for the discharge jets is always drawn from this cooler bottom layer so the dilution is fixed by the rate of supply of bottom water. When there is no drift the bottom flow is generated by the jet entrainment. When an ambient current is present the flow of diluting water is even greater so the peak temperatures are reduced.

Comment 5-3

(page 5-2, paragraph 4)

The DES states, "Although the problem of underprediction is inherent in all the applicant's results, it is less significant for the realistic cases." It cannot be concluded that the hydraulic model consistently underpredicts delta T's with respect to what will really occur; rather, the only conclusion that can be drawn is that the math model gives consistently higher values than the physical model.

The basic hydraulic model report (Reference (5)) discusses possible errors in hydraulic modeling and deduces a laboratory target value of 2.5°F so that all possible errors will be included within the 4°F limit; but the report does not imply that there is an expected bias in the results as the errors could as well be negative as positive.

5.3.1.2 Staff's thermal analysis

Comment 5-4

(pages 5-3, 5-4, and Fig. 5.6)

Atmospheric data purported to be typical of July are used in the NRC mathematical model to predict ocean temperatures. Specifically, air temperatures with a maximum of approximately 82°F and a minimum of 65°F were used in the model (see DES Fig. 5.6, page 5-7).

Actual field data measured at coastal sites in Southern California for July show mean daily maxima and mean daily minima substantially lower than these temperatures. In addition, temperature summaries for the San Onofre site presented in Table 2.3-6 of the FSAR and Table 2.3.2-4 of the Applicants' Environmental Report OL Stage show mean daily maxima and mean daily minima temperatures on the order of 67°F and 61°F respectively.

Published U.S. Climatological Data for July 1975, 1976, 1977, 1978 (Attachments F, G, H and I) give temperatures for two coastal stations (Newport Beach Harbor and Santa Monica Pier). Data at San Onofre are from the meteorological tower maintained at the site: (Attachment J).

Actual Air Temperatures For The Month Of July

	Newport Beach Harbor mean daily		Santa Monica Pier mean daily		San Onofre mean daily	
	max	min	max	min	max	min
1975	69.8°F	62.1°F	68.0°F	61.5°F	66.6°F	59.5°F
1976	72.4°F	64.4°F	71.1°F	63.5°F	67.6°F	63.3°F
1977	70.7°F	61.4°F	67.9°F	61.2°F	67.5 F	61.5°F
1978	70.7°F	62.0°F	68.1°F	59.8°F	67.5 F	61.2°F

The indication is clear that a typical July daily atmospheric maximum temperature at San Onofre should be in the order of 68°F with a typical minimum of about 61°F.

These atmospheric data are an important feature of the numerical model since high air temperatures will lead to high ambient water temperatures being produced by the numerical model in the inshore region. An indication that this has in fact occurred, are the water temperatures used in Section 5.4 (in the benthic section ambient depth-averaged temperatures of 27.8°C (82°F) and in the kelp section ambient bottom temperatures of 21.5-24°C (71-75°F)). These temperatures are considerably higher than have actually been measured in the field (References (8),(22) and (23)). High ambient water temperatures in the inshore region will, in turn, be reflected as high temperature increments offshore due to the inshore water being transported offshore by the net offshore drift produced by the diffusers. It is quite likely that these features of the numerical model could be responsible for the possible temperature excess violations predicted by the staff's numerical modeling.

Comment 5-5

(page 5-4, paragraph 2)

The DES omits computed ambient temperature maps (without heated water discharge) and computed temperature maps with thermal discharge from which the delta T maps were derived as presented in DES Figures 5.8, 5.10, 5.12, 5.14, 5.16, 5.18, 5.20, 5.22. DES Section 5.4, environmental impacts, refers to this section (5.3.1) and discusses absolute values of ambient temperatures.

Since the basis for the prediction of temperature excess associated with the operation of SONGS Units 2 and 3 is the difference between the numerically predicted temperature distributions for operating and ambient conditions, these temperature maps should be made available to the applicants for evaluation and interpretation, or included in the FES. In addition, these temperature maps are essential to the assessment of impacts on marine life and necessary to provide the basis for much of DES Section 5.4.

Comment 5-6

(page 5-7, paragraph 2)

The DES states, "The net downcoast drift used for these simulations is based on limited data for mid-July. During other times of the year, the data indicate that an absense of drift can persist for up to several days. Although there are no data to confirm a no-drift assumption during mid-July, the staff believes that this situation is at least possible, and therefore, should be considered." Applicants disagree with the assumpation that a no-drift situation is possible.

Current data analyses have been previously supplied to NRC (References (3) and (4)). In Reference (3), pages 59 and 60, it was concluded that current speeds are higher in summer than in winter and that, during winter, periods of very low currents could exist lasting a few days, but that tracks indicated no evidence of currents with no net transport during this period. The available current record for summer, published in Reference (3), shows no evidence of any period of no net drift.

In Reference (4) more recent data obtained by Winant and Severance for the Marine Review Committee were analyzed. These data were collected using a newer type of current meter less susceptible to clogging than the meters used for the data previously analyzed (obtained from Intersea Research Corporation). Reference (4) makes it clear that at no time in the current meter records are there data to indicate that there is a period of zero drift. In fact, the records indicate a substantial drift either upcoast or downcoast with a speed of the order of 0.1 to 0.2 knots (5-10 cms/sec). The data therefore confirm the drogue and current meter data initially obtained by Intersea Research Corporation (IRC). The data appear to indicate that in fact IRC's meters may have been underrecording the magnitude of the currents.

In the past year (1978) more data have been collected at Del Mar (15 miles downcoast from San Onofre) by Winant of Scripps Institution of Oceanography and also at San Onofre by Brown and Caldwell Engineers under contract to the Marine Review Committee of the California Coastal Commission. Winant's data (Attachment K) show substantial longshore currents always occur at Del Mar. The Brown and Caldwell data obtained at the San Onofre site appear to be well correlated with the Del Mar data and also indicate strong drift currents either upcoast or downcoast for periods of several days. The change in direction is always a rapid process. These most recent data further corroborate the previous conclusion that there exist no periods of zero drift (Attachment L). A zero drift period is not considered to be credible, and should not be postulated for evaluating compliance with the state thermal requirements.

Comment 5-7

(page 5-7, paragraph 3)

The DES states, "Although the thermal numerical model is depth-averaged, it is still possible to address the state standards with model results because the buoyancy and shear generated by the diffuser discharge produce a hydrodynamic instability, resulting in the water column's being well mixed within several diffuser lengths of the discharge". Therefore, within the specified mixing zone, the depth-averaged predictions are reasonable representations of surface temperatures."

Reference 8. C. W. Almquist and K. D. Stolzenbach, Staged Diffusers in Shallow Water, Report No. 213, Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1976.

Referring to pages 103-106 of DES Reference 8 (Attachment M) it is clear that the hydrodynamic instability claimed as the basis for application of depth-averaged numerical modeling definitely will not occur with the San Onofre diffusers. It is therefore evident that depth-averaged modeling is inappropriate to the San Onofre configuration so that drawing conclusions about violation of the California thermal standards on the basis of the results of such a model is not valid. It cannot be concluded that depth-averaged predictions are reasonable representations of surface temperatures. For the same reasons, the bottom temperatures cannot be predicted correctly from the NRC depth-averaged numerical model.

Comment 5-8

(page 5-7, paragraph 4)

The DES states that, "The model numerical is inadequate for addressing the issue of bottom temperature. However, at worst, the 4°F excess temperature should only touch the bottom over a very limited area in the vicinity of the Unit 2 and 3 diffusers."

The applicants agree that the numerical model is inadequate for addressing the bottom temperature issue as noted above. In view of the staff's admission of this inadequacy there is no basis for the staff's statement concerning the 4°F excess bottom temperatures. In the assessment of San Onofre 2&3 diffuser plume extent, Figures 1, 2 and 3 have been formulated from Reference (5) (Attachments N, O and P). These show hydraulic modeling results in the horizontal and vertical and with respect to the San Onofre kelp bed area under conditions of no ambient currents, and two typically encountered downcoast ambient currents.

It should be noted that the vertical profiles in Figures 1, 2 and 3 (Attachments N, O and P) stop at a depth of 35 feet but the actual bottom depth is deeper. These figures show no indication of impingment of a 4°F isotherm on the bottom or even present in the water column.

Figure A-7 (Attachment D) shows an actual vertical cross-section of the modeling results from surface to bottom along the centerline of the San Onofre 2 & 3 diffusers. This figure shows that the thermal plume does not impinge substantially anywhere on the bottom and that a temperature increase of 0.4°C (0.8°F) is not exceeded on the bottom.

Comment 5-9

(pages 5-2 through 5-24)

The DES omits any reference to error analysis for either applicants' hydraulic modeling or the staff's numerical modeling. Such an analysis is essential in determining the bounds within which the results are accurate or applicable.

The applicants' modeling has been subjected to a comprehensive error analysis, Reference (7), which discussed possible sources of error and determined appropriate error margins. This error analysis should be referenced in the DES.

There is no discussion of errors for the staff's math model. As with all math models, various assumptions and coefficients are necessary and the results must be viewed with consideration of the potential error inherent in the model. It is a particular concern with this math model which appears to be deficient in representing the real phenomenon occurring, specifically two-layer stratified shear flow and individual jet mixing. Because of this, the range of possible error for the math model is considered to be greater than for the hydraulic model. An error analysis for the staff's math model should be presented, or at least referenced and made available to the applicants.

Comment 5-10

(page 5-7, paragraph 5)
(page 5-24, paragraph 1)

The DES states, "In the absence of drift, the 4°F excess temperature will not reach the shore. However, state thermal standards would be violated since the 4°F surface isotherm will extend beyond the 1000 ft. radius during most of the tidal cycle. The staff concludes that although there exists a remote possibility that state thermal standards could be violated by the operation of Units 2 and 3, violations would, at worst, be infrequent and for short periods. There is no evidence in available drift data to indicate that such an occurrence would take place during the summer when thermal impacts would be the most severe."

The applicants do not agree that the state thermal standards limitation for the 4°F surface isotherm beyond 1000 ft. for more than one half of a tidal cycle will be violated in the absence of drift or under any other circumstance. The applicants' thermal modeling studies addressed a no-drift condition, showing no violation of state thermal standards (DES Figure 5.3). It is the position of the applicants that the mathematical model predictions are excessively high, mainly as a result of inappropriate inputs and assumptions. The staff selected inputs include air temperatures that are about 10°F too high (see Comment 5-4), unsubstantiated two day no-drift conditions along the open coast at San Onofre in July (see Comment 5-6), and modeled ambient depth average water temperatures that are higher than ever recorded in the area's field data (see Comment 5-8). Also, such violations predicted (as remote) by the staff are derived from output of their mathematical model when the model itself could be approaching its limits of validity. Yet, this can not be proven, mainly because an error analysis that would substantiate the claimed applicability of the numerical model is not included in the DES (see Comment 5-9).

For these reasons, the staff's conclusion, that even a remote possibility of a violation of the state thermal standard exists, cannot be justified on a technical basis.

5.4 ENVIRONMENTAL IMPACTS

5.4.1 Terrestrial environment

Comment 5-11

(page 5-24)

The discussion on environmental impacts to the terrestrial environment should also include an assessment of the Probable Maximum Flood (PMF) berm. The applicants submitted an environmental assessment of the PMF berm, by letter dated February 14, 1978. The assessment indicated that the PMF berm should have no adverse environmental impact on the terrestrial ecological characteristics.

5.4.2 Impacts on the aquatic environment

5.4.2.1 Effects of the heat dissipation system

Thermal effects

Comment 5-12

(page 5-24, paragraph 8)

The discussion of the proposed heat treatment states, "the applicant proposes to heat treat portions of the intake system to remove biological growth (Sect. 3.2.2)." This statement is incomplete since the applicants also propose to heat treat the discharge system. The text should be changed to reflect this point.

Comment 5-13

(page 5-25, paragraph 2)

While the applicants do not agree that the area to be affected by thermal discharges will be greater than previously thought, the applicants do concur that even assuming a larger plume, the impact to the aquatic environment is expected to be minimal and of an acceptable nature.

Fish

Comment 5-14

(page 5-25, paragraph 5)

The applicants agree that cold kills of fish are not likely to occur, but for the reason that the extent of the thermal plume is relatively small, and the difference between the ambient and the induced temperatures is less than the rapid temperature changes that occur naturally.

Comment 5-15

(page 5-25, paragraph 4)

It is stated that, "However, with more area to be influenced by the effluent, more fish potentially will be affected."

This appears to be an oversimplification since the thermal plume will not be uniformly distributed with depth but rather the more buoyant heated water will be on the surface with the bottom water remaining unaffected. This means that an increase in the surface area of the plume would only effect fish species which inhabit the upper water column and no additional effect would be expected for fish associated with the bottom. Fish are not uniformly distributed within the water column and actually exhibit a distribution opposite to that of the thermal plume, that is with a greater concentration of fish associated with the bottom and fewer fish associated with the surface. During the 1976 ETS studies a comparison of surface versus bottom gill net data showed that 88% of the fish were found on the bottom and only 12% in the surface waters. Therefore, the area potentially effected by a larger plume would be only the surface waters, which have a relatively small percentage of the total fish abundance.

Benthic fauna

Comment 5-16

(page 5-25, paragraph 8)
(page 5-26, paragraph 1)

In the discussion of DES reference 11 (Ford, et al., 1976), it is not made clear that effects upon growth and mortality of S. franciscanus, P. ochraceus and R. poulsoni occurred only in the experiment simulating a location 84 meters from the discharge and not at 335 m away.

The applicants recommend that clarification be added to these paragraphs in order that the reader be clearly informed that the effects discussed in the DES were limited to the simulation of the 84 location meter distant from the point of discharge.

Benthic fauna

Comment 5-17

(page 5-26, paragraph 2)

Ambient water temperatures in DES Section 5.3.1 are referenced here but no ambient temperatures are included in that section. As previously noted, in Comment 5-5, maps of these ambient temperatures should be presented.

The ambient temperatures used in the discussion of the assessment of benthic fauna are apparently taken from the staff's mathematical model. The ambient temperatures used are clearly too high, as example, "temperatures potentially as high as 27.8°C (82°F) may occur naturally,..." This is far in excess of actual measurement of natural ambient water for the area.

The maximum surface water temperature reported in the vicinity of San Onofre is approximately 23°C (References (8),(22), (23), (16) and (17)). Mean San Onofre natural surface temperatures for July and August of the past three years are on the order of 19°C and the corresponding bottom temperatures are about 17°C.

University of California Scripps Institution of Oceanography (SIO) data reports entitled "Surface Water Temperatures at Shore Stations - United States West Coast" give mean surface water temperatures at San Clemente pier, five miles North of San Onofre, References (16) and (17)):

Mean Surface water Temperatures at San Clemente

	July	August	September
1977	18.27	20.48	18.53°C
1976	19.59	17.95	19.77
1975	18.58	17.01	17.91
3 year mean	18.8	18.5	18.7°C

With surface temperatures in the 18-19°C range it should further be noted (for benthic assessment) that corresponding bottom temperatures will be even lower: all San Onofre field data support the existence of vertical temperature stratification in depths greater than about 30 feet when surface temperatures are in this range. (see Attachment T).

Comment 5-18

(page 5-26, paragraph 3)

The DES states, "On the basis of the 1977 study[11] the staff concludes that several components of the benthic fauna in the vicinity of SONGS would probably be adversely affected in areas where weekly mean temperatures of 22°C prevail for

one month or more or where daily temperatures reach or exceed 24°C. It is not, however, anticipated that temperatures averaging 22°C will occur for more than 2 to 3 weeks or that the areas experiencing temperatures of 24°C or greater as a result of SONGS operation will be considerably larger than the area experiencing these temperatures under natural conditions."

Based upon historical temperature records between 1975 and 1978 (References (8),(22) and (23)) the use of weekly mean bottom temperatures of 22°C appears to be inappropriate and should be lowered to 17°C.

The applicants recommend, therefore, that the sentence indicating 22°C weekly mean temperature could exist on the bottom for 2 to 3 weeks be changed and that a summary sentence be added to indicate that the components of the benthic fauna previously discussed will not be adversely affected.

Also, the date of DES reference 11 (Ford, et. al.) is 1976, not 1977, as stated in the first sentence of the paragraph.

Kelp

Comment 5-19

(page 5-26, paragraph 5)

The DES states, "Although this deterioration may have been partially a result of overharvesting, much of it is probably caused by the increased alteration of the near-shore environment by human activities. In particular increased temperatures and increased turbidity have been shown to be inimical to kelp survival."

The thermal effects on kelp cited in Phillips (1974) were for naturally occurring events and not as induced by human activities. Man induced thermal effects on kelp have not been demonstrated.

The turbidity comment by Phillips (1974)(Reference (15)) was in reference to work conducted by North (1960)(Reference (12)) on effects of sewage outfalls on kelp health. The type of turbidity generated by a sewage outfall is not equivalent to the surface turbidity which may be associated with a cooling water discharge.

It is recommended that the discussion be changed to reflect that the deterioration may have been partially a result of overharvesting, much of it is probably caused by increased alteration of the near-shore environment by human activities,

in particular, sewage treatment facilities and industrial/ chemical discharges. The toxic element of each discharge has not been isolated to date, i.e., heavy metals, sedimentation, oils, turbidity, etc.

Comment 5-20

(page 5-26, paragraph 6)

The DES states, "Typically, canopy tissue deteriorates during the warmest time of the year leaving the basal portion of the plant (which is in cooler water) for regeneration when temperature and light conditions permit."

It has been documented that kelp deterioration occasionally occurs when (apparently) surface temperatures exceed critical thermal limits. However, it appears that seasonal kelp deterioration may be due to synergistic effects and not just to a thermal component. In the open coast setting, an inverse relation often occurs between temperature and dissolved nutrients. As the temperature increases, the nutrient content often decreases, to or perhaps below levels critical to kelp. Additionally, the highest nutrient concentration is found on the bottom near the basal tissues and the lowest concentration near the surface where most kelp deterioration occurs (Reference (2)).

Other evidence (Reference (13)) implies that when Macrocystis pyrifera is placed in a bay, which are typically much higher in nutrients than found in the open coast, the kelp remains in the healthy state even when the entire plant is subjected to 25-26°C (77-79°F) for extended periods.

At this time, it is not known clearly if temperature, nutrients, and/or other unknown components of the water contribute the most to kelp deterioration. However,there is a possibility of a beneficial effect from Units 2 & 3 operation if outfall upwelling creates a surface nutrient plume that will occasionally come in contact with kelp plants during the warm water months.

It is recommended that the DES be changed to reflect the fact that typically, canopy tissue deteriorates during the warmest time of the year leaving the basal portion of the plant (which is in the cooler water) for regeneration when temperature and light conditions permit; and that reduced surface nutrients and higher bottom nutrient concentrations may contribute to canopy deterioration and basal tissue regeneration, respectively (Reference (2)).

Comment 5-21

(page 5-26, paragraph 7)

The DES states, "It is estimated that the larval, juvenile, and adult stages of 25 main sport fish use kelp beds for refuge and food gathering (eating the associated invertebrates, the kelp itself, or other algae) and the average standing crop of fish is estimated to be 300 kg/ha (300 pounds per acre)."

For many years it was believed that the kelp beds, especially the canopy region, represented spawning and nursery grounds of many sport and forage fish (Reference (1)). No evidence is available to support the therory that the canopy is widely used as a spawning area (Reference (6)). Larvae of a few fishes are found in greater abundance in kelp beds than elsewhere. These include the topsmelt, kelp goby, kelp clingfish and striped kelpfish (Reference (1)); species not considered important sport fish.

Many juvenile fishes inhabit the kelp canopy. However, those of recreational or commercial value are found to be more numerous in rocky areas away from kelp, i.e., kelp bass. The only common juvenile fish that are reported to be at higher concentrations within kelp beds are kelp surfperch, kelp pipefish and kelp clingfish (Reference (1)).

Only one adult species, the kelp clingfish, is considered to be obligate to kelp plants. All other fish species will persist in the environment with or without kelp plants present. Diversity of fish species is not altered significantly by the presence or absence of kelp. A highly varied bottom topography appears to be the most important factor for extensive fish-life and to be of greater significance in this respect than kelp (Reference (14)).

The DES should be changed to reflect the fact the kelp beds do not appear to be spawning grounds, rearing grounds, or refuge areas for recreationally or commercially important fish species (Reference (1) and (14)). Only the kelp clingfish appears to be obligate to kelp beds for survival.

Comments 5-22

(page 5-26, paragraph 8)

The DES states, "Kelp is an important commercial commodity ...harvested yearly at a landed value of $2 million."

The commercial value of kelp is well documented, although, a kelp bed is only considered commercially important when it has: high stand density, extensive areal coverage and close proximity to a commercial harbor. The San Onofre kelp bed does not now nor has it ever met these criteria because of the limited extent of substrate suitable for attachment. The DES should be revised to reflect the fact that the kelp beds in the vicinity of San Onofre are not commercially harvested.

Comment 5-23

(page 5-27, paragraph 2)

The DES states, "It has been rather well established that temperatures above 18-20°C (64-68°F) cause deterioration of kelp, and the degree of degradation is directly related to the duration of exposure to these temperatures. Increased surface temperatures caused by SONGS operation (all three units) would have the effect of extending the period of canopy absence. During the hottest time of the year, data in Section 5.3.1 suggests that the closest kelp bed (San Onofre bed) will experience an average surface temperature increase (over a 24-hour period) of 1.4°C (2.6°F); the range of temperature increase will be 0.6-2.2°C (1-4°F)."

The statement in Reference (15), of 18-20°C (64-68°F) thermal exposure causing kelp deterioration was based on comments made in Reference (12), which refers to the colder water variety of kelp found near Monterey, California. For kelp plants located in southern California waters, the critical thermal maximum is more in the range of 20-22°C (68-72°F) (Reference (21)).

During the warm water months of the year, data in Section 5.3.1 suggests that the closest kelp bed (San Onofre bed) will experience average surface water temperatures increases due to the operation of SONGS of less than 0.6°C (1°F); the range of temperature is 0-0.9°C (0-1.5°F).

Temperatures taken in the vicinity of San Onofre between July and September over a three year period show a range of averages of 18.5 to 18.8°C (65.3-65.8°F) for the surface waters (References (16) and (17)). Clearly, the predicted maximum temperature increase of 0.9°C from plant operation when added to the ambient temperature in the vicinity of San Onofre of 18.8 C will not exceed the critical thermal limits established by North. The DES should be revised to reflect this fact.

Comment 5-24

(page 5-27, paragraph 3)

The DES states, "Although daily natural temperature variations of 1°C (2°F) are not uncommon in the area (ER page 2.2-28) they would not be continuous in nature and would thus not affect the bed as severely as the continuous SONGS discharges would. Prediction of the degree to which canopy disappearance would be prolonged is impossible. Regeneration would be quicker in years with naturally cooler ocean temperatures, assuming the regenerative tissues remain unaffected (see below)."

The operation of SONGS 1, 2, and 3 will not have a continuous effect on the San Onofre kelp bed. Power plant thermal discharges will contribute no more than 0.9°C surface temperature increases to the kelp bed and thus will only occur with downcoast currents. The more recent current meter data, as discussed in Comment 5-6 must be considered in regard to this kelp section. It is seen from these data that summer upcoast currents, which would result in no kelp bed plume impingement, occur during approximately half of the summer season. Further, the increase in temperature will be dependent on the strength and duration of the current. Increased surface temperatures due to the operation of SONGS 1, 2 and 3 will always be less than the measured natural surface temperature variations of the area, and will be sporadic.

The staff is requested to revise the DES to reflect the fact that increased nutrients brought to the kelp bed surface waters by outfall induced upwelling may help resist the natural seasonal canopy deterioration and provide beneficial effects from station operation when an outfall induced nutrient plume drifts over the kelp bed during warm water months.

Comments 5-25

(page 5-27, paragraph 4)

The DES shows ambient bottom temperatures in July reaching as high as 23-24°C (74-76°F) with temperature of 22-23°C (72°F and 73°F) for a week at a time. These temperatures are the outcome of the staff mathematical model (DES Section 5.3.1) and are an inaccurate representation of existing natural conditions occurring at San Onofre. Applicants' Comment 5-17 suggests that a bottom temperature of 17°C (63°F) is a more realistic representation.

Also, this section references DES Section 5.3.1 as a basis for a typical bottom temperature range of up to 19°C (66°F) in August and September, however, these referenced temperatures are not found in DES Section 5.3.1. Such a temperature appears to represent more adequately the extreme or high end of the range of summer bottom temperatures at San Onofre. As indicated above, an appropriate representation of a monthly or weekly mean bottom temperature would be 17°C (63°F).

Comment 5-26

(page 5-27, paragraph 4)

The DES states, "...a several week period could exist in which temperatures exceed 19°C."

Results of the applicants' thermal analysis demonstrates that the temperature increase at the bottom in the San Onofre kelp bed will be much less than 0.6°C (1°F) under any current condition. Under most conditions it is predicted that there will be no increase in bottom temperature in any portion of the kelp bed. Bottom temperatures measured at San Onofre during July and August over a three year period show a range of averages of 12-18°C (55-64°F). The addition of less than 0.6°C (1.0°F) to measured ambient temperatures should have no adverse effects to kelp basal tissues from which the canopy is regenerated annually.

Comment 5-27

(page 5-27, paragraph 5)

This paragraph summarizes the staff's conclusions that, based on assumed natural bottom temperatures of 21.5 - 24°C (71 - 75°F) and bottom temperature increases in the San Onofre kelp bed of 1 - 1.5°C (2 - 3°F) due to operation of Units 1, 2 & 3, damage to the kelp basal tissue might result if slack currents occur for several days. Further, if this scenerio occurs frequently, the bed might not recover fully, resulting in long term damage. While the staff admits this is unlikely, it recommends additional extensive monitoring of the San Onofre kelp bed.

It is the applicants' conclusion that an assessment based on appropriate ambient bottom temperatures (17°C or 63°F) derived from actual field data, and temperature increases recognizing that the thermal plume will be stratified (0.6°C/1.0°F maximum) will yield a conclusion that damage to basal tissues will not occur, even under worse case conditions. Also, there is no evidence to support the use of an assumption that a condition of several days of slack current will ever occur, or that it would occur frequently. The applicants believe that the proper conclusion to be drawn from the relevant data is that the operation of San Onofre Units 1, 2 & 3 will have no significant adverse effects on the San Onofre kelp bed.

The greatest adverse effect which could be expected is a slight prolongation of the natural summer surface canopy deterioration period which does not effect the basal tissues or the regeneration of the kelp in the fall.

Based on the above evaluation, the extensive monitoring recommended by the staff is not justified, and monitoring presently being accomplished is sufficient to assess potential effects of San Onofre Units 1, 2 & 3. Specific comments on the monitoring are contained in Comment 6-3.

5.4.2.1 Turbidity and Sediment Transport Effects

Comment 5-28

(page 5-27, paragraph 6)

The DES is deficient in that it fails to substantiate the assertion that larger thermal plumes directly imply larger turbid plumes.

Comment 5-29

(page 5-28, paragraph 1)

The DES states, "The effect on the kelp would potentially be decreased photosynthesis, possibly causing many of the plants to die if the exposure is continuous (a 1% increase in the absorption coefficient has been found to result in a 20% loss in net photosynthesis at 15m)[13] and burial of the holdfasts in particles which settle out, inhibiting regeneration and recolonization. Regardless of the magnitude of these effects, their presence would add to the probability that the kelp bed would be adversely affected (see preceding section)".

As discussed in Comment 5-24, the plume from SONGS 1, 2 and 3 will not have continuous contact with the San Onofre kelp bed.

Reductions in photosynthesis from power plant induced turbidity has not been demonstrated. The net reduction in photosynthesis referred to by Phillips (1974)(Reference (15)) , was based on work by North (1958)(Reference (18)) . The model (computation) was based on a uniform dispersal of light absorbtive material throughout the water column. This model was designed for the turbidity generated by a sewage outfall. For thermal diffusers, there would be an uneven distribution of natural turbidity and the equation does not apply.

Sewage outfalls generate a substantial amount of turbidity that is dispersed throughout the water column. A thermal outfall does not create turbidity, but rather, can occasionally redistribute portions of a naturally occurring dense bottom turbid layer to the surface. Therefore, there is no net gain in the amount of suspended matter in the water. The major effect is that the turbidity on such occasions can be seen on the surface. Further, the turbid plume characteristics sometimes experienced at Unit 1 should not be applied to Units 2 and 3.

A surface plume can be seen at Unit 1 when the surface waters are relatively clear and the bottom water is turbid. The intake and outfall withdraws and upwells, respectively, portions of the bottom turbid layer and pumps it to the surface. The bottom turbid layer qualitatively appears to be essentially a nearshore phenonemon that is generated from wave agitated bottom sediments. Units 2 and 3 outfalls are located in deeper and clearer ocean waters, although the intakes are at a depth comparable with Unit 1. It is predicted that on occasions when naturally occurring turbidity is present the Units 2 and 3 intakes will withdraw turbid bottom water like Unit 1, however, the Units 2 and 3 outfalls will be upwelling clearer bottom waters. Additionally, Units 2 and 3 effluent will be initially diffused through 63 ports each and then mixed with the receiving water at an estimated ratio of 10:1 (Unit 1 dilution ratio is approximately 3:1). Given the situation of clearer water at the outfalls and increased mixing of effluent, it is predicted that a turbid plume will not normally be detected.

In terms of effects, Unit 1 can be viewed as potentially creating more severe effects than Units 2 and 3, i.e., single port outfall and reduced mixing (3:1). The environmental evidence indicates that there is no adverse impact on benthic faunal or floral groups near the outfall. In fact, results from the Environmental Technical Specifications benthic program demonstrate that the fauna and flora near the Unit 1 outfall are more abundant than those from the control station (References (8), (9) and (10)).

No relationship has been established between a turbid plume and thermal plume. The factors that influence the intensity and extent of each constituent are different and may not be interrelated.

The applicants' conclusions are that a turbid plume emanating from Units 2 and 3 operation may occur under certain oceanographic conditions, however, it should be less intense than observed at Unit 1 because (1) of increased mixing of the discharge and (2) the diffusers are located in deeper, clearer waters. Environmental Technical Specifications benthos study results show that redistributing a natural turbid layer has no adverse effects on faunal and floral groups for Unit 1 (References (8), (9) and (10)). Therefore, no adverse effects on faunal or floral biota are predicted.

Entrainment

Comment 5-30

(page 5-29, paragraph 2)

The DES states, "The staff's analysis of entrainment effects in the FES-CP remains valid (FES-CP, p. 5-7 to 5-12). A program on the mortality experienced by entrained ichthyoplankton is being planned currently at SONGS 1 and is expected to be submitted to the NRC staff in December, 1978, for approval."

Refer to (applicants' Comment 6-5).

Impingement

Comment 5-31

(page 5-29, paragraph 4)

The DES states, "The majority of the fish impinged at SONGS 1 are anchovy,..."

A review of last three years (1975-1977) of ETS in-plant impingement monitoring reveals that the Queenfish, Seriphus politus has been the most predominant species impinged at Unit 1 in terms of both numbers and weight.

Entrainment of anchovy has been sporadic and shows occasional high numbers entrapped probably reflecting the schooling behavior of the species. Early impingement information (pre-ETS-1975) indicating high impingement of anchovy may have been biased by a combination of sampling frequency and these chance occurrences.

It is recommended that the word anchovy be replaced with "Queenfish" to reflect the most recent data available. This change does not effect the overall assessment result indicating no significant effect on recreational or commercial fishing resources.

Offshore Current Induction

Comment 5-32

(page 5-29 paragraph 5)

The applicants agree that there are no detrimental effects of induced circulation on the aquatic environment. However, the discussion of the analysis in the DES concerning the effects of the induced circulation on the aquatic environment should mention that the analysis is based on the diffuser design described in Section 3.4 of the ER-OLS and Section 9.2 of FSAR.

5.5 RADIOLOGICAL IMPACTS

Comment 5-33

(page 5-33, Table 5.4)

Table 5.4 of the DES shows calculated annual doses nearly a factor of 3 greater than the values provided by the applicants in Table 5.2-12 of the Environmental Report - Operating License Stage (ER-OLS). The doses shown in Table 5.2-12 of the ER-OLS were calculated using annual average meteorology.

It appears that the staff has used short term 15th percentile meteorology (valid only for purge releases instead of continuous long-term releases) in calculating the doses shown in Table 5.4 of the DES. The staff is requested to revise the doses consistent with Table 5.2-12 of the ER-OLS.

Comment 5-34

(page 5-34, Table 5.6)

Table 5.6 of the DES shows that the dilution factor used for the dispersion of liquid release is 1. However, Section 5.2.4.3 of the applicants' Environmental Report-Operating License Stage (ER-OLS) shows that the dilution factor is 10 between 0-10 miles and 12.5 between 10-50 miles. The values reported by the applicants were derived consistent with Regulatory Guide 1.112.

The staff is requested to revise the values in Table 5.6 of the DES to be consistent with the dilution factors shown in Section 5.2.4.3 of the ER-OLS.

5.6 SOCIOECONOMIC IMPACTS

5.6.1 Introduction

Comment 5-35

(page 5-40, paragraph 8)

The second sentence should read:

"The central portion of Orange County ...".

5.6.5 Impact on recreational resources

Comment 5-36

(page 5-44 and 5-45)

The NRC staff concludes in this section and other sections (5.6.5, 9.1, 10.5, and 10.7) of the Draft Environmental Statement (DES), that the applicants' current plan to restrict the public use of the beach in front of the San Onofre Nuclear Generating Station, within the exclusion area, is a significant cost of the project unanticipated at the issuance of the construction permit. Applicants disagree with the conclusion that there will be any significant loss of recreation area.

Subsequent to the issuance of the Final Environmental Statement (FES) required for the construction permits of SONGS 2 and 3, the ASLAB in its initial decision dated December 24, 1974 (ALAB-248) questioned whether recreational activities within portions of the exclusion area should be permitted, and the adequacy of the applicants' authority to control activities in the exclusion area. By Decision dated April 25, 1975 (ALAB-268) the ASLAB ruled that the applicants' authority to control activities within the exclusion area was insufficient and remanded the issue for further hearing.

On October 10, 1975, the applicants submitted Amendment No. 22 to the PSAR consisting of information concerning a proposal for a reduced exclusion area. Amendment No. 22 also provided estimates of the number of persons anticipated within the proposed reduced exclusion area. Applicants' experts estimated the maximum number of persons within the proposed reduced exclusion area would be 31.

The NRC Staff evaluated applicants' assessment of potential beach use as provided in Amendment No. 22 to the PSAR and concluded that applicants' estimates of the maximum number of people on the beach or in the water within the proposed reduced exclusion area were conservative.

The ASLAB Memorandum of Order dated January 22, 1976 (ALAB-308) resolved the issue concerning authority to control activities within portions of the new reduced exclusion area landward of the mean high tide line in the applicants' favor. However, the Board declined to deal with the question concerning the tidal beach and remanded this issue to the ASLB.

The ASLB held hearings on May 19-21, 1976, at which time evidence was heard on several issues concerning the tidal beach, including the anticipated public use of the beach.

Applicants' expert witnesses provided testimony regarding activities within the beach areas in the vicinity of the San Onofre Nuclear Generating Station and the projected number of persons that would be anticipated within the reduced exclusion area. With respect to activities within the beach areas, applicants' expert witness indicated that distances from parking and beach access points to the area in front of the station are such that there will be a low level of activity on beaches within the reduced exclusion area as compared to other beach areas in the San Onofre State Beach because beach users tend to remain relatively close to their point of beach access. With respect to the projected number of persons within the reduced exclusion area, the applicants' expert witness conservatively assumed the total number of persons which could ultimately be accommodated by all park facilities developed to their planned ultimate capacity would occupy the beach at the same time. Based upon a probabilistic distribution of that population , an estimated 35 persons would be located within the reduced exclusion area. Further, based upon actual observations of persons using the San Onofre State Beach, in addition to similar observations on other beaches, it was predicted that the average and maximum number of people using the beach in front of the station, within the exclusion area, would be 7 and 31, respectively.

NRC Staff supported the applicants' contentions and indicated in both written and oral testimony that the area directly in front of the plant was the least desirable both from an aesthetic point of view and for swimming, surfing or sunbathing, and also indicated that when one is laden with beach blankets and other recreational gear, migration up or down the beach would be discouraged, therefore, beach users would congregate relatively close to the paths up the bluffs of the San Onofre State Beach.

ASLB Order dated January 6, 1977, ordered applicant to provide all data collected since March 14, 1976, reflecting the actual daily count of persons using the beach within the applicants' exclusion area, including the tidal beach. Oral Arguments were held on February 1, 1977, during which the applicants' provided an analysis of the daily counts previously submitted to the ASLB. That analysis showed less than 10 persons were observed on the beach in the exclusion area for approximately 57.6 percent of the time, and that, on the average, only 12 to 15 percent of the total number of people observed in the study area (area in front of the station and adjacent areas 1/4 mile north and 1/4 mile south) were in the exclusion area. There was a peak number of 108 persons observed in the exclusion area, however, the 108 persons (40 percent stationary, 19 percent in transit, 20 percent swimming, and 21 percent surfing) represent about 36 percent of the total number observed in the study area. It should be noted that the administrative features proposed in Amendment 22 will only effect stationary persons within the exclusion area. Transit through the exclusion area as well as activities below the mean high tide line such as, swimming, fishing and surfing will remain unrestricted.

The ASLB Initial Decision dated May 20, 1977, ruled in the applicants' favor ordering that the Construction Permits shall be continued in effect.

Given the following facts that:

1. The conclusions drawn by the NRC staff in the DES appear to be based upon the Final Environmental Statement Construction Permit Stage.

2. The ASLAB and ASLB have given detailed consideration, in hearings, regarding usage of the beach in front of the San Onofre Nuclear Generating Station within the exclusion area.

3. The applicants provided expert testimony supporting the fact that the beach in front of the station was the least desirable from the standpoint of aesthetics for swimming, surfing or sunbathing and does not receive significant usage and that people tended to congregate near the paths of the state beach away from the exclusion area.

4. The staff supported the applicants' contention regarding minimal beach usage and undesirability of the beach in front of the station.

In view of the above, the appropriate sections of the DES should be revised to conclude that limiting the use of the beach within the exclusion area boundary and above the mean high tide line to a passage way does not represent a significant loss of recreational space.

6. ENVIRONMENTAL MONITORING

6.2 PREOPERATIONAL MONTIORING PROGRAM

Comment 6-1

(page 6-2, Fig. 6.1)

The legend is in error, the triangle symbol should represent DO, pH and Heavy Metals. The square symbol should represent continuous temperature.

6.2.1.5 Intertidal Organisms

Comment 6-2

(page 6-3, paragraph 5 and 6)

The monitoring described in the first paragraph was a requirement for Unit 1 which was deleted in September, 1977, because no effects had been detected. Although this study has been deleted as a requirement, SCE has continued an intertidal study program somewhat reduced in scope. The applicants contend continued conduct of this present cobble intertidal sampling program as described below will meet the objectives outlined in the second paragraph of Section 6.2.1.5 of the DES.

The applicants recommend replacing the existing paragrpah with the following paragraph:

"Although not a required component of the monitoring programs, quarterly observations are made along cobble intertidal transects at four monitoring stations and one control station. Predominant macroscopic species and substrate composition are identified and enumerated within three permanent 0.25m^2 (2.69-$ft.^2$) quadrats along a line perpendicular to the beach. Photographs are also taken of each quadrat for a permanent record of ecological changes."

6.2.1.6 Requirements

Comment 6-3

(page 6-3, requirement 2)

The staff requires extensive monitoring of the San Onofre kelp bed based on predictions made in Section 5.4.2.1.

Kelp investigations are currently in progress with the Construction Monitoring Program, which is a special study of the Preoperational Monitoring Program. Detailed methods are outlined in Reference (11). A brief outline of the scope of effort, at all three San Onofre region beds, is as follows:

1. Three benthic stations are located in and about the San Onofre kelp bed and one each at Barn kelp and San Mateo kelp. Stations are quantatively assessed quarterly.

2. Kelp canopies and rock substrate are mapped for areal extent on a quarterly basis.

3. Water nutrient analysis for ammonia, nitrates, nitrites and phosphate taken monthly at all three beds. Water samples are taken for the surface and bottom from within each bed and offshore of each bed. An additional offshore station serves as a monitoring area for upwelling.

4. Kelp tissue analysis for nutrient content is conducted on a monthly basis at all three kelp beds. Each leaf is analyzed for nitrogen content.

5. Assessments of the health of kelp plants in the San Onofre region beds are made on a quarterly basis. Parameters assessed include: success of juvenile recruitment, density of kelp plants, amount of encrusting organisms and grazing by herbivores and abundance of senile and diseased plants.

Based upon the applicants' extensive comments dealing with the predicted impact of the San Onofre thermal plume on the San Onofre kelp bed, the applicants contend that requirement number 2 in Section 6.2.1.6 is unwarranted and should be deleted.

6.3.1 Water quality monitoring program

Comment 6-4

(page 6-6)

The entire section is in error and should be deleted. The program that the staff discusses in the DES is actually a 1976 draft of the applicants' proposed preoperational oceanographic program. An operational program for San Onofre 2 and 3 has not yet been established.

6.3.3 Aquatic biological monitoring

Comment 6-5

(page 6-7, paragraph 2)

This paragraph states, "The applicant intends to forward a description of the study with a schedule for completion to NRC by December, 1978, (see ER, Suppl. 1, p. S1-31)."

In keeping with efforts to avoid duplication and utilize the 316(b) study results, the study plan submittal to the NRC will be made after the completion of the methods development phase of 316(b). We presently anticipate that the 316(b) method development phase will be completed in early 1979, and, therefore, the study plan should be submitted to the NRC by mid-1979.

6.3.3 Aquatic biological monitoring, and

6.3.5 Requirements for Environmental Technical Specifications

Comment 6-6

(page 6-6 and 6-7)

The DES states in Section 6.3.3, paragraph 2 and in requirement number 3, Section 6.3.5, that "...the ichthyoplankton study now being conducted and the required kelp preoperational program should be continued during operation of the facility until such time as it is possible to state credibly that no significant impacts result from the facility."

The ichthyoplankton study being conducted is a one year program to provide a baseline for comparison with the operational ichthyoplankton study which is also envisioned to be a one year program. Further, as stated in applicants' Comment 6-4, the required kelp preoperational program is considered to be unwarranted and the requirement should be deleted.

8. NEED FOR THE STATION

8.2 APPLICANT'S SERVICE AREAS AND REGIONAL RELATIONSHIPS

8.2.1 Applicant's service areas

Comment 8-1

(page 8-1, paragraph 2)

The reference number used in the discussion appears to be incorrect.

8.3 BENEFITS OF STATION OPERATION

8.3.1 Minimization of production costs

Comment 8-2

(page 8-3, Table 8.1)

Table 8.1 was derived from the applicants' ER-OLS, Table 1.1-3 and page S.2-188. However, the data found on ER-OLS Table 1.1-3 is not the most current for 1976 and will be updated in a future amendment to the ER-OLS. The applicants have revised Table 8.1 of the DES to reflect changes in data as reported to the Federal Power Commision on Form 1, Annual Operating Report for Southern California Edison Company for the year ending December 31, 1976.
(Revised Table 8.1 (Attachment X))

8.3.2 Energy demand

Comment 8-3

(page 8-4, paragraph 2)

The discussion on the overestimation of peak demands in the 1973 forecast should also mention load management programs. The applicants suggest the last sentence be rewritten as follows:

> "These peak demands were overestimated because the 1973 forecast did not foresee the Arab oil embargo, the following period of economic recession, the nationwide effort to promote energy conservation, and load management."

Comment 8-4

(page 8-4, paragraph 3 and Table 8.3)

The staff's evaluation is based on the 1976 forecast data provided by the applicants in their ER-OLS. The data found on ER-OLS Table 1.4-1[a] is based on an early 1976 forecast and does not reflect the revised forecast (July 23, 1976) data found on ER-OLS Table 1.1-1. SCE has revised Table 8.3[b] of the DES based on ER-OLS Table 1.1-1 and their revised 1976 forecast. The last line in the second paragraph has been changed by the applicants to be consistent with the revised data and reads as follows:

> "SCE's revised 1976 forecast shows a peak demand growth rate of 3.9% from 1976 to 1985, and energy requirements are expected to experience a growth rate of 4.3% in the same period."

a. ER-OLS Table 1.4-1 will be revised in a future amendment to the ER-OLS.

b. Revised Table 8.3 (Attachment Y).

Comment 8-5

(page 8-5)

The discussion of the three forecasts that states, "their projections do not reflect non-price-induced conservation...," this does not consider current SCE forecast methodology. Non-price-induced standards were incorporated into SCE's peak demand forecasts, e.g., the peak demand for 1985 includes a 2.4% reduction due to load management and the "weather sensitive demand" for 1985 was reduced 29% because of building insulation and air conditioning efficiency standards (Reference 19 and 20). Therefore, the discussion on page 8-5, specifically paragraphs 1, 3 and 4 should be modified.
(see Attachments Q and R)

10. BENEFIT-COST SUMMARY

10.2 BENEFITS

Comment 10-1

(page 10-1, paragraph 2, and page 10-2, Table 10.1)

The net power output for each unit is estimated to be in the range of 1052 to 1106 MWs (see Comment A-1 for discussion). The regional generating capacity will be increased 2104 to 2212 MWe with the addition of Units 2 and 3. The discussion on the primary benefit and Table 10.1 should be revised to reflect the estimated net power output.

10.7 SUMMARY OF BENEFIT-COST

Comment 10-2

(page 10-3, item (2))

The "possible destruction of at least a portion of the San Onofre Kelp Bed during summer months by the heated water discharge" is listed as an additional environmental cost. Because this cost is based on an assessment performed by the staff using disputed data, the applicants request that this cost be deleted if the reassessment of Section 5.4.2.1 Effects of the heat dissipation system warrants such a change.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
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Project # D-NRC-K06002-CA

William H. Regan, Jr., Chief
Environmental Projects, Branch 2
Division of Site Safety & Environmental
Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Regan: FEB 13 1979

The Environmental Protection Agency has received and reviewed the draft environmental statement for the SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 and 3, SOUTHERN CALIFORNIA EDISON COMPANY, SAN DIEGO GAS AND ELECTRIC COMPANY.

EPA's comments on the draft environmental statement have been classified as Category ER-2. Definitions of the categories are provided on the enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequence of the proposed action and the adequacy of the environmental statement.

EPA appreciates the opportunity to comment on this draft environmental statement and requests three copies of the final environmental statement when available.

If you have any questions regarding our comments, please contact Betty Jankus, EIS Coordinator, at (415)556-6695.

Sincerely,

Sheila M. Prindiville

for Paul De Falco, Jr.
Regional Administrator

Enclosure

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Water Quality Comments

1. In Section 5.3.1.1., some assessment is made of the effects of the discharge of heated cooling water on the receiving coastal waters with regards to the California State thermal standards. When evaluating thermal discharge, all effects of Units 2 and 3 should be considered in conjunction with the effects of Unit 1. The natural background is a situation where none of the three units is operating. The natural receiving water temperature as defined by California Thermal Plan (see next paragraph) is "the temperature of the receiving water at locations, depths, and times which represent conditions unaffected by any elevated temperature waste discharge". Unless Units 2 and 3 are not planned to operate concurrently with Unit 1, their effects will occur in concert. All modeling, graphs, and maps produced from models should include Unit 1 effects when evaluating SONGS' effects on the receiving water temperature.

   Under Section 316(a) of the Federal Water Pollution Control Act of 1972 (FWPCA) and under the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (1975 Thermal Plan) (EPA approved State water quality standards), there are several criteria which discharges to coastal waters must fulfill. These should be addressed in any EIS on operating a new coastal discharge of elevated temperature wastes. These are as follows:

   a. In part 3.B.(3.) of the Thermal Plan, it is stated that "the maximum temperature of thermal waste discharges shall not exceed the natural temperature of receiving waters by more than 20°F." Part 3.2.2. of the DEIS states that the cooling water "experiences an 11.1°C (20°F) temperature rise across the condenser." Since the waters in the vicinity of the intakes for Units 2 and 3 are close to the discharge structures for these units, it is possible that these intake waters are already heated beyond their natural temperature. Some evaluation of this effect must be included in the FEIS. The influence of the heated discharge from Unit 1 must also be described. In addition, the intake

and discharge facilities and their depths and how temperature stratification profiles relate to the 20°F requirement should be discussed.

b. In Part 3.B.(4) of the Thermal Plan, it is stated that "the discharge of elevated temperature wastes shall not result in increases in the natural water temperature exceeding 4°F at (a) the shoreline, (b) the surface of any ocean substrate, or (c) the ocean surface beyond 1,000 feet from the discharge system. The surface temperature limitation shall be maintained at least 50 percent of the duration of any complete tidal cycle." Figure 5.3 of the DEIS represents projected incremental increases above natural surface temperatures for the study area. This figure should be changed in the FEIS to include the Unit 1 intake and discharge structures and the increase of surface temperatures already caused by Unit 1 discharges in conjunction with those of Units 2 and 3 so as to compare the increases with the true natural surface water temperature.

c. In addition, the FEIS should document the estimate (Section 5.3.1.2) of the increase in temperatures at the surface of the ocean substrate around the discharges. This estimate indicates that "violations of the state thermal standards are unlikely." Again, such estimates should compare natural temperatures to the combined effects of Units 1, 2, and 3. These temperatures are of special concern because of the importance of low basal temperatures to maintaining the nearby kelp bed.

d. Finally, the Thermal Plan and Section 316(a) of the FWPCA assert the need to "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made". In Section 5.4.2.1 of the DEIS, biological/ecological evaluations refer to the effects of the discharges on various types of organisms, indicating the effects to be minimal and acceptable. For plankton, the effects will be "species composition changes" and

"greater respiration rates", also, "significant effects should be localized". For fish, the effects will be mainly "shifts in the types of species (and their numbers) which inhabit the area". For benthic fauna, adverse effects may be expected if "weekly mean temperatures of 22°C prevail for one month or more or where daily temperatures reach or exceed 24°C. It is not, however, anticipated that temperatures averaging 22°C will occur for more than 2 to 3 weeks or that the area experiencing temperatures of 24°C or greater as a result of SONGS operation will be considerably larger than the area experiencing these temperatures under natural conditions". For kelp, the information "suggests that the thermal discharges from SONGS 1, 2 and 3 may result in the destruction of at least a portion of the San Onofre Kelp Bed during the summer months". All of these statements indicate that the indigenous populations will be altered, giving no specific documentation that these effects will be minimal or acceptable. A detailed evaluation of how the aquatic ecosystem will be affected, over what area each species or type of fauna may be influenced, and what constitutes a significant adverse effect should be made and presented clearly in the FEIS.

2. Section 5.4.2.1. Thermal Effects, mentions a final report due on December 29, 1978. This study, provided for under the Thermal Plan and Section 316(a) of the FWPCA, is to be used in evaluating the heat-treatment process which is used to clear the intake facilities of biological growth. EPA considers this study to be an integral part of the assessment of the environmental effects of the thermal discharges from the Units. As such, it must be distributed, along with biological and water quality assessments and conclusions (perhaps in the form of a supplement to the DEIS) to all recipients of this DEIS, with the allowance of a comment period prior to incorporation in the Final EIS.

3. Section 5.4.2.2 includes a discussion of the potential effects of chlorine discharges. The discussion evaluated potential "significant impacts" of the periodic 15-minute chlorine dosing period. The FEIS should include a comparison of effluent concentrations with the State Standards contained in the Water Quality Control Plan for the Ocean Waters of California (1978 Ocean Plan), Table B and Footnote 11, should appear in the EIS. Should the comparison predict that the discharges exceed the requirements, the plans to lower the discharge concentration to agree with the State Standards must be described in the FEIS.

4. No assessment appears in the DEIS of the potential seismic effects of nearby faults on the units, although there is a fault within a mile of the plant (the Christianitos Fault and others in the vicinity). The FEIS should address the potential of seismic events and the resultant damage from fault movement, with particular emphasis on the water quality and off-site radiological contamination.

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Radiological Comments

Beach Regulation

This DEIS gives little information on the anticipated beach population. The presence of thousands of daytime beach users and hundreds of overnight campers within 1.5 miles from the reactors has significant security, emergency planning, and radiation dose implications. Consequently, we believe this issue warrants a thorough discussion in the Final EIS so that those reviewers who will not read the Environmental Review and Emergency Plan will be aware of this situation and have an opportunity to evaluate it.

We agree with the decision to restrict usage of the beach in front of the reactors since it will simplify the security and emergency planning problems and will reduce the radiation doses to the population from routine release. However, the practical effectiveness of this restriction should be addressed in the FEIS (e.g., is the prohibition against restricting the area seaward of mean high water, coupled with permitting viewing and pedestrian passage going to make enforcement difficult?).

It would be helpful to briefly mention the Emergency Response Plan that is in effect for the Nuclear Station and relate it to the transient population.

As mentioned under the Dose Commitment section, it is not clear whether beach users and Visitor Center users are included in the individual and population dose calculations.

Environmental Dose Commitments

Page 5-31-34 of the DEIS:

The estimated maximum individual dose and the population dose were independently checked by EPA with results similar to those presented in the DEIS. However, we do have several questions about assumptions used in the DEIS calculations. The FEIS should clarify the following items:

1. The manner in which the individual and population dose to users of the beach is calculated is unclear. For example, what allowance is made for direct radiation doses, especially to those using the walkway between the south and north beaches, and to those at the Visitors Center? Do the individual and population doses include these users of the beach and the Visitors Center and, if so, what assumptions were made on hours of exposure, shielding factors, etc.? Also, it would be helpful if the habits of "a maximum individual" were described so it could be determined to what extent these various pathway dosages are additive.

2. The actual maximum individual dose from present operation of Unit 1 should be described. This dose should be added to those being projected for Units 2 and 3 (from all pathways). This, in turn, should be compared with the 25 millirem per year limit (75 millirem per year to the thyroid) of the Uranium Fuel Cycle Standard (40 CFR 190).

EPA is encouraged that the NRC is now calculating annual population dose commitments to the U.S. population, which is a partial evaluation of the total potential environmental dose commitments (EDC) of H-3, Kr-85, C-14; iodines and "particulates." This is a big step toward evaluating the EDC which EPA has urged for several years. However, it should be recognized that several of these radionuclides (particularly C-14 and Kr-85) will contribute to long-term population dose impacts on a world-wide basis, rather than just in the U.S. To the extent that the draft statement (1) has limited the EDC to the annual discharge of these radionuclides, (2) is based on the assumption of a population of constant size, and (3) assesses the doses during 50 years only following each release, it does not fully provide the total environmental impact. Assessment of the total impact would (1) incorporate the projected releases over the lifetime of the facility (rather than just the annual release), (2) extend to several half-lives or 100 years beyond the period of release, and (3) consider, at least qualitatively or generically, the world-wide influences on the total environmental impact or specify the limitations of the model used.

Environmental Monitoring

The pre-operational and operational radiological environmental monitoring program (as described in Section 6.1.5 of the Environmental Report) appears adequate with the following exceptions which the FEIS should address:

1. A delay of 8 days before analyzing charcoal filter air samples would permit over 99% of the Iodine-133 and 50% of the Iodine-131 to decay before being counted. The decay would be much greater for contamination occurring at the beginning of the 7-day sampling period. The maximum time before analyzing filters should be shortened significantly in order to detect as many incidences of sporadic contamination as possible.

2. It is not clear why a minimum of only ten 7-day air particulate samples are required per quarter. The intent should be to monitor all 13 weeks in a quarter.

3. No TLD stations are indicated for the walkway along the seawall or the mean high water exclusion area in front of the reactors. It would be desirable to include TLD's at these locations to monitor the direct radiation at a site boundary where the public has access.

Reactor Accidents

The EPA has examined the NRC's analyses of accidents and their potential risks. The analyses were developed by NRC in the course of its engineering evaluation of reactor safety in the design of nuclear plants. Since these issues are common to all nuclear plants of a given type, EPA accepts NRC's generic approach to accident evaluation in the DEIS. However, the NRC is expected to continue to ensure safety through plant design and accident analyses during the licensing process on a case-by-case basis.

In 1972, the AEC initiated an effort to examine reactor safety and the resultant environmental consequences and risks on a more quantitative basis. The final report of this effort was issued in October 1975 by the U.S. Nuclear Regulatory Commission as the Reactor Safety Study, WASH-1400 (NUREG-75/014). The EPA's review of this study

included in-house and contractual efforts, and our comments were released in a report in June, 1976. In subsequent discussion with NRC we determined that of the concerns we expressed, those having the most significance with regard to the results of the study were on (1) the latent cancer health effects and (2) the probability of BWR scram failure where we differed by factors of four and a maximum of ten, respectively. We believe that the methodology of the Reactor Safety Study should continue to be used as a tool in the evaluation of nuclear systems that vary from the models chosen for the study, and that a generic analysis should be made of the acceptability of the present risks and the necessity for increased levels of safety.

High-Level Waste Management

The techniques and procedures used to manage high-level radioactive wastes will have an impact on the environment. To a certain extent, these impacts can be directly related to the individual projects because the spent fuel from each new facility will contribute to the total waste. The AEC, on September 10, 1974, issued for comment a draft statement entitled "The Management of Commercial High-Level and Transuranium-Contaminated Radioactive Waste" (WASH-1539). In this regard, EPA provided extensive comments on WASH-1539 on November 21, 1974. Our major criticism was that the draft statement lacked a program for arriving at a satisfactory method of "ultimate" high-level waste disposal. At present, DOE is preparing a new draft statment which will discuss waste management and emphasize ultimate disposal in a more comprehensive manner. EPA concurs with this decision and will review and comment on the new draft statement replacing the September 10, 1974 version when it is available.

EPA is cooperating with both NRC and DOE to develop an environmentally acceptable program for radioactive waste management. In this regard, on November 15, 1978, EPA issued proposed environmental radiation protection criteria (43 FR 53262) for the management of all radioactive waste and will propose environmental radiation protection standards for high-level waste in 1979.

Transportation

In its earlier reviews of the environmental impacts of transportation of radioactive material, EPA agreed with AEC that many aspects of this program could best be treated on a generic basis. The NRC has codified this generic approach (40 FR 1005) by adding a table to its regulations (10 CFR Part 51) which summarizes the environmental impacts resulting from the routine transportation of radioactive materials to and from light-water reactors. These regulations permit the use of the impact values listed in the table in lieu of assessing the transportation impact for individual reactor licensing actions if certain conditions are met. Since San Onofre appears to meet these conditions and since EPA agrees that the routine transportation impact values in the table are reasonable, the generic approach appears adequate for this plant.

The impact value for routine transportation of radioactive materials has been set at a level which covers 90 percent of the reactors currently operating or under construction. However, the basis for the impact, or risk, of transportation accidents is not as clearly defined. At present, EPA, DOE, and NRC are each attempting to more fully assess the radiological impact of transportation risks. The EPA will make known its views on any environmentally unacceptable conditions related to transportation. On the basis of present information, EPA believes there are no unique characteristics of the San Onofre site which would result in greater accident risks than from the "typical" site being studied generically.

Fuel Cycle and Long-Term Dose Assessments

EPA is responsible for establishing generally applicable environmental radiation protection standards to limit unnecessary radiation exposures and radioactive materials in the general environment resulting from normal operations that are part of the total uranium fuel cycle as well as those of the facilities. The EPA has concluded (in 40 CFR 90) that environmental radiation standards for nuclear power industry operations should take into account the total radiation dose to the population, the maximum individual dose, the risk of health effects attributable to these doses (including the future risks arising from the release of long-lived radionuclides to the environment), and the effectiveness and costs of effluent

control technology. EPA's Uranium Fuel Cycle Standards are expressed in terms of dose limits to individual members of the general public and limits on quantities of certain long-lived radioactive materials released to the general environment.

A document entitled "Environmental Survey of the Uranium Fuel Cycle" (WASH-1248) was issued by the AEC in conjunction with a regulation (10 CFR 50, Appendix D) for application in completing the cost-benefit analysis for individual light-water reactor environmental reviews (39 FR 14188). This document is used by NRC in draft environmental statements to assess the incremental environmental impacts that can be attributed to fuel cycle components which support nuclear power plants.

Recently, the NRC decided to update the WASH-1248 survey. We believe this is a prudent step and commend the NRC on initiating this update. In providing comments to the NRC on this subject, dated November 14, 1978, we encouraged NRC to express environmental impacts in terms of potential consequences to human health, since for radioactive materials and ionizing radiation the most important impacts are those ultimately affecting human health. We believe the presentation of environmental impact in terms of human health impact fosters a better understanding of the radiation protection afforded the public.

A second major concern of EPA deals with the discharge and dispersal of long-lived radionuclides into the general environment. In the areas addressed in WASH-1248, there are several cases in which radioactive materials of long persistence are released into the environment. The resulting consequences may extend over many generations and constitute irreversible public health commitments. This long-term potential impact should be considered in any assessment on health impact. EPA has consistently found inadequate the NRC's estimates of population doses for these persistent radioactive materials. In particular, the NRC has generally limited their analysis to the population within 50 miles of a facility or, in rare cases, to the U.S. population, and to doses committed for a 50-year period by an annual release. These limitations produce incomplete estimates of environmental impacts and underestimate the impact in some cases, such as from releases of tritium, Krypton-85, Carbon-14, Technetium-99, and Iodine-129. The total impact of these

persistent radionuclides should be assessed, qualifying such estimates as appropriate to reflect the large uncertainties. In this regard, we note that NEA is addressing this approach in making assessments and that NRC is represented in this effort.

Another major consideration in updating WASH-1248 is the health impact from Radon-222 from the uranium mining and milling industry. Estimates made by EPA, among others, indicate that Radon-222 contributes the greatest fraction of the total health impact from nuclear power generation. In preparing an updated WASH-1248, we believe NRC should:

1. include the Radon-222 contribution from both the uranium mining and milling industries;

2. determine the health impact to larger populations, not only the local populations;

3. recognize the persistent nature of the Radon-222 precursors (Th-230 and Ra-226) by estimating the health impact for a period reflecting multi-generation times.

Decommissioning

The NRC has published a proposed rulemaking on Decommissioning Criteria for Nuclear Facilities in the Federal Register on March 13, 1978. EPA comments were sent to NRC on July 5, 1978, dealing with the decommissioning issue.

In summary, we believe that one of the most important issues in the decommissioning of nuclear facilities is the development of standards for radiation exposure limits for materials, facilities, and sites to be released for unrestricted use. We have included the development of such standards among our planned projects. The work will require a thorough study to provide necessary information, including a cost-effectiveness analysis for various levels of decontamination.

The development of standards for decommissioning must, of course, include consideration of the many concurrent activities in radioactive waste management and radiological protection. EPA has developed proposed Criteria for Radioactive Waste for management of all

radioactive wastes which will provide guidance for decommissioning standards. From the decommissioning view, probably the most important criterion is that limiting reliance on institutional controls (guards and fences) to a finite period. EPA believes that the use of institutional control to protect the public from retired nuclear facilities until they can be decontaminated and decommissioned should be limited at the most to 100 years and preferably less than 50 years. This includes nuclear reactors shut down and mothballed or entombed for a period of time under protective storage. After the allowable institutional care period is over, the site will have to meet radioactive protection levels established for release for unrestricted use. We believe EPA's proposed criteria would be directly applicable, as above, to decommissioning of nuclear facilities and should be given serious consideration by the Nuclear Regulatory Commission (NRC).

The availability of adequate funds when the time to decommission arrives is also most important; it should be the responsibility of the NRC to assure that such provisions are made. We recognize the great complexity of providing funds at construction for decommission in 40 years. However, if it can be determined that the total cost of decommissioning in current dollars is a very small fraction of initial capital costs, provision of escrow funding may not be necessary. Therefore, we urge the NRC to conduct the necessary studies and assessments to determine unequivocally costs of decommissioning and to compare such costs to initial capital costs. It is only through a definitive analysis, and perhaps through realistic demonstrations, that this issue can be resolved.

EIS CATEGORY CODES

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objection to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Marvin I. Lewis
6504 Bradford Terrace
Phila. PA 19149
3-6-79.

Director, Division of Site Safety Environmental Analysis
Office of nuclear Reactor Regulation
USNRC
Washington. /d.C. 20555
Sir:
NUREG 0490 does a lot of things , but it does not in any way justify the operation of the San Onofre Nuclear Generating Station.

Although the NUREG does provide a lot of good information, this information actually contradicts the usefulness of the SONGS, San Onofre Nuclear Generating Station. For instance, the growth rate in Table 2.2 ,Page 2-2, is 3.5 % or less for the period 1976 to 1990. The growth rate in Table 8.3 and 8.4 on Pages 8-4and 8-5 is close to 5% for the same period. Inotherwords , the growth rates in various parts of the report are 'selected ' to provide justification for whatever the writer wishes to justify in any particular part of the report. This technique is called 'fiction'.

In Appendix D-23 Page 2.5 Seismology is dismissed in a few paragraphs. Considering the recent and continuing seismic discoveries at the Hosgri fault at Diablo Canyon (which is in a similar -in fact same- gelological domain), passing off seismology this cavalierly is indefensible.

Page 5-37. First you state in a Table that the Commissioner has directed that Radon 222 will be reconsidered elsewhere; then, the Staff includes Radon 222 in this Nureg in a convoluted and artificial manner which does not in any way investigate or acknowledge Radon 222's full period of toxicity as required by NEPA.

Page 5-39 Tailings are not required to be stabilized forever, and even if it were required , forever stabilization is a God like requirement which may be impossible to mortal men.

Chapter 7. This is based entirely on the Rasmussen Wash 1400 . Commisssioner Kennedy has already stated on October 16, 1978, "It (Rasmussen Report) found some deficiencies which suggest that the absolute values of the risks presented in the Study should not be used uncritically either in the regulatory process or for public policy purposes."

The DES for operation of SONGS proves unequivocally that this nuclear power plant is unnecessary and dangerous. This is despite the Stall evaluation which ignores all important negative effects.

DO NOT LICENSE THIS NUCLEAR POWER PLANT TO OPERATE AT THE EXPENSE

OF HUMAN LIVES.

Marvin I. Lewis

A-45

Southern California Edison Company
P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

J. H. DRAKE
VICE PRESIDENT

TELEPHONE
213-572-2258

April 6, 1979

Director, Office of Nuclear Reactor Regulation
Attn: Wm. H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Gentlemen:

Subject: San Onofre Nuclear Generating Station
Units 2 and 3
Docket Nos. 50-361 and 50-362

Mr. Oliver Lynch, Jr., of the NRC staff called on March 27, 1979, to request clarification of Applicants' Comment 6-4 to the Draft Environmental Statement for San Onofre Nuclear Generating Station, Units 2 and 3. Applicants' Comment 6-4 was submitted with other comments by letter to you dated February 2, 1979.

In response to Mr. Lynch's request, a revised Comment 6-4 is enclosed for your information. If you have additional comments regarding this comment, please contact me.

Sincerely,

Enclosure

7904240399

Cooper 1/1

6.3.1 Water Quality Monitoring Program
Comment 6-4 (Revised April 6, 1979)
(Page 6-6)

The first five paragraphs of this section of the DES describe a proposed operational monitoring program which was presented in the ER-OLS (Section 6.2) and was based upon the proposed preoperational monitoring program also presented in the ER-OLS. The ER-OLS was developed in 1976 and submitted in 1977 to the NRC.

Since that time, the Preoperational Monitoring Program has been revised to incorporate the latest site specific study results and recent developments in marine ecological study techniques. The revised Preoperational Monitoring Program was approved by the NRC and implemented in 1978. It is the Applicant's intention to develop an operational monitoring program which incorporates results of the Preoperational Monitoring Program and submit it in the near future for approval. It was the intention of Comment 6-4 to indicate that the specific details of the operational monitoring program proposed in the ER-OLS in 1976 (and contained in the DES) should not be considered to represent the program which will actually be implemented. While the program which will ultimately be implemented will be similar to the one included in the ER-OLS, it will not be identical, and the differences between the two cannot be specified at this time because the development process is still underway.

A-46

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Attorney for Intervenors

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	Docket Nos. 50-361 OL 50-362 OL
SOUTHERN CALIFORNIA EDISON COMPANY, et al.,	COMMENTS ON DRAFT ENVIRONMENTAL STATEMENT - SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3
(San Onofre Nuclear Generating Station, Units 2 and 3)	

We have carefully reviewed the above draft environmental statement in relation to the requirements imposed by Section 102(2)(c) of the National Environmental Policy Act (NEPA) and 10 CFR Part 51 of the NRC Regulations, and have set forth below intervenors' comments on the proposed action and on this draft statement pursuant to 10 CFR Part 51.25. Intervenors find this draft statement inadequate in a) the discussion and assessment of environmental effects, both beneficial and adverse, associated with the operation of the San Onofre Nuclear Generating Station, Units 2 and 3, and b) the discussion and consideration of available alternatives to the proposed action. Intervenors specifically identify the following deficiencies:

1. The evaluation of cooling water discharge impacts is

inaccurate and misleading. The heated water will very likely result in the destruction of at least a portion of the San Onofre kelp bed during the summer months, the long-term thermal impacts are likely to be severe, and violations of the state standards will occur. On page 5-7 of the DES it is stated: "The staff concludes that although there exists a remote possibility that state thermal standards could be violated by the operation of Units 2 and 3, violations would, at worst, be infrequent and for short periods. There is no evidence in available drift data to indicate that such an occurence would take place during the summer when thermal impacts would be most severe." This conclusion was apparently based on applicants' "worst case" modeling theory; however, in light of recent findings as a result of studies presently being performed by the Marine Review Committee (MRC) at the request of the California Coastal Commission, it has been determined that the state thermal standards will not be met. The following excerpts from the "Supplemental Staff Report And Recommendations - Review of Thermal Requirements For San Onofre Nuclear Generating Station, Units 2 and 3" prepared by the California State Water Quality Control Board staff are appropriate: "The Report of the MRC confirms the previous prediction that, under normal operating conditions, the proposed discharge will violate the 20 degree F temperature differential in the "receiving waters" i.e., waters at the location and depth of the diffusers of Units 2 and 3. This Report notes: '...if the "receiving" waters are defined as in this paragraph, the standards of the State Thermal Plan will probably be exceeded by the operation of Units 2 and 3.' Although the Report indicates that the discharge will "likely" or "probably"

or "may" violate the temperature differential, there really is no question that such violations will occur." (pp. 4-5)

In a hearing for the purpose of interpreting the term "receiving waters" held on December 21, 1978, the California State Water Quality Control Board held that "...the temperature at the intake point does not represent conditions at the receiving waters," (p. 3 of Opinion of Chairman Bryson and Board Member Mitchell) contrary to applicants' requested interpretation. The net result of this ruling is that the state thermal discharge limitation will be exceeded by operation of SONGS Units 2 and 3.

The DES states at p. 5-27 "The greatest threat of SONGS to the long-term survival of the San Onofre kelp bed is the possibility of injury to the basal tissues from which the canopy is regenerated each year...under extreme worst case conditions (e.g., several days with high ambient temperatures and slack currents, and with all the plants operating continuously), destruction of the basal regenerative tissues might result." The DES further states: "...the community (kelp bed), if destroyed frequently, could never achieve a stable state characteristic of other kelp beds in the area. Furthermore, constant temperature increases coupled with added turbidity would be inimical to interim reestablishment...The perennial occurrence of worst case conditions seems highly unlikely and the staff thus concludes that the long-term thermal impacts from normal station operation are not likely to be severe." (p . 5-27) It is clear that since the state thermal discharge limitation will be exceeded during normal operation of SONGS 2 and 3, the staff's conclusion was based on a faulty premise. Dischargers' normal plant operation will result

in continuous high temperature discharge approximating the worst case conditions and resulting in both short and long-term thermal impacts on the San Onofre kelp beds. The DES states at p. 5-27 "It has been rather well established that temperatures above 18-20 degrees C. (64-68 degrees F) cause deterioration of kelp, and the degree of degradation is directly related to the duration of the exposure to these temperatures."

2. The DES is inadequate in its discussion of the 316(a) exception process as related to thermal pollution caused by the proposed action. Section 6.4.1 of the DES discusses the "thermal exception studies" as related only to periodic "heat treatment" to control fouling organisms. The DES fails to consider the 316(a) exception required for continuous high ambient temperature discharges during the normal operations of Units 2 and 3. It is highly likely that a 316(a) exception request will be forthcoming from applicants in light of the recent denial by the California State Water Quality Control Board of applicants' requested interpretation of the term "receiving waters" as used in the State Thermal Plan. Had applicants' interpretation been approved, it would have obviated applicants' need for a 316(a) exception to the requirements of the FWPCA. Because a 316(a) exception is necessary for the operation of Units 2 and 3 in their present design mode, the DES is inadequate for failure to consider the implications, both short and long-term, on the aquatic environment if such an exception is granted. With respect to the maximum temperature of thermal waste discharges, and contrary to the requirements of 10 CFR Part 51.23(c), due consideration was not given to "...compliance of the facility construction or operation

and alternative construction and operation with environmental quality standards and requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection, including applicable zoning and landuse regulations and water pollution limitations or requirements promulgated or imposed pursuant to the Federal Water Pollution Control Act."

3. The DES is inadequate in its evaluation and analysis of the social and economic impact of operating SONGS 2 and 3.

A. With respect to the environmental impact of SONGS on recreational resources, the DES recognizes the failure of applicants to comply with the terms and conditions of the construction permit: "The current plan to restrict the use of approximately 25% of the 3 1/2 mile San Onofre Beach for the 30-year operating life of the plant is a significant loss of valuable recreational and scenic space and represents a substantial change in action between issuance of the FES-CP and application for an operating license." (Section 5.6.5) Staff reiterates previous statements made in the FES-CP that "the beach...is considered to be a unique and scarce recreational resource," (FES-CP, p. 2-11) and "that closure even for a brief period is objectionable" (FES-CP, p. 8-11). Despite the re-affirmation of these judgments, staff concludes that the social and economic impact of operating SONGS 2 and 3 - with the significant exception of restricting public use of the beach - will be only "moderate". The overall impact will be more severe than "moderate" if the beach access restriction is factored into the balancing process. Staff's treatment of this issue is misleading and inconsistent

with the purpose and intent of NEPA, section 102(2)(c), which calls for preparation of a detailed statement on, among other things, any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Restriction of the public's use of this beach is such an irreversible and irretrievable commitment of resources.

B. With respect to the economic impact of SONGS 2 and 3, the DES provides no analysis of the effects of the Jarvis-Gann Amendment (Proposition 13). The DES states that "The applicant should reassess the potential tax benefits accruing to these jurisdictions and districts in light of Proposition 13." (p . 5-44) This is a wholly inadequate treatment of the economic impact of SONGS 2 and 3, inasmuch as the revenue from the plant and its allocation within communities will be "significantly different from what was assumed" - to use the staff's own words - in this economic impact analysis. (p . 5-44, section 5.6.4)

4. The DES inadequately evaluates the environmental impact of postulated accidents in that Class 9 occurrences were omitted from consideration. (Section 7-1) The DES states on p. 7-2 with respect to Class 9 occurrences that "Their consequences could be severe." The DES fails to discuss the probability of Class 9 occurrences in a complete and comprehensive manner. In view of the recent earthquake fault discoveries near the San Onofre site and the existence of the dewatering-well cavities found beneath the site, a full discussion of failures more severe than those required for consideration in the design bases of protective systems and engineered safety features (Class 9) is warranted. Further, the estimated dose of 1400.00 man-rems to population in

the 50-mile radius for a large-break loss of coolant accident (Table 7.2, p. 7-3, Class 8.1) is substantial and inadequately discussed, if at all, in the text.

5. The DES is inadequate in that it fails to discuss the environmental impacts to the region in the event of an accidental release of radiation requiring evacuation. No discussion is contained in the DES as to the adaptability of the San Onofre site to adequate evacuation processes including evacuation of the nearby beach areas during times of peak use; no discussion is contained in the DES as to the suitability of existing evacuation plans; no discussion is contained in the DES as to the effects which adoption of the NRC/EPA Task Force Report on Emergency Planning (NUREG-0396) will have on evacuation within the new and expanded Emergency Planning Zone as distinct from the presently designated Low Population Zone (NRC Regulations 10 CFR Part 100).

6. The DES is inadequate in that it fails to reassess the seismic design basis for SONGS 2 and 3 in light of a) the dewatering-well cavities and b) the recent earthquakes and faults discovered since the current design basis was established.

7. The DES is inadequate in that the cost/benefit analysis fails to provide consideration for the greatest possible escalation of uranium prices, based on recent occurrences, for SONGS 2 and 3 over the operating life of the plant. The projected fuel costs identified as $87,900,000/yr for 1981 (Table 10.1, p. 10-2), will possibly escalate to a prohibitively high level since long-term uranium contracts are generally tied to market price at delivery or 7$ per year escalation, whichever is greater Staff admits (section 10.3) that since the issuance of the FES-CP

the fuel, operating, and maintenance costs of nuclear plant operation have escalated more rapidly than anticipated. The DES does not discuss adequately the possibility of additional future escalation of costs with respect to the fuel requirements of San Onofre, and does not utilize a "worst possible case" approach to determine total fuel costs over the operating life of the plant. The cost/benefit analysis contained in the DES is therefore invalid.

8. The DES is inadequate in that it fails to discuss the possibility that decommissioning costs may escalate to prohibitively high levels by the end of the operating life of the plant, at which time the applicant is required to prepare a proposed decommissioning plan for review by the NRC. (Section 9.4) Although NRC regulations do not require the applicant to have developed a decommissioning plan at the time an operating license is obtained, the discussion of alternative decommissioning methods and their associated costs found in the DES is misleading and does not present an accurate projection of what the actual decommissioning costs for SONGS will be. Staff calculations for determining decommissioning costs per unit of electricity generated do not utilize a start-up date of 1981 or an escalation rate based on the current rate of inflation. Staff's projection that "For the SONGS Units 2 and 3 the decommissioning costs would be about double that indicated for all of the decommissioning one-unit alternatives" (p. 9-17) is wholly inadequate for purposes of making an informed cost/benefit judgment. As a consequence, the cost/benefit analysis for SONGS 2 and 3 is invalid.

9. The DES is inadequate in that it fails to comprehensively

discuss the temporary storage of nuclear waste materials, including the interim storage of spent fuel, on site.

10. The DES is inadequate in that it fails to discuss the issue of plant security and provide assurances that all nuclear materials will remain accounted for and protected from the risk of terrorist or criminal activity or sabotage.

Because due consideration was not given to compliance with the requirements of 10 CFR Part 51.23(c), and because this DES fails to consider all environmental impacts of the proposed action and alternatives to the proposed action as required by Section 102(2)(c) of NEPA, staff's conclusion that the action called for is the issuance of operating licenses for Units 2 and 3 of SONGS is premature and founded on insufficient and inaccurate data.

For the foregoing reasons, intervenors request that the NRC either a) adequately address the issues raised above in the final environmental statement for SONGS 2 and 3, or b) deny applicants' request for licenses to operate SONGS 2 and 3.

Dated: Jan 30, 1979

Respectfully submitted,

Richard J. Wharton

RICHARD J. WHARTON
Attorney for Intervenors

COMMENTS ON
SUPPLEMENT TO
DRAFT ENVIRONMENTAL STATEMENT

A-51

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON 20426

IN REPLY REFER TO:

January 23, 1981

Mr. Frank J. Miraglia
Acting Chief, Licesning Branch
No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Miraglia:

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I am replying to your request of January 16, 1981 to the Federal Energy Regulatory Commission for comments on the Supplement to the Draft Environmental Impact Statement related to the operation of the San Onofre Nuclear Generating Station, Units 2 and 3. This Draft EIS has been reviewed by appropriate FERC staff components upon whose evaluation this response is based.

This staff concentrates its review of other agencies' environmental impact statements basically on those areas of the electric power, natural gas, and oil pipeline industries for which the Commission has jurisdiction by law, or where staff has special expertise in evaluating environmental impacts involved with the proposed action. It does not appear that there would be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should this action be undertaken.

Thank you for the opportunity to review this statement.

Sincerely,

Jack M. Heinemann
Advisor on Environmental Quality

8102020408

United States Department of Agriculture
Economics and Statistics Service
Washington, D.C. 20250

January 26, 1981

Mr. Frank J. Miraglia
Acting Chief, Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Miraglia:

Thank you for forwarding the Supplement to the Draft Environmental Statement for the San Onofre Nuclear Generating Station, Units 2 and 3.

We have reviewed the material, Docket Numbers 50-361 and 50-362, and have no comments at this time.

Sincerely,

MELVIN L. COTNER
Director, Natural Resource
Economics Division

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8102020412

Oceanside, California
January 6, 1981

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

I wish to comment on the environmental impact report your organization supplied on the installation and licensing of the nuclear installations at San Onofre which are practically in our back yards:

1.- From what I read in the Oceanside Blade-Tribune no mention was made re. the extreme hazards and the potential of submarines from an enemy action shelling these huge nuclear concrete domes, shattering them thereby releasing that deadly nuclear radiation which could depopulate this entire area. We think this is a tremendous oversight and needs to be studied along with earthquake consideration.

1a.- A remedy in the area of earthquakes and wartime action would be to pipe some of that 100 trillion cubic feet of natural gas that CBS's 60 Minutes said exists under the U.S. continent. (President Reagan's own people admit to this). And fire the San Onofre steam boilers with this gas and eliminate all of the dangers on which you debate. I pray to God that you consider this alternative and act upon it. People's lives and health are more important than corporate profit.

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2.- We believe that due to the fact that SB G&E will control only 20% of the nuclear output and Southern California Edison will control 80% and by grid more all of this 80% of this generated power to areas that are not threatened by radiation that these should be (if these plants are activated) from 60% to 30% rate discounts for people who live close to this operation. This proposal is now before the Calif. Public Utilities Commission. If you license these plants we would appreciate your recommendation to the PUC. France and Japan presently are allowing this type of discount due to the hazards of nuclear energy. If the proposal does have precedent.

8102110284

Office of Nuclear Reactor Regulation (2) January 6, 1981

3.- To be complete and legally valid, we believe that all elements relating to the subject need to be included in the EIR. Apparently the subject of potential enemy action on these nuclear plants was not included and it needs to be discussed.

In closing may I request an answer to the positions expressed in this letter. I will be extremely grateful. I remain.

Very sincerely

Frank H. Grundell
1888 Blackhawk St
Oceanside, Calif 92054

Perspective
TIMES-ADVOCATE
SUNDAY, JANUARY 25, 1981 C-1

Nuclear neighbor asks for discount

By DICK PHILLIPS
T-A Staff Writer

OCEANSIDE — An Oceanside man is working to achieve a considerable reduction in utility rates for those living near the San Onofre nuclear power plant.

Frank Arundel, 1888 Blackhawk St., proposed the compensation for those residents he thinks live in a danger zone — near San Onofre. He thinks they should get a 60 percent discount in electrical rates.

Residents within 30 miles should receive 50 percent rate reduction, he says, and those within a 30- to 40-mile radius a 40 percent rate reduction; people living in a 40- to 50-mile radius should have their rates cut by 30 percent.

"People here are being gouged to death by utility rates," said Arundel, 73. "With this plan, the next time they build a nuclear plant, they'll put it out of the umbrella of people where it wouldn't be troublesome in case of earthquake or war. They wouldn't put these plants at our backdoor.

"If we have to live here and bear the brunt of nuclear power, we should be beneficiaries of cheap electricity, particularly if 80 percent of the energy produced there will be transmitted outside this area anyway."

Arundel's plan did not impress the Public Utilities Commission, which has indicated there is little chance of seeing the policy implemented statewide.

The "chances of this plan flying are slim" because it would be discriminatory ratemaking, one PUC spokesman said.

San Onofre, 19 miles north of Oceanside, has one operating nuclear plant, which was shut down for repairs through most of 1980. Units 2 and 3 are nearing completion, at a cost of $2.3 to $5 billion. Both are designed to produce 1,100 megawatts of electricity.

Southern California Edison, based in Los Angeles, holds 80 percent interest in the nuclear plant and SDG&E has 20 percent. The SDG&E service area consumes about 2,300 megawatts of electricity.

Martin Matties, legal adviser to John Bryson, PUC chairman, said copies of Arundel's proposal have been given to the commissioners for study. "But, I don't know of any action planned on the subject," Matties said.

He said the commission reaches decisions in three ways. Under one, a consumer may apply for a rate change. "This is one way Arundel could intervene and advocate his proposal," Matties said.

"Or, he could file a complaint against a utility for discriminatory rates, for example. But, the burden of proof is upon the complainant and it's difficult to win a case this way," Matties said.

The commission can also initiate an investigation into an area of interest. "It's possible the PUC may decide to pursue this and investigate," Matties said.

In his reply to Arundel, Matties said he discussed several problems with the discounted rate plan. "If the PUC adopts rate discounts based on unfavorable aspects of having a utility company in the neighborhood, people will make other demands based on similar situations," the adviser said.

For example, those living near an operating fossil fuel plant suffer because of pollution, he said. Transmission lines may be another unfavorable aspect. "The commission is already faced with substantial complications in ratemaking procedures," Matties said.

Arundel disagrees: "If we're going to put up billions of dollars for these plants and they're going ahead and build them anyway, we should be the beneficiaries." He said 220,000 area residents would fall under the discount plan.

Frank Arundel: 'We bear the brunt'

United States Department of Agriculture
Soil Conservation Service
2828 Chiles Road
Davis, CA 95616
(916) 758-2200

February 11, 1981

Mr. Frank J. Miraglia
Acting Chief, Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miraglia:

The Soil Conservation Service has reviewed the Supplement to the Draft Environmental Statement for San Onofre Nuclear Generating Station, Units 2 and 3. We find no controversial items within the realm of SCS responsibilities.

This Environmental Statement Supplement reveals no conflicts with any of the ongoing projects within our jurisdiction. No prime land will be lost to the proposed project.

We appreciate the opportunity to review and comment on this report.

Sincerely,

FRANCIS C. H. LUN
State Conservationist

cc: Norman A. Berg, Chief, SCS, Washington, D.C.
Jack Smith, Area Conservationist, Escondido, CA

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The Soil Conservation Service is an agency of the Department of Agriculture

SCS-AS-1
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United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

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MAR 2 1981

Mr. Frank J. Miraglia
Acting Chief
Licensing Branch No. 3
Division of Licensing
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miraglia:

We have reviewed the supplement to the draft environmental statement for San Onofre Nuclear Generating Station, Units 2 and 3, San Diego, California, and find we have no comments.

The opportunity to review this document is appreciated.

Sincerely,

CECIL S. HOFFMANN
Special Assistant to
Assistant SECRETARY

4-55

RICHARD J. WHARTON
Attorney at Law
University of San Diego
Alcala Park, California 92110

(714) 291-6480 Ext. 4376

Attorney for Intervenors

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of SOUTHERN CALIFORNIA EDISON COMPANY, et al. (San Onofre Nuclear Generating Station, Units 2 and 3)	DOCKET Nos. 50-361 OL 50-362 OL JOINT INTERVENORS COMMENTS ON SUPPLEMENT TO DRAFT ENVIRONMENTAL STATEMENT RELATE TO OPERATION OF SAN ONOFRE NUCLEAR GENERATING STATIONS, UNITS 2 and 3 (NUREG-0490)

The Supplement to Draft Environmental Statement (NUREG-0490, December, 1980), hereinafter referred to as NUREG-0490, prepared by the Office of Reactor Regulation (Staff) of the United States Nuclear Regulatory Commission (NRC) related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS 2 and 3) has been reviewed by Intervenors in relation to the requirements imposed by the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321, et seq.), 10 C.F.R. Part 51, and 40 C.F.R. Part 1502. Intervenors comments on the proposed action and on NUREG-0490 are made pursuant to 10 C.F.R. Part 51.25 and 40 C.F.R. Part 1503.

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The purpose of NUREG-0490 was "to identify and evaluate the site-specific environmental impacts attributable to accident sequences that lead to releases of radiation and/or radioactive materials including sequences that can result in inadequate cooling of reactor fuel and to melting of the reactor core." NUREG-0490, p. vi. These accident sequences are commonly referred to as meltdowns or Class 9 accidents.

The NRC's historic first site-specific impact study of a meltdown accident at a California nuclear reaction is inadequate, incomplete and misleading. NUREG-0490 is misleading because it does not provide decision-makers with sufficiently detailed information regarding the potential environmental impacts of a meltdown at SONGS 2 and 3 to aid them in a substantive decision whether or not to proceed with granting an operating license to this federal nuclear project in light of the economic and other consequences of an accident at SONGS 2 and 3. NUREG-0490 does not encourage public participation because it does not make adequate information available to the public in non-technical language about the potential economic and environmental impacts that could affect the lives of twelve million people. NUREG-0490 appears inadequate and incomplete when compared with other independent meltdown impact analyses.

After the Three Mile Island accident, which resulted in mass evacuations and temporary relocation of many people, the California State Legislature passed a law (Senate Bill 1183, now Section 8610.5 of the Government Code), which required the State

Office of Emergency Services (OES) to prepare Emergency Response Plans for potentially severe nuclear accidents involving the release of large amounts of radiation. In order to plan for such accidents, the State required information of the potential scenarios and consequences that could result from meltdowns in California reactors. The State lead agency, OES, contracted with a conservative consulting group, Science Applications, Inc. (SAI), to study the consequences and potential scenarios of meltdowns at California reactors. SAI has conducted research for the NRC, the Department of Energy, nuclear military projects, nuclear utilities, and the nuclear industry. The SAI-OES study was released to the public in Sacramento, California on July 15, 1980. The portion of the SAI-OES study which relates to SONGS 2 and 3 was based on extensive site-specific data whereas NUREG-0490, while it purports to be based on site-specific data, considers mainly excerpted "data, methodology and assumptions" from the WASH-1400 study. The inadequacies of this approach are demonstrated by the following comparison between the SAI-OES study and NUREG-0490 consequence analyses:

The SAI-OES study indicates that the maximum consequences for a nuclear meltdown at SONGS 2 and 3 would be $180 billion in economic cost consequences, NUREG-0490 estimates $35 billion; SAI-OES estimates 16,000 square miles of land contaminated with radiation, NUREG-0490 estimates 3,000 square miles; SAI-OES estimates eight to ten million Southern Californians would be required to relocate and leave their homes and property for up to ten years. Four to five million of them would have to be relocated longer than ten

years, NUREG-0490 gives no estimates for the magnitude of the population affected by relocation. SAI-OES estimates that in 1975 there were 7.7 million people living within 60 miles of the San Onofre site. Within 100 miles there are approximately 12 million people. The SAI-OES study acknowledges that "Latent deaths from San Onofre can occur within 100 miles, which includes half of the population of California." Another report done for the California State Legislature, discussed below, warns that children within 100 miles downwind from the reactor would receive damage to their thyroid glands and would require surgery due to exposure to radioactive iodine gases. The SAI-OES study also estimates that $6.6 billion in cost consequences could occur within 500 miles of San Onofre following a meltdown. Reports to the President's Council on Environmental Quality warn that areas as far away as 1,000 miles or more could be affected, and that up to 125,000 square miles of land could suffer some contamination or crop or milk interdiction. The possibility exists that Southern California could be permanently contaminated after a meltdown at SONGS 2 and 3. This is not surprising when we look at other accident scenarios and compare their estimates.

One NRC analysis of reactor accidents, WASH-740, estimated that an area the size of Pennsylvania could be permanently contaminated by a meltdown at a reactor significantly smaller than either Unit 2 or 3 at San Onofre. Another report, the Rasmussen report, WASH-1400, estimated that 3,000 square miles of land would be contaminated, but assumed that effective

evacuations would take place out to 30 miles downwind from the reactor accident. NUREG-0490, estimates the maximum consequences of a San Onofre meltdown to be $35 billion in costs for mitigating actions (evacuations, relocations, land interdiction, emergency response by local, county, state and federal teams), 1 million people would receive more than 25 rems, there would be 130,000 acute fatalities, and 300,000 latent cancers in the population within 50 miles who would be exposed to 30 to 40 billion person rems released during the accident.

The consequences of nuclear power plant core melt accidents have also been estimated at the request of the California State Legislature and the President's Council on Environmental Quality by Dr. Jan Beyea and Dr. Frank von Hippel, nuclear physicists with the Princeton University's Program on Nuclear Policy Alternatives of the Center for Energy and Environmental Studies. Dr. Beyea noted in his analysis that a meltdown with a release of radioactive gases from a large reactor could involve "health effects and possible land use restrictions have been considered out to distances of 1,000 miles and for periods of decades after the release." He estimates that up to 175,000 square miles of land could be under some form of interdiction or restricted use following the meltdown. He explains this by saying "The number of health effects and the . . . land contamination can range so high because a substantial fraction of the released radioactivity can be carried for hundreds of miles downwind

before being removed from the atmosphere by deposition on the ground. Dr. Beyea told the President's Council on Environmental Quality (CEQ) that "early fatalities could occur up to 30 miles downwind" of a reactor meltdown. Dr. Frank von Hippel testified before the California State Legislature after Three Mile Island that "the thyroid could receive a radiation dose tens to hundreds of times higher than the rest of the body. Exposed children more than a hundred miles downwind would suffer thyroid damage which would require surgery years later." (emphasis added) NUREG-0490 did not reference the SAI-OES study, in spite of the fact that the Atomic Safety and Licensing Board (ASLB) and the NRC Staff were made aware of the report by Intervenors during July and August of 1980, six months before NUREG-0490 was issued.

The SAI-OES study is a conservative report in that it calculates its predictions and models based on site-specific data. NUREG-0490 is not conservative and is inadequate because it is not sufficiently based on site-specific data. The SAI-OES report used extensive site-specific data regarding the nearby population centers and the various weather conditions in Southern California. That report identified several site-specific unique features which should have warranted a different conclusion from the NRC Staff than "there are no special or unique features about the San Onofre site and environs that would warrant special or additional engineered safety features for the San Onofre plants." Joint Intervenors conclude there are special and unique features that exist at the San Onofre site which are listed as follows:

(1) The three reactors at San Onofre are uniquely located near the intersection of two major Fault Zones, the Cristianitos and the Newport-Inglewood. Prior to 1980, the NRC believed there was no structural relationship between the two Fault Zones. However, in 1980, federal and state marine geologists discovered a new zone of faults which they named "Cristianitos Zone of Deformation" which project directly beneath the three reactors. Thus, the possibility of damage to the reactors during earthquakes is higher now because of the possibility of surface rupture directly under the reactors. This was not factored into the Rasmussen Report, WASH-1400, the Lewis Report, SAI-OES or NUREG-0490. NUREG-0490 does not even mention geologic-seismic site-specific events as a significantly possible factor in the probabilistic risk assessment.

(2) The San Onofre site is uniquely located on the Pacific plate, near the Plate Tectonic Boundary Fault, the San Andreas. San Onofre is moving north in relation to the North American Plate. These reactors are uniquely migrating north on a geologic time scale. Plate Tectonics were not understood when the San Onofre site was originally chosen in 1962. It was not until 1969 that the plate tectonics theories were accepted.

(3) The San Onofre site has the unique feature of being sited close to San Onofre Unit 1. If Unit 1 had a meltdown, it would severely affect operations of Units 2 and 3, resulting in various consequences, none of which were considered in NUREG-0490. The older reactor at the site, San Onofre Unit 1,

was identified by the SAI-OES analysis as having the highest probability of a meltdown of any reactor in California for two primary reasons. "The first reason is that the Unit One auxiliary feedwater system depends on operators to align and initiate the system. Potential failures due to human factors make the system less reliable than automated systems. The second reason relates the long term recirculation mode of emergency core coolant, which requires at least one of two pumps located in the containment. In the event of a pump failure, repairs cannot be made because the pump is inside the containment and would be isolated during an accident." NUREG-0490 does not consider the proximity of SONGS 2 and 3 to Unit 1 to be a unique or special feature.

(4) San Onofre Unit 1 has been shutdown for approximately one year due to leaky corroded steam generator tubes. The NRC issued a report in 1976 (NUREG-0900-5, Report to Congress on Abnormal Occurrences) which explained that "The failure of a number of steam generator tubes as a result of the pressure transients during a loss of coolant accident could render the emergency core cooling system ineffective." The Unit 1 was not designed for the magnitude of ground motions that Units 2 and 3 were. An earthquake could conceivably only damage Unit 1, because of its structurally weak steam generator tubes, but that could result in a LOCA (loss of coolant accident) and a meltdown, which would affect the two other reactors and the environment.

(5) The San Onofre reactors are special and unique in that the reactor core of Unit 2 was installed backwards, necessitating total rewiring of the control room and other systems.

(6) The San Onofre site is unique also in that San Onofre Unit 2 was constructed above earthquake faults that were not discovered until 1974 during construction excavations.

(7) SONGS 2 and 3 are underlain by dewatering cavities that developed during construction. Intervenors believe this also is a special of unique feature at SONGS 2 and 3 which must be considered.

(8) The Southern California region, including San Onofre, frequently has weather inversions. During these inversions, air pollutants, including accidentally leaked radioactive gases, can be trapped beneath the inversion layer, where they can only mix and travel horizontally. Thus, a meltdown at SONGS 2 and 3 could affect the nine to ten million people who live in the air basins that share the same East Pacific high pressure zone inversion layers. Although NUREG-0490 admits that "accident consequences are very much dependent on the weather conditions existing at the time . . ." they do not specifically consider the unique Southern California high pressure inversion layers which are a predominant characteristic of the San Onofre site.

(9) The San Onofre reactors are uniquely located on a Southern California beach state park that stretches for many miles, but which is inaccessible and inescapable except by driving past the reactors on the old-highway, now running parallel to Interstate-5. On a typical summer day, 25,000 persons drive close to the reactors on a narrow and curving road. These beach-goers could be trapped during a meltdown, especially if

an earthquake occurred at the same time or caused it.

(10) Another unique or special feature of San Onofre is its proximity to roads used by thousands of uncontrolled travelers per day which presents a unique possibility for sabotage accidents that could lead to releases of radioactivity.

(11) The San Onofre site is special and unique in that one-half of the population of the State of California lives within 100 miles of the site.

(12) It is a unique feature of SONGS 2 and 3 to be the largest reactors ever considered for operating licenses.

(13) The San Onofre site is unique in that it is sited within contamination distance of a major portion of the nation's fresh produce farms, especially in the winter months.

(14) The San Onofre site is also unique in that it could cause international economic and environmental impacts by contamination of a significant part of Baja California's agricultural resources.

After the Kemeney Commission and the Rogovin Report were issued on Three Mile Island, the Council on Environmental Quality wrote a letter to the Nuclear Regulatory Commissioners on March 20, 1980. The letter released the results of the CEQ review and critized the NRC's lack of compliance with NEPA laws in the EIS analyses of potential accidents at reactors. The CEQ stated that the NRC's EIS discussions of "potential accidents and their environmental impacts was found to be largely perfunctory, remarkably standardized, and uninformative to the public." The CEQ also advised the NRC that "site specific treatment of data

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should be substituted for "'boilerplate' assessment of accident initiating events and potential impacts, and EIS's should be comprehensible to non-technical members of the public..." Intervenors comment upon the fact that NUREG-0490 contains 29 pages of text with about 8 pages of site-specific information which is selective and slanted. NEPA requires detailed statements of aspects of proposed action significantly affecting the quality of the human environment and Intervenors feel NUREG-0490 is inadequate in that it is"largely perfunctory, remarkably standardized and uninformative to the public."

NUREG-0490 is also inadequate in that it failed to consider earthquake induced core melt accidents. While the Reactor Safety Study(RSS), WASH-1400, concluded that the probability of core melt accidents in nuclear power plants from seismic events was insignificant compared to core melt probabilities from other accidents, recent assessment of the potential for earthquake induced core melt accidents suggests that the probability of such events may be significant when compared to core melt accidents from other causes considered by RSS. Intervenors contend that the seismic design basis for SONGS 2 and 3 is inadequate and, therefore, consider it prudent to evaulate the potential for seismic-induced core melt accidents at SONGS 2 and 3 to establish if they may be significant factors. The purpose of NUREG-0490 was to identify and evaluate site-specific environmental impacts. It does not evaulate the potential for seismic-induced core melt accidents and, therefore its probabilistic assessment of risk at SONGS 2 and 3 is inadequate.

NUREG-0490 is further inadequate and particularly misleading in its assessment of health affects avoidance (Section 7.1.1.4). NUREG-0490 did not mention thyroid blocking in its assessment of health affects avoidance, relying only on restriction of contaminated property and foodstuffs. Dr. Frank von Hipple in his testimony before the California State Legislature states:

> The thyroid can be protected against absorbing radioiodine, however, if before the cloud arrives you take about one thousand times your ordinary daily iodine intake in the form of potassium iodide (the form of iodine present in iodized salt). This will saturate the thyroid with ordinary iodide and reduce its ability to absord the radioactive iodide when it arrives. This strategy was recommended in the American Physical Society's reactor safety study four years ago. The Food and Drug Administration approved potassium iodide for emergency thyroid 'blocking'. . . I would recommend that California do two things with regard to this thyroid protection strategy:
>
> 1) Develop a stockpile of potassium iodide in the appropriate dosage in either sealed foil wrapped pills or liquid solution. This would not be costly. Based on a 1972 study for the Defense Civil Preparedness Study, it appears that enough pills for the entire nation could be produced for a few million dollars.
>
> 2) The more difficult part of the job would be to develop an effective distribution system. If one waited until a cloud of radioiodine had been released before distributing the blocking chemical and informing the public of its use, one might well be too late. (A week after the beginning of the crisis at Three Mile Island, the Pennsylvania state government refused to distribute the chemical to the population within 10 miles of the site - despite the joint recommendation to do so from the Surgeon General, the Food and Drug Commissioner, and the Director of the National Institutes of Health who thought that sufficient warning time might not be available to protect this population

> in case a release occurred. On the other hand, if people were given potassium iodide to keep in their medicine cabinets along with asprin, it is likely that many would lose track of it pretty quickly. Perhaps it should be attached by the local utility to household electricity meters and its presence announced in case of need. The best strategy is obviously a problem well worth a study. California could break some important ground here."

Section 7.1.1.4. is particularly misleading in its statement that "radiation hazards in the environment tend to disappear by the natural process of radioactive decay (but) can continue for a relatively long period of time -- months, years or even decades." (emphasis added) This misleading statement fails to note that some ratioactive wastes from nuclear accidents such as radioactive Strontium and Cesium can enter the food chain and remain a hazard for 1,000 years or more. Other isotopes remain a hazard for 1 million years or more.

NUREG-0490, Section 7.1.3. entitled Mitigation of Accident Consequences is inadequate in that it fails to note that consequences could be reduced by retrofitting SONGS 2 and 3 with filtered venting systems to prevent accidental releases of radioactive gases.

NUREG-0490, Section 10 is misleading, inadequate and incomplete. The Section contains three sentences with regard to its conclusions and Re-Evaluated Benefit-Cost Balance. This section should be expanded because the environmental risks of a Class 9 accident involve the entire region of Southern California, Norther Baja California, Mexico, and parts of Arizona. These regions could be permanently contaminated with radiation following a coremelt at SONGS 2 and 3. The risks involve the

value of all real and personal property, both public and private in those regions. The risks involve fatalities, latent cancer deaths and genetic damage. The risks involve compensation to victims in the event of such accidents. Section 10 of NUREG-0490 concludes that the environmental risks of Class 9 - coremelt accidents - "does not change the results of the cost-benefit balance contained in the Draft Environmental Statement (Section 10)."

CONCLUSION

NUREG-0490 concludes "that there are no special or unique features about the San Onofre site and environs that would warrant special or additional engineered safety features for the San Onofre plants." Intervenors conclude there are unique characteristics at SONGS 2 and 3 that warrant additional engineered safety features especially in light of the unique earthquake hazard which could cause a coremelt accident and common-cause failure of essential safety systems at SONGS 2 and 3. A future earthquake near the San Onofre site could be the common cause for failure of the cooling systems of all three reactors on the San Onofre site and all three of the spent fuel pools simultaneously. This would be the worst case accident that should be analyzed by the NRC and this analysis should be a part of a revised NUREG-0490.

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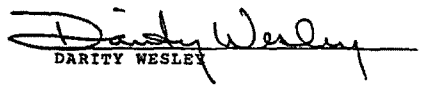
CERTIFICATE OF SERVICE

I hereby certify that the JOINT INTERVENORS COMMENTS ON SUPPLEMENT TO DRAFT ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SAN ONOFRE NUCLEAR GENERATING STATIONS, UNITS 2 AND 3 (NUREG-0490) have been served on the following by deposit in the United States mail, first class, postage prepaid, this 9th day of March, 1981:

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Director, Division of Licensing

Executed on March 9, 1981 at San Diego, California.



DARITY WESLEY

Union of
CONCERNED
SCIENTISTS

9 March 1981

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Director, Division of Licensing

Dear People:

Re: Supplement to the Draft Environmental Statement (NUREG-0490) related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3

Herewith are some brief comments on the above Supplement, in response to your invitation.

We are pleased that the NRC has finally published a document providing a hint of the consequences of severe accidents at the San Onofre Station. We consider, however, that this Supplement does not satisfy the intent of the Commission's Statement of Interim Policy of 13 June 1980 (Federal Register, 45, 40101). Nor does this Supplement provide the public with information sufficient to make a reasoned assessment of the risks of severe accidents at this plant.

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You will recall that the Commission's Statement of Interim Policy followed a letter of 20 March 1980 from the Chairman of the Council on Environmental Quality (CEQ) to the Chairman of the NRC. Included in this letter was the statement:

> "The results of our review of impact statements prepared by the NRC for nuclear power reactors are very disturbing. The discussion in these statements of potential accidents and their environmental impacts was found to be largely perfunctory, remarkably standardized, and uninformative to the public."

This Supplement must be substantially revised and improved before it overcomes these CEQ criticisms. For guidance during this process of revision and improvement, the NRC staff should consult the report "NRC's Environmental Analysis of Nuclear Accidents: Is It Adequate?", prepared for CEQ by the Environmental Law Institute (ELI) in February 1980. A copy of this

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report was provided to the NRC with the CEQ Chairman's letter.

Part 5 of the ELI report recommends that the NRC should continue, with some substantial improvements, its previous practice of studying a selection of accident scenarios. The ELI report recommends that this selection should be expanded to include "Class 9" accidents. Section 7 (Environmental Impact of Postulated Accidents) of the San Onofre Draft Environmental Statement (dated November 1978) exemplifies this previous practice; it estimates radiation doses for a number of selected accidents in Classes 1 through 8. This Supplement, however, merges nine release categories, weighted by assumed probabilities. The results of this analysis are confusing for the public; one might suspect that this is by intention.

Each accident scenario should be considered alone. For each scenario, the NRC should provide a clear account of:

(i) the nature of the postulated accident

(ii) the estimated nature of the radioactive release

(iii) the estimated nature of the environmental consequences of that release.

The Commission's Statement of Interim Policy directs:

> " . . . approximately equal attention shall be given to the probability of occurrence of releases and to the probability of occurrence of the environmental consequences of those releases."

This Supplement does not satisfy the intent of that directive. It merges these two probabilities although they are of quite different natures. One might suspect that this approach is selected in order to persuade the public that severe consequences have extremely low probabilities. This form of analysis and presentation does not fulfill the NRC's obligation to accurately inform the public.

As the NRC staff should well know, probabilities in nuclear accident analysis fall into two distinct categories:

(i) probability of occurrence of release
This category of probability concerns engineering estimates. These are very difficult to make since there is a limited statistical base and much of the uncertainty relates to human behaviour.

(ii) probability of occurrence of environmental consequences, given a particular release

This category of probability concerns factors such as wind speed and direction. These factors can be estimated from a good statistical base.

The NRC staff should revise this Supplement so as to exhibit their estimates of these probabilities separately, within each accident scenario studied.

The Commission's Statement of Interim Policy also directs:

> " . . . consequences shall be characterized in terms of potential radiological exposures to individuals, to population groups, and, where applicable, to biota."

This Supplement does not fulfill the intent of that directive. It provides very limited information on the geographical variation of potential exposure. More seriously, it provides essentially no information on the significance of exposure for different population groups. As the NRC staff should well know, certain population groups (especially children and fetuses) are at greater risk for a given release.

The importance of revising this Supplement, so as to accurately inform the public, can be illustrated by two estimates which can be gleaned from the supplement itself:

(i) probability of occurrence of the "PWR2" core melt accident

This release is one of the most severe accidents considered in the Reactor Safety Study (WASH-1400) and this Supplement. Table 7.1.4-2 of the Supplement estimates its probability as 7×10^{-6} per reactor-year. Section 7.1.4.2 concedes that this estimate could be low by a factor of 100. One thus finds (assuming a reactor life of 30 years) that this Supplement admits that a "PWR2" accident could have a 4% probability of occurrence during the life of San Onofre Units 2 and 3.

(ii) potential for serious health effects

Table 7.1.4-4 of this Supplement admits that a severe accident at San Onofre could lead to 130,000 acute fatalities, 300,000 subsequent fatal cancers, and 600,000 genetic effects.

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In the light of the grave hazard shown by these estimates, the NRC has a clear duty to provide the public with more complete information than is contained in this Supplement.

Thank you for your attention.

Sincerely,

G.R. Thompson

Gordon Thompson, Ph.D.
Staff Scientist

GT:VN

UNITED STATES ENVIRONMENTAL PROTE
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

Project # DS-NRC-K06002-CA

Frank J. Miraglia, Acting Chief
Licensing Branch No. 3
Division of Licensing
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miraglia:

The Environmental Protection Agency (EPA) has received and reviewed the Draft Supplement (DS) to the Draft Environmental Impact Statement (DEIS) for the project titled SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3.

In our previous reviews of environmental documents dealing with Light Water Reactors (LWR) EPA has consistently emphasized the need for a thorough evaluation of the environmental impacts from different LWR accident scenarios to include Class 9 accidents. The discussion of the environmental and societal impacts of a core melt down accident included in the Supplement to the Draft Environmental Impact Statement for the San Onofre Nuclear Generating Station, Units 2 and 3 is a step forward in this respect and, as a result, EPA applauds the Nuclear Regulatory Commission's (NRC) decision to prepare this Supplement.

The assessment of environmental impacts for severe accidents at the plant uses methodologies originally developed in the Reactor Safety Study (WASH-1460) and the Liquid Pathway Generic Study (NUREG-0440). Because these two studies will be the cornerstones for similar assessments for other nuclear power plants environmental statements, we would refer NRC to EPA's original technical comments on these studies. These comments can be found in "Reactor Safety Study (WASH-1400): A Review of the Final Report" and a letter from EPA's Office of Federal Activities to NRC dated February 8, 1977.

Our specific comments on the San Onofre Supplemental DEIS and generic comments are attached. The EPA appreciates the opportunity to comment on this Draft Supplement. Should the NRC choose to revise other sections of the EIS, EPA would like to review these documents. If you have any questions regarding our comments, please contact Susan Sakaki, EIS Review Coordinator, at (415)556-7858.

Sincerely yours,

Jake Mackenzie, Director
Surveillance and Analysis Division

Attachment

A-65

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EPA Technical Comments on the Supplement to the Draft Environmental Statement Related to the Operation of the San Onofre Generating Station Units 2 and 3 (NUREG-0490)

General Comments

The Final EIS for San Onofre Units 2 and 3 is dated March 1973. This statement contains a Section 7, titled "Environmental Impact of Postulated Accidents." It is not clear if the Supplement is to replace the original information or if the Supplement is supplemental. If this information is supplemental then we would suggest that the original Section 7 be revised to agree with the supplemental statements and data.

It would also be hoped that any previous information and conclusions would be revised if it is impacted by events occurring since 1973 or by a change in Commission consideration. For instance the supplement refers to the original Section 5.5 and further mentions 10 CFR Part 20 and 10 CFR Part 50. However, the supplement does not make any mention of the Commission's implementation of 40 CFR 190 for normal operation.

Specific Comments

Table 7.1.4-4

This table should correspond on a one-to-one basis with the release categories (PWR 1-9) in Table 7.1.4-2. It is also not readily apparent how the PWR 1-9 compares to the original Table 7.1.

Design Basis Accidents

In the discussion of accident risk and impact assessment of Design Basis Accidents (DBAs), Section 7.1.4.1, we do not understand the intent of the comparison of the results in Table 7.1.4-1 to the Reactor Site Criteria of 10 CFR 100. First, the infrequent accidents listed in Table 7.1.4-1 do not meet the requirements of 10 CFR 100 for purposes of site analysis. Footnotes to 10 CFR 100 state:

> (1)...calculations should be based upon a major accident, hypothesized for the purposes of site analysis...that would result in potential hazards not exceeded by those from any accident considered credible, and
>
> (2)...this 25 rem whole body value and the 300 rem thyroid value have been set forth as reference values, which can be used in the evaluation of reactor sites with respect to potential reactor accidents of exceedingly low probability of occurrence, and low risk of public exposure to radiation.

Secondly, by the description of infrequent accidents in the supplement ("events that might occur once during the lifetime of the plant"), these accidents have an annual probability of occurrences on the order of 10^{-2}, are considered credible, and are not of exceedingly low probability of occurrence. Reference to 10 CFR 100 and its implementation provide a misleading inference that, since the results shown in Table 7.1.4-1 are within the dose values of 10 CFR 100, the risk of those infrequent accidents is small and therefore acceptable. Also, the radiation doses listed in Table 7.1.4-1 are calculated using a conservative model approach which is relevant to safety evaluations and not consistent with the realistic approach to the assessment of environmental risks of normal operation and severe core melt accidents.

The discussion of impacts of infrequent accidents and limiting faults, in both the original DES and the Supplement, addresses probabilities of occurrence qualitatively. Yet, in the discussion of the more severe core melt accidents the probabilities of occurrence are quantified (Table 7.1.4-2). For consistency in the presentation of all environmental risks, the probabilities of occurrence of infrequent accidents and limiting faults DBA's should also be provided.

It is not clear whether the risks listed in Table 7.1.4-5, Annual Average Values of Environmental Risks Due to Accidents, include those from infrequent accidents and limiting faults (Table 7.1.4-2), postulated accidents (Table 7.2 of the original DES), and accidents leading to the PWR 1-9 release categories (Table 7.1.4-2). The risks should include all those from moderate frequency accidents, infrequent accidents, limiting faults and severe core melt accidents. Although the risk of the infrequent accidents and limiting faults is "judged to be extremely small" and appear to be overshadowed by the risk from core melt accidents, they should be fully presented. The risks from the more probable yet lower consequence accidents may indeed be significant to the individual risk and should be listed in the Supplement. It would also be beneficial to extend Figures 7.1.4-3, 7.1.4-5, and 7.1.4-7 to include the higher probability accidents.

It would be helpful to provide a summary table of the annual average value of environmental risks from operation of all the reactors at the San Onofre site. The risks

should include all those from normal operations, moderate frequency accidents, infrequent accidents, limiting faults and severe core melt accidents. Both societal and individual risks should be presented.

7.1.1.3 Health Effects

The statement that a dose greater than about 25 rem is necessary before any physiological effects to an individual are clinically detectable should be reviewed. Information contained in a World Health Organization technical report No. 123 would seem to indicate that physiological changes can occur at exposures as low as 10 rem.

7.1.3.3 Emergency Preparedness

It is unclear what is the basis of the statement, "Emergency preparedness plans including protective action measures for the San Onofre facility and environs are in an advanced, but not yet fully completed stage." The plans (seven) are at this date undergoing informal review by the Region IX Regional Assistance Committee (RAC). Thus, there has been no request for formal review, there has been no drill schedule established and there has been no full scale exercise. We do not concur in the Commission's statement that these plans are in an advanced stage.

Table 7.1.4-5

It is not clear from the information presented regarding risk and protective action that protective actions can be taken to reduce exposures by 10-20 times or in fact to prevent exposures determined by the State of California to be unacceptable considering the following:

1. The emergency preparedness plans and protective action measures for the San Onofre facility are not yet complete.
2. The State of California does not use the EPA's Protective Action Guides (PAG's).

In view of the above, we feel the statements made are premature.

Figure 7.1.4-8

This figure, "Relative Directional Risk to Individuals," might be a useful risk analysis. However, as presented, the figure is illegible and lacking in background information. It should be presented more clearly, with an accompanying table or coding explaining the significance of the numbers.

Decommissioning

The cost of reactor decommissioning and replacement power costs are as large as the costs from the Three Mile Island accident. It would seem that these costs could significantly change the cost-benefit information originally provided in Section 13. Future EIS's or Supplements to EIS's should include an evaluation of these costs.

San Diego
ASSOCIATION OF
GOVERNMENTS
Suite 524, Security Pacific Plaza
1200 Third Avenue
San Diego, California 92101
(714) 236-5300

March 19, 1981

Mr. Dino C. Scaletti
San Onofre Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Scaletti:

On March 16, 1981, the Board of Directors of the San Diego Association of Governments (SANDAG) adopted a resolution supporting the operation of San Onofre Nuclear Power Plant Units 2 and 3 and requested the Nuclear Regulatory Commission to grant an operating license for these units subject to federal regulations regarding the safety of nuclear power plant operations and emergency planning for nuclear power plant accidents. This resolution and the supporting staff report are attached.

Please call me or have your staff call Steve Sachs of my staff if you have any questions about the Board of Directors action.

Sincerely,

for RICHARD J. HUFF
Executive Director

RJH/SS/sc

Attachments

cc: Patricia Fleming, SDG&E
Fred Massey, SCE

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MEMBER AGENCIES: Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, Vista and County of San Diego

San Diego ASSOCIATION OF GOVERNMENTS

RESOLUTION No. 81-36

RESOLUTION SUPPORTING THE OPERATION
OF SAN ONOFRE NUCLEAR POWER PLANT
UNITS 2 AND 3
SUBJECT TO FEDERAL REGULATIONS REGARDING THE
SAFETY OF NUCLEAR POWER PLANT OPERATIONS AND
EMERGENCY PLANNING FOR NUCLEAR PLANT ACCIDENTS

WHEREAS, the Energy 2000 Task Force, appointed by Mayor Wilson of the City of San Diego, presented the conclusions and recommendations of its report to the SANDAG Board of Directors on February 23, 1981; and

WHEREAS, one of the recommendations of the Energy 2000 Task Force is to support the completion and operation of San Onofre Plants 2 and 3; and

WHEREAS, San Onofre Units 2 and 3, if completed and operated on schedule, will supply approximately half of the additional electricity needs forecast for the San Diego region between now and 1995; and

WHEREAS, the Nuclear Regulatory Commission will begin licensing hearings for San Onofre Units 2 and 3 in June 1981; and

WHEREAS, federal regulations concerning nuclear power plant safety and emergency response planning will have to be met in order for a license to be granted; NOW THEREFORE

BE IT RESOLVED that the Board of Directors supports the operation of San Onofre Nuclear Power Plant Units 2 and 3 and requests the Nuclear Regulatory Commission to grant an operating license for these units subject to federal regulations regarding the safety of nuclear power plant operations and emergency planning for nuclear plant accidents.

PASSED AND ADOPTED this 16th day of March 1981.

ATTEST: _____ SECRETARY

_____ CHAIRMAN

MEMBER AGENCIES: Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, Vista and County of San Diego

SAN DIEGO ASSOCIATION OF GOVERNMENTS

RESOLUTION NO. 81-36 DATE CONSIDERED: 3/16/81

AGENCY	YES	NO	ABSENT	ABSTAIN
CARLSBAD	X			
CHULA VISTA	X			
CORONADO	X			
DEL MAR		X		
EL CAJON	X			
IMPERIAL BEACH	X			
LA MESA	X			
LEMON GROVE	X			
NATIONAL CITY	X			
OCEANSIDE	X			
SAN DIEGO	X			
SAN MARCOS	X			
SANTEE	X			
VISTA	X			
TOTALS	13	1		

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I certify from personal observation and count that the above results are an accurate record of the SANDAG Board of Directors vote and action.

Betty Clark

San Diego Association of Governments

BOARD OF DIRECTORS

DATE: March 16, 1981 AGENDA REPORT No.: R-95

CONSIDERATION OF SUPPORT FOR OPERATION OF SAN ONOFRE NUCLEAR POWER PLANT UNITS 2 AND 3

Introduction

The Board requested this report as the basis for considering a resolution to support the operation of San Onofre Nuclear Power Plant Units 2 and 3. Three important points the Board should consider before taking a position are:

- The risks to health and life of both present and future generations and the costs of reducing these risks associated with almost all aspects of the nuclear fuel cycle, are extremely controversial. There is little scientific or technical consensus on the severity of the risks and the effectiveness or cost of strategies to reduce these risks.

- San Onofre Units 2 and 3 would provide 440 MW of electric power to the San Diego region - almost one-half of the additional power requirments forecast to be needed between now and 1995 for the SDG&E Service Area by SDG&E and the California Energy Commission. These forecasts include the effects of existing conservation and alternative energy source programs which will reduce electricity demand. Potential additional electricity supplies and conservation and alternative energy sources which could result in a balance between demand and supply over the next 10 to 20 years without San Onofre Units 2 and 3 have been identified (see attachment for a partial list) but are not yet committed. In some cases, these sources may be infeasible or unavailable.

- The construction of San Onofre Units 2 and 3 is nearing completion. About one-half of the total $3.4 billion projected construction cost has been expended. The plant is currently undergoing U.S. Nuclear Regulatory Commission review in order to obtain an operating license.

It is my

RECOMMENDATION

that the Board of Directors support the operation of San Onofre Nuclear Power Plants 2 and 3 and request the Nuclear Regulatory Commission to grant an operating license for these units subject to federal regulations regarding the safety of nuclear power plant operations and emergency planning for nuclear plant accidents.

Discussion

San Onofre Units 2 and 3 are scheduled to have a total capacity of 2,200 megawatts (MW) of electricity. SDG&E is a 20% partner in the plan. is therefore entitled to 440 MW of the electricity generated. The other 1,760 MW is scheduled to be used by Southern California Edison Company (76%) and Municipal Utilities serving the Cities of Anaheim and Riverside (total of 4%).

The Nuclear Regulatory Commission (NRC) is the federal agency responsible for issuing nuclear power plant operating licenses. The NRC will hold hearings on the license applications for San Onofre Units 2 and 3 starting in June 1981.

There are many environmental and economic issues related to the operation of San Onofre Units 2 and 3 which include:

- Cost and reliability of nuclear power
- Risk of accidents from transport of uranium, spent nuclear fuel and operation of the plants.
- Cost of decommissioning the plants.
- Ability of the plants to withstand earthquakes.
- Hazards, cost and technical feasibility of long-term storage of radioactive wastes.
- Scope and adequacy of emergency plans to reduce radiation exposure in the event of an accident.

At the licensing hearings in June, it appears that the most controversial issues will be the ability of the plants to withstand earthquakes and the adequacy of emergency planning in case of an accident that could impact surrounding areas. The Plant must meet federal standards in both of these areas before a license will be issued.

RICHARD J. HUFF
Executive Director

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San Diego ASSOCIATION OF GOVERNMENTS

RESOLUTION No. 81-36

RESOLUTION SUPPORTING THE OPERATION
OF SAN ONOFRE NUCLEAR POWER PLANT
UNITS 2 AND 3
SUBJECT TO FEDERAL REGULATIONS REGARDING THE
SAFETY OF NUCLEAR POWER PLANT OPERATIONS AND
EMERGENCY PLANNING FOR NUCLEAR PLANT ACCIDENTS

WHEREAS, the Energy 2000 Task Force, appointed by Mayor Wilson of the City of San Diego, presented the conclusions and recommendations of its report to the SANDAG Board of Directors on February 23, 1981; and

WHEREAS, one of the recommendations of the Energy 2000 Task Force is to support the completion and operation of San Onofre Plants 2 and 3; and

WHEREAS, San Onofre Units 2 and 3, if completed and operated on schedule, will supply approximately half of the additional electricity needs forecast for the San Diego region between now and 1995; and

WHEREAS, the Nuclear Regulatory Commission will begin licensing hearings for San Onofre Units 2 and 3 in June 1981; and

WHEREAS, federal regulations concerning nuclear power plant safety and emergency response planning will have to be met in order for a license to be granted; NOW THEREFORE

BE IT RESOLVED that the Board of Directors supports the operation of San Onofre Nuclear Power Plant Units 2 and 3 and requests the Nuclear Regulatory Commission to grant an operating license for these units subject to federal regulations regarding the safety of nuclear power plant operations and emergency planning for nuclear plant accidents.

PASSED AND ADOPTED this 16th day of March 1981.

ATTEST: _____
SECRETARY

_____
CHAIRMAN

ATTACHMENT
(From Energy 2000 Task Force Report)

Potential Supply Alternatives
For the SDG&E Service Area*
1980-2000

San Onofre 2 and 3	440 MW (nuclear)
Arizona (renewed contract)	400 MW (imported)
New Mexico (renewed contract)	150 MW (imported)
Washington (renewed contract)	100 MW (imported)
Mexico (purchase)	300 MW (imported)
Geothermal	800 MW (geothermal)
Blythe site	1,000 MW (coal gasification)
Hydroelectric	34 MW (hydroelectric)
Cogeneration	100 MW (cogeneration)
Wind	30 MW (wind)
TOTAL	3,354 MW

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SOURCE:

San Diego Gas and Electric Company, September 1979

*Some of these sources may be infeasible or unavailable. For example, Arizona Public Service Company would have to agree to a renewed contract for 400 MW of imported power from Arizona; the feasibility of 1000 megawatts from a coal gasification plant at Blythe has not been proved.

Southern California Edison Company
P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

K. P. BASKIN
MANAGER OF NUCLEAR ENGINEERING, SAFETY, AND LICENSING

TELEPHONE (213) 572-1401

March 24, 1981

Director, Office of Nuclear Reactor Regulation
Attention: Darrel G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

References: Realistic Estimates of the Consequences of Nuclear Accidents, M. Levenson and F. Rahn, EPRI, November, 1980.

This letter provides Southern California Edison Company's comments to the Supplement to Draft Environmental Statement related to the operation of San Onofre Nuclear Generating Station Units 2 and 3 NUREG-0490. In our review of this document we have found two points which we feel are in need of further clarification prior to the issuance of a Final Environmental Statement.

1. The following statement contained in Section 7.1.4.3,

> "The 200-rem whole-body dose figure corresponds approximately to a threshold value for which hospitalization would be indicated for the treatment of radiation injury. The 25-rem whole-body (which has been identified earlier as the lower limit for a clinically observable physiolgical effect) and 300-rem thyroid figures correspond to the Commission's guideline values for reactor siting in 10 CFR Part 100."

requires clarification, to prevent the statement from being misconstrued to state that San Onofre does not meet the Commission siting guidelines of 10 CFR 100.

In order to clearly differentiate between the Class 9 accident and the design basis accidents used in the Commission siting criteria, specific clarification is needed. The traditional Design Basis Accidents (DBA's) are hypothetical and conservative scenarios, evaluated in accordance with regulations and other regulatory guidance which define the required assumptions and methodology. In contrast, the Class 9 accident scenario is defined with no consideration of mitigation by engineered safety features, assumes highly conservative and consequence maximizing behavior of natural mitigation processes. Since the Class 9 accident uses much more conservative, unrealistic, assumptions, it is not considered in the evaluation of reactor siting.

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2. Although uncertainties in probability calculations are discussed in Sections 7.1.4.2 and 7.1.4.7 of the Supplement, the uncertainties in the source terms, and hence the consequences of the accident, are not discussed in either Section 7.1.4.3 or 7.1.4.7. These radiation source terms have been shown to be conservative by experiments performed at Rockwell, Karlsruke, Oak Ridge National Laboratory, General Electric (Aircraft Nuclear Propulsion Department), Bettis National Laboratory, Hanford National Laboratory, and tests performed in the Idaho Reactor Test Site. The results of these tests and experiments, summarized in a paper by M. Levenson and F. Rahn of the Electric Power Research Institute, indicate that natural processes are operating which prevent the release of radioactive nuclides from molten nuclear reactor fuel (Reference 1). Dr. Chauncey Starr, former President of the Electric Power Research Institute advised the Commission, at the Commissions November 18, 1980 meeting in Washington, D.C., that,

> "The important issue is that the initial review of this subject appears to indicate that under any conceivable realistic circumstance, the real source term is likely to result in risk to the public that is less by factors of 10 to 100 than that which was previously estimated."

Using Dr. Starr's estimate of a realistic maximum release into the atmosphere would lower the consequences (acute fatalities and cancer deaths) from a Class 9 accident by 1 to 2 orders of magnitude.

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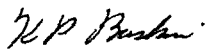
The Final Environmental Statement for San Onofre Units 2 and 3 should be accurate, concise, and not leave room for misinterpretation. Where applicable, all sources of error, and the relative magnitude of error, should be indicated. We hope that these comments will help to make the FES for SONGS 2 and 3 such a document.

Very truly yours,



APPENDIX B

NEPA POPULATION DOSE ASSESSMENT

Appendix B

NEPA POPULATION DOSE ASSESSMENT

Population dose commitments are calculated for all individuals living within 80 km (50 miles) of the facility employing the same models used for individual doses (see Regulatory Guide 1.109, in preparation). In addition, population doses associated with the export of food crops produced within the 80-km region and the atmospheric and hydrospheric transport of the more mobile effluent species such as noble gases, tritium, and carbon-14 have been considered.

B.1 NOBLE GAS EFFLUENTS

For locations within 80 km of the reactor facility, exposures to these effluents are calculated using the atmospheric dispersion models in Regulatory Guide 1.111 and the dose models described in Section 5.5 and Regulatory Guide 1.109. Beyond 80 km and until the effluent reaches the northeastern corner of the United States, it is assumed that all of the noble gases are dispersed uniformly in the lowest 1000 m (3280 ft) of the atmosphere. Decay in transit was also considered. Beyond this point, noble gases having a half-life greater than one year (e.g., Kr-85) were assumed to mix completely in the troposphere of the world with no removal mechanisms operating.

Transfer of tropospheric air between the northern and southern hemispheres, although inhibited by wind patterns in the equatorial region, is considered to yield a hemisphere average tropospheric residence time of about two years with respect to hemispheric mixing. Since this time constant is quite short with respect to the expected mid-point of plant life (15 years), mixing in both hemispheres can be assumed for evaluations over the life of the nuclear facility. This additional population dose commitment to the U.S. population was also evaluated.

B.2 IODINES AND PARTICULATES RELEASED TO THE ATMOSPHERE

Effluent nuclides in this category deposit onto the ground as the effluent moves downwind, which continuously reduces the concentration remaining in the plume. Within 80 km of the facility, the deposition model in Regulatory Guide 1.111 was used in conjunction with the dose models in Regulatory Guide 1.109. Site-specific data concerning production, transport, and consumption of foods within 80 km of the reactor were used. Beyond 80 km, the deposition model was extended until no effluent remained in the plume. Excess food not consumed within the 80-km distance was accounted for, and additional food production and consumption representative of the eastern half of the country was assumed. Doses obtained in this manner were then assumed to be received by the number of individuals living within the direction sector and distance described above. The population density in this sector is taken to be representative of the eastern United States, which is about 410 persons per km^2 (160 persons per mi^2). (This approach is conservative for San Onofre because population densities in the western United States are considerably lower than those in the eastern portion.)

B.3 CARBON-14 AND TRITIUM RELEASED TO THE ATMOSPHERE

Carbon-14 and tritium were assumed to disperse without deposition in the same manner as krypton-85 over land. However, they do interact with an atmospheric residence time of 4 to 6 years with the oceans being the major sink. From this, the equilibrium ratio of the carbon-14 to natural carbon in the atmosphere was determined. This same ratio was then assumed to exist in man so that carbon-14 to natural carbon in the atmosphere was determined. This same ratio was then assumed to exist in man so that the dose received by the entire population of the United States could be estimated. Tritium was assumed to mix uniformly in the world's hydrosphere, which was assumed to include all the water in the atmosphere and in the upper 70 m (230 ft) of the oceans. With the model, the equilibrium ratio of tritium to hydrogen in the environment can be calculated. The same ratio was assumed to exist in man, and was used to calculate the population dose, in the same manner as with carbon-14.

B.4 LIQUID EFFLUENTS

Concentrations of effluents in the receiving water within 80 km of the facility were calculated in the same manner as described above for the Appendix I calculations. No depletion of the nuclides present in the receiving water by deposition on the bottom of the Pacific Ocean was assumed. It was also assumed that aquatic biota concentrate radioactivity in the same manner as was assumed for the Appendix I

evaluation. However, food consumption values appropriate for the average individual, rather than for the maximum, were used. It was assumed that all of the sport and commercial fish and shellfish caught within the 80-km area were eaten by the U.S. population.

Beyond 80 km, it was assumed that all of the liquid effluent nuclides except tritium have deposited on the sediments so they make no further contribution to population exposures. The tritium was assumed to mix uniformly in the world's hydrosphere and to result in an exposure to the U.S. population in the same manner as discussed for tritium in gaseous effluents.

APPENDIX C

EXPLANATION AND REFERENCES FOR BENEFIT-COST SUMMARY

Appendix C

EXPLANATION AND REFERENCES FOR BENEFIT-COST SUMMARY

C.1 ECONOMIC IMPACT OF STATION OPERATION

C.1.1 Direct benefits

C.1.1.1 Energy

2114 MWe x 1000 kW/MW x 365 days x 24 hr/day x capacity factor (0.5 or 0.7). This product ranges from 9.3 x 10^9 kWhr/year (0.5 capacity factor) to 13.0 x 10^9 kWhr/year (0.7 capacity factor).

C.1.1.2 Reduced regional oil consumption

Section 8.3.1 shows that the applicants primarily have oil/gas fired units, which would have to be operated to a greater extent if SONGS 2 & 3 are not operated. The additional fuel oil consumption (assuming a 50% capacity factor for the nuclear units) is calculated as follows:

$$\frac{9.3 \times 10^9 \text{ kWhr} \cdot 9{,}000 \text{ Btu/kWhr} \cdot 1 \text{ bbl oil}}{6.29 \times 10^6 \text{ Btu}} = 13.2 \times 10^6 \text{ bbl oil.}$$

C.1.2 Economic costs

C.1.2.1 Fuel

From Sect. 8.3.1, the staff's estimate of fuel cost is $10.8 per megawatt-hour in 1983. Assuming a 60% capacity factor or 11.1 x 10^6 MWhr/yr gives the value in Table 10.1.

C.1.2.2 Operating and maintenance

Using the staff's OMCST computer code, operating and maintenance costs are estimated to be 4.05 mills/kWhr at 60% capacity, which multiplied by 11.1 x 10^9 kWhr/year gives the values in Table 10.1.

Decommissioning: Based on estimates given in Sect. 9.4, the cost of decommissioning each unit will be $66.7 million in 1978 dollars or $85.4 million in 1980 dollars at the end of the useful life of the plant. If this value is discounted from 2013 to 1983, then annualized over a 30-year life assuming a real interest and discount rate of 4.76%, and then multiplied by 2 units, the value in Table 10.1 is obtained.

APPENDIX D

CULTURAL RESOURCES

STATE OF CALIFORNIA—THE RESOURCES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 2390
SACRAMENTO 95811
(916) 445-8006

DEC 18 1980

Mr. Dino Scaletti
Environmental Projects
Division of Site, Safety,
and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Scaletti:

San Onofre Nuclear Generating Station,
Units #2 and #3, Operating License Stage

My staff has recently completed review of the "National Register Assessment Program of Cultural Resources of the 230 KV Transmission Line Rights-of-Way from San Onofre Nuclear Generating Station to Black Star Canyon and Santiago Substation and to Encina and Mission Valley Substation", prepared by WESTEC Services, dated September 1980.

In accordance with the provisions of the Advisory Council on Historic Preservation's Procedures set forth in 36 CFR 800, Section 106 of the National Historic Preservation Act of 1966 and the Memoranda of Agreement of October 29, 1979, I have the following comments to offer:

1. Based on the information I have been provided, I concur that the following sites are not eligible for National Register of Historic Places: CA-Ora-419, Ora-823, Ora-786, Ora-787, Ora-700, Ora-782, Ora-784, Ora-785, Ora-832, SDi-6693, SDi-6131, SDi-5444, SDi-6136, SDi-6137, SDi-6150, SDi-6151, and SDi-6152.

2. Sites CA-Ora-640, Ora-458, and SDi-6133 are outside the area of potential environmental impact for this undertaking.

3. I do not concur that site CA-Ora-824 is not eligible for the National Register of Historic Places. I feel that this site may be eligible based on Bean and Vane's findings in 1979 that this site possesses a high potential for significance.

4. I concur that the following sites are eligible for inclusion in the National Register as important components of the proposed San Joaquin Archeological District: CA-Ora-495, Ora-496, and Ora-499.

5. The following sites have been determined eligible for inclusion in the National Register as important components of the Upper Aliso Creek Archeological District: CA-Ora-447, Ora-438, and Ora-725.

6. The following sites should also be included as eligible properties within the Upper Aliso Creek Archeological District: CA-Ora-905, Ora-828, Ora-825, Ora-826, and Ora-827.

7. I concur that the following sites are eligible for inclusion in the National Register as significant components of the proposed Santiago Creek Archeological District: CA-Ora-829, Ora-830, and Ora-831.

8. I concur that the following sites are eligible for inclusion in the National Register as significant components of the proposed Agua Hedionda Archeological District: CA-SDi-6135, SDi-6133, and SDi-6140.

9. I also concur that the following sites are locally significant and are eligible for the National Register under Criterion "d" (36 CFR 1202.6): CA-Ora-498, SDi-4538, SDi-6130, SDi-6138, and SDi-6149.

10. Formal determinations of eligibility for these sites and districts should be sought from the Keeper of the Register in accordance with 36 CFR 1204.

11. I concur with the report's findings that this undertaking will have No Effect on eligible sites CA-Ora-905, Ora-828, Ora-826, Ora-827, Ora-829, and SDi-4538.

12. I concur with the report's findings that operation and maintenance (O&M) of access roads will affect the following eligible sites: CA-Ora-498, Ora-824, Ora-495, Ora-447, Ora-496, Ora-499, Ora-825, Ora-725, Ora-830, Ora-831, and SDi-6130. However, I feel that there will no No Adverse Effect on these resources if one of the two following conditions can be met:

    a. Access roads can be covered with a chemically inert, visually distinguishable fill within the boundaries of these sites in a manner which will preclude future ground disturbance of the cultural deposit during future O&M activities on access roads, or;

    b. O&M activities can be restricted to access roads, and the remaining research potential of surface artifacts within the provenience of existing access roads can be used to define the important factors which should be considered in determining the effects of continued disturbances as proposed in the Cultural Resource Management Plan on page 359 of the subject report. This program should be oriented towards defining the value of research potential and the effects that various activities may have on disturbed surface sites in similar environmental contexts. The program should also be responsive to the Advisory Council's Supplementary Guidance for Treatment of Archeological Properties supporting a No Adverse Effect Determination.

13. The information I have been provided indicates that undisturbed cultural deposits will be affected by O&M of access roads in the vicinity of site CA-Ora-438. However, it is my opinion that there will be No Adverse Effect if one of the two following conditions can be met:

    a. Access roads can be covered with a chemically inert, visually distinguishable fill within the boundaries of this site in a manner which will preclude future ground disturbance of the cultural deposit during future O&M activities, or;

    b. O&M activities can be restricted to access roads, and a Data Recovery Plan is implemented in accordance with the Advisory Council's Supplementary Guidance for Treatment of Archeological Properties supporting a No Adverse Effect Determination. The rationale for this recommendation is stated in the above referenced Guidance on pages 10 and 11, "An Undertaking may be taken to have no adverse effect...if the agency is committed to a data recovery program...if...the property is shown to be subject to destruction and deterioration regardless of the undertaking, so the agency's action is only slightly hastening a process that is inevitable in any event."

14. O&M activities and construction will have an effect on sites CA-SDi-6135, SDi-6138, SDi-6149, and SDi-6140. However, it is my opinion that there will be No Adverse Effect on these sites if a Data Recovery Plan is implemented in accordance with the Advisory Council's Supplementary Guidance for Treatment of Archeological Properties supporting a No Adverse Effect Determination. The rationale for this recommendation is the same as that cited in Item 13.b. above.

15. Concurrence of these determinations of effect should be sought from the Advisory Council in accordance with 36 CFR 800.4.c.

If you should have any questions, please contact Daniel Bell of my staff at (916) 322-8702.

Sincerely,

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation

D-6317D

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APPENDIX E

CALIFORNIA COASTAL COMMISSION,
MARINE REVIEW COMMITTEE REPORT

CALIFORNIA COASTAL COMMISSION
631 Howard Street, San Francisco 94105 — (415) 543-8555

TO: State Commissioners

FROM: Michael Fischer, Executive Director

SUBJECT: Report of San Onofre Nuclear Power Plant Marine Review Committee (For Commission consideration at the February 17-19 Meeting.)

E.1

Summary

The 1974 permit for the San Onofre Nuclear Power Plant's Units 2 and 3 established a three member Marine Review Committee (MRC) to study the effects of the Plant's cooling system on ocean life and to make recommendations to the Commission. Units 2 and 3 of the Plant are not yet operational. The MRC has submitted a report (conclusions attached) predicting effects on fish, kelp, plankton and other ocean life. The MRC recommends against any design changes to the cooling sustem at this time. Staff recommends the Commission take note of the MRC recommendations and endorse a future monitoring program to determine actual effects on ocean life in the future after system operation. If substantial adverse effects are found, the Commission can impose design or operational changes or mitigation measures, based on MRC recommendations. But, given MRC predictions, major system design changes in the future seem unlikely.

Background

The Commission's predecessor Coastal Zone Commission approved the construction of Units 2 and 3 of the San Onofre Nuclear Generating Station (SONGS) on February 20, 1974 (Permit No. 183-73). Condition B of the Permit provided for the establishment of an applicant funded Marine Review Committee (MRC) composed of an appointee of the State Commission, an appointee of Southern California Edison Company, and an appointee of the appellants. The appellants are coordinated by Friends of the Earth. The Condition provides for the MRC to undertake a "comprehensive and continuing study of the marine environment offshore from San Onofre...to predict, and later to measure, the effects of San Onofre Units 2 and 3 on the marine environment..." (Condition B1).

The MRC can make recommendations to the Commission, based on MRC studies, and the recommendations can include changes that the MRC believes necessary in the cooling system for Units 2 and 3. This cooling system takes in large amounts of seawater to cool the units and then discharges the heated water back to the ocean. Condition B6 of the Permit states:

> Should the study at any time indicate that the project will not comply with the regulatory requirements of State or Federal water quality agencies, or that substantial adverse effects on the marine environment are likely to occur, or are occurring, through the operation of Units 1, 2, and 3, the applicants shall immediately undertake such modifications to the cooling system as may reasonably be required to reduce such effects or comply with such regulatory requirements (which can be made while construction is going on and could be as extensive as requiring cooling towers if that is the recommendation). The State Commission shall then further condition the permit accordingly.

Thus; the Commission can impose new conditions on the cooling system only if the conditions are based on MRC recommendations and the Commission judges the conditions to be "reasonable". New conditions can be based only on an MRC finding that "substantial adverse effects on the marine environment are likely to occur, or are occuring, through the operation on Units 1, 2, and 3...."

Since its beginning, the MRC has submitted a number of reports to the Commission. After receiving an MRC report in mid-1979 the Commission, at its November 21, 1979 meeting, asked the MRC to take one final "best shot" at predicting effects on the marine environment prior to the start of Nuclear Regulatory Commission (NRC) hearings on the operating license for Units 2 and 3. The MRC has now submitted that report, MRC Document 80-04(I). The conclusions are attached to this staff report, and the MRC will present the conclusions to the Commission at its January 20-22 meeting.

Staff Analysis

The Marine Review Committee has, over the last six years, conducted monitoring and predicting studies that seem to be as comprehensive and thorough as possible given the state-of-the-art in predicting effects on the large and dynamic nearshore ocean environment. It is possible that the square kilometer offshore SONGS is the most heavily sampled and studied patch of the ocean anywhere. Predicting the effects of the SONGS cooling system on ocean life has had to face a number of inherent difficulties, including: understanding the life cycles of ocean organisms; obtaining enough samples over a long enough time period to enable statistical analyses; developing quantitative models of water flows, turbidity and population dynamics; and, most important, attempting to separate out effects or likely effects of the cooling system from other major factors affecting ocean life, including storms, water temperature and chemistry changes, fishing, changes in nutrient levels, changes in migratory habits, and natural population fluctuations.

Design Changes. The MRC has needed to use models and numerous assumptions in assessing possible effects on living ocean populations. Such exercises can give scenarios, but not high confidence predictions. The MRC report consequently presents a number of estimates of future effects on fish larvae, small shrimp, plankton, and and a kelp bed. It does not, however, state that these effects are likely or certain to occur, and, therefore, it does not state that "substantial adverse effects on the marine enviroment are likely to occur", as required in Condition B6 for modification of the cooling system. The report, then,explicitly recommends against design changes in the cooling system at this time, while stating "it is possible that we have grossly underestimated the ecological consequences of SONGS Units 1, 2, and 3" (Page 7). The actual effects can only be determined through monitoring the ocean environment after the Units become operational. The MRC has extensive results from pre-operational sampling and data collection and will be in a position to implement a useful post-operational monitoring program. Staff is therefore recommending the Commission endorse a continued MRC monitoring program and ask that the program design and budget be submitted to the Commission. If the MRC finds "substantial adverse effects" the Commission may still impose conditions accordingly.

Mitigation. One such condition could involve mitigation for damage determined by the MRC. The Commission directed the MRC to explore mitigation alternatives. This last attempt at predictions has taken up most MRC time, and the MRC report states it will recommend to the Commission which mitigation measures, in addition to artificial reefs for kelp, should be examined.

Radiological Monitoring. A 1979 MRC report detailed a number of inadequacies in the radiological monitoring program in the ocean around SONGS. The Commission directed staff to report these inadequacies to the Southern California Edison Co., the Nuclear Regulatory Commission, and the California Department of Health Services and to pursue remedies. SCE has since revised its radiological monitoring program extensively and has submitted it to the NRC. Both the NRC and the MRC author of the previous report are evaluating the revised program at present.

Staff Recommendation

Staff recommends the Commission adopt the following resolution:

The Commission thanks the Marine Review Committee for the report "Predictions of the Effects of San Onofre Nuclear Generating Station and Recommendations", adopted unanimously by the members of the MRC. The Commission notes that the MRC does not predict at this time that substantial adverse effects on the marine environment are likely to occur fron the operations of the SONGS cooling system, and that the MRC recommends against system design changes at this time. However, the Commission also notes that the MRC states it may have grossly underestimated these effects. Tha Commission agrees, therefore, that the MRC should conduct a comprehensive and thorough monitoring program of the effects after SONGS becomes operational and requests that the MRC submit the design and cost of such a program to the Commission. If such monitoring discovers substantial adverse effects on the marine environment, the Commission can, at that time, based on MRC recommendations, impose new conditions including design or operating changes or mitigation measures. The Commission recognizes, given the MRC predicted effects of the cooling system, that future imposition of any major design changes to the cooling system is unlikely.

F-2

marine review committee

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UNIVERSITY OF CALIFORNIA
SANTA BARBARA, CA 93106

November 17, 1980

RECEIVED
NOV 2 6 1980
CALIFORNIA
COASTAL COMMISSION

Mr. Bill Ahearn
California Coastal Commission
4th Floor
631 Howard Street
San Francisco, California 94105

Dear Bill:

This letter formally transmits to the California Coastal Commission, under separate cover, the Marine Review Committee's predictions concerning the effects of San Onofre Units 1, 2 and 3 upon the marine ecosystem. The Report also contains a study of options and a set of recommendations to the Commission. These predictions and recommendations have been agreed upon unanimously by the Committee. The Appendices will follow in approximately two weeks.

A later report will discuss mitigation in more detail.

Yours sincerely,

Rimmon C. Fay

Rimmon C. Fay

Byron Mechalas

William W. Murdoch
(Chairman)

REPORT OF THE MARINE REVIEW COMMITTEE TO THE CALIFORNIA COASTAL COMMISSION: PREDICTIONS OF THE EFFECTS OF SAN ONOFRE NUCLEAR GENERATING STATION AND RECOMMENDATIONS
PART I: RECOMMENDATIONS, PREDICTIONS, AND RATIONALE

E-3

Marine Review Committee

William W. Murdoch, Chairman
University of California

Byron J. Mechalas
Southern California Edison Company

Rimmon C. Fay
Pacific Bio-Marine Labs, Inc.

MRC Document 80-04(I)

CONTENTS

INTRODUCTION

The Marine Review Committee was charged, in Permit No. 183-73 of the California Coastal Commission, to carry out "a comprehensive and continuing study of the marine environment offshore from San Onofre . . . to predict, and later to measure, the effects of San Onofre Units 2 and 3 on the marine environment, . . . in a manner that will result in the broadest possible consideration of the effects of Units 1, 2 and 3 on the entire marine environment in the vicinity of San Onofre." This Report responds to the charge to predict the effects of Units 2 and 3.

San Onofre Nuclear Generating Station (SONGS) Unit 1 has been operating since 1968. Almost 150 billion gallons of seawater per year circulate through the Plant. Water flows in through a single intake and is discharged through a single discharge pipe at 19°F above the intake temperature. The construction of SONGS Units 2 and 3 is virtually completed. Each has a single intake, each drawing in seawater at a rate of 830,000 gallons per minute, which will result in an estimated flow of almost 700 billion gallons per year. Each also discharges its heated effluent through a series of 63 diffuser ports set along a kilometer-long pipe that tapers from 18' to 10'-14' in diameter (Figure 1, Maps 1 and 2). This discharged water moves rapidly towards the surface, entraining and moving with it roughly 10 times its own volume of water. As it spreads, this water mass moves various distances offshore, depending upon the prevailing currents. MRC has measured these currents, and Southern California Edison has produced a physical model of SONGS' water movement.

The effects of the cooling system of Unit 1 upon the marine ecosystem were described in MRC Annual Reports for 1978 and 1979. The documented effects are restricted to a region within a kilometer or two of SONGS. In seeking to predict the effects of Units 2 and 3, MRC has looked at the loss of organisms taken into the intakes, the possible losses caused by water movements driven by the diffuser plumes, and the effects of the diffusers and heat treatments on the physical environment, and hence upon the biota.

The predictions presented in this Report are in most cases close to final. Although we can and will obtain some more information on the major parts of the ecosystem near SONGS before Units 2 and 3 begin operation, we have obtained most of the information it is possible to obtain with a feasible expenditure of effort. Where major uncertainties remain, further study will not in general resolve them; they are largely an inescapable result of the practical difficulties in studying real ecological systems, and of the nature of such systems. The exceptions are kelp, where future work should provide more, and important, information, and some modelling studies that have not yet been completed. At this point, however, future work on predictions is aimed mainly at guiding our monitoring studies.

Following this Introduction, the Report presents our recommendations. There follows a brief statement of predictions for each major part of the community, and a more extensive Rationale, which explains how we arrived at the predictions. The Rationale unavoidably contains some technical discussion, but we have tried to write it so that the reader unfamiliar with the study can follow it. Finally, a series of separate Appendices accompanies this Report. These appendices are the reports of various contractors, and

analyses (by MRC and its consultants) of a number of difficult technical issues. The Rationale refers to those Appendices, where necessary, by project, number and, if appropriate, page number.

We would like to stress two findings that have general importance for management of and planning for nearshore coastal waters in California. First, we reiterate a previous conclusion that, in open coastal situations, a diffuser design is likely to be ecologically more damaging than a single point discharge, even though the latter would violate present State thermal discharge standards.

Second, we have recently obtained evidence that the early (larval) stages of nearshore sport and commercial fish species (e.g. bass, halibut) are particularly sparse very close to shore, while the larvae of fodder fish species are abundant right into shallow waters. Fodder fish populations are probably better able than sport and commercial species to withstand additional mortality on their larval stages. If this pattern holds along the whole California coast, it should be used as basic information in future planning - e.g. the placement of intakes and outfalls. This is not a blanket recommendation for placing structures close to shore, but rather a recommendation to weigh the possible losses of fish larvae in such decisions.

OPTIONS AND RECOMMENDATIONS

Options

San Onofre Kelp bed (SOK) and nearshore fish populations are the major parts of the marine ecosystem that SONGS Units 1, 2 and 3 could significantly harm. Mysids, and perhaps zooplankton, are of less direct interest to society, but they also might sustain significant and quite large impacts. In the light of the predictions, MRC reviewed a number of possible recommendations that could be made to the Commission:

1. Make no design changes at this time. Monitor the effects.
2. Make no design changes at this time. Examine the feasibility of mitigating some or all of the effects, with a view to recommending mitigation measures to the Commission.
3. Extend the intake pipes to beyond the 30 meter depth.
4. Redesign the diffusers of Units 2 and 3, to convert them to single point discharges, located either 4 to 5 km offshore or very close inshore.
5. Convert the once-through cooling system to cooling towers.

Option 1 would require only a monitoring program, which would be carried out over several years to determine the effects of SONGS on the marine ecosystem. This program, in addition, would generate important information for future coastal planning, and would test how well we can predict the ecological consequences of a major coastal installation.

Option 2 MRC has completed a short "paper" feasibility study of certain kinds of mitigation (Mitigation Appendix). This study describes various methods of enhancing the production of economically important species, such as reef fish and abalone. Southern California Edison has

established an experimental reef aimed at producing a kelp bed and associated organisms, including fish and abalone. Other mitigation measures may be feasible.

It should be stressed that mitigation could not be expected to replace completely the biota lost through SONGS' operation. San Onofre Kelp bed could perhaps be replaced by a similar kelp bed, but fish losses would probably be replaced (partially) by a somewhat different mix of species. Lost mysids and plankton are not likely to be replaced by any known mitigation measure. An adequate mitigation study would therefore need to address the acceptability of "replacing" losses of one species by increasing the production of another.

Option 3 The possibility of extending the intakes out to deeper water was suggested previously (MRC 1979 Interim Report) as a means of (1) reducing the turbidity of intake water, so that the effects on SOK would be reduced, and (2) reducing the kill of nearshore fish larvae. With regard to aim (1), the turbidity study (Turbidity Appendix) suggests that much of the turbid water passing over SOK will originate at the inshore segment of the diffusers and will be carried offshore by secondary entrainment, so that the gain from changing the intakes would be relatively small. With regard to aim (2), our recent analyses show that the larvae of nearshore sport and commercial species are relatively sparse in the present intake area, and are quite dense out to about 7 km offshore. The gain in moving the intakes offshore would therefore be mainly a reduction in fodder fish kills, while we would likely kill more of sport and commercial species.

Option 4 The diffusers carry turbid water over the kelp bed. They

also will cause an unknown, but probably significant, amount of mortality in mysids, plankton and fish larvae. A single point discharge would greatly reduce this latter mortality, and moving the discharge either close inshore or further offshore would remove the kelp bed from the influence of the discharge. A single point discharge would violate the State thermal tolerances, but MRC believes this would cause much less ecological damage than the diffusers. It might be possible to make practical use of the waste heat from an inshore discharge. MRC has not evaluated in detail the ecological consequences of these two alternatives.

Recommendations

We recommend Options 1 and 2, and recommend against design changes at this time (Options 3, 4 and 5).

Monitoring is needed to measure the effects of Units 1, 2 and 3, as required by the Permit. It is also essential that the effects are measured and compared with MRC's quantitative predictions. Part of our study is a unique effort to make such predictions, and it is only by testing them that we can determine if such prediction is possible, how accurate it is, and what changes are needed to make better predictions in future planning. Predictions of probable effects, whether made explicit or not, are of course an integral part of all coastal planning.

We also recommend that MRC's remaining and ongoing prediction efforts be completed. These are now small studies. Such quantitative predictions are important, not only in themselves, but as a guide to the future monitoring program.

It is important to monitor the success of Southern California Edison's experimental reef, now established some 5 km south of SONGS. The evidence

on the efficacy of reefs, especially as a basis for new kelp beds, is equivocal and in contention, and this experiment will allow us to judge the best available California reef technology. MRC will present to the Commission, at a later date, a recommendation on whether or not other mitigation measures should be examined.

We recommend against moving the intake pipes (Option 3), for the reasons given under that Option. We also recommend against Options 4 and 5 at this time. Destruction of the offshore portion of the kelp bed is a major possible effect of the diffusers. However, at this moment we are not certain this will occur, and it is also possible that the effect could be mitigated. Some mitigation of fish losses may also be possible.

It is possible that we have grossly underestimated the ecological consequences of SONGS Units 1, 2 and 3. If monitoring proves this to be the case, we will re-examine the possibility of recommending major design changes.

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PREDICTIONS

FISH

Introduction

Most fish caught in Southern California are netted by commercial fishermen, and most come from fishing areas more than a few kilometers off the coast. By contrast, most sport fish in Southern California are caught close to the land - within the 33 California Fish and Game "fishing blocks" that are contiguous with the shore. In this Report we are concerned mainly with those sport fish and with commercial catches taken close to shore, for it is only this nearshore group of fish that SONGS is expected to affect. In evaluating the predictions, therefore, it should be kept in mind that SONGS is not expected to influence the great bulk of the fish populations that are harvested by California fishermen.

The species that concern us are fish that live as adults mainly within about 4 or 5 km of shore and that produce planktonic (drifting) eggs and larvae in the same zone. Among these species there are two groups: the nearshore sport and commercial species, the harvest of which is made up mainly by halibut, white seabass, kelp bass and sand bass, and the nearshore fodder fish (or forage fish) that form a major portion of the prey of the sport and commercial species.

In the predictions, we present various numbers to help the reader evaluate the likely effects of SONGS. It is easy to misinterpret these numbers, and we give here some essential background information. If we know the abundance and sizes of all of the halibut, say, in some area along the

coast, we can calculate the total living weight (biomass) of halibut in that region. This is called the standing stock. Each year, there are additions to this standing stock - some individuals that were larvae grow up to become adults, and many of those already adult grow and gain weight. If we could add up all the accumulated growth (in weight) we would be able to say how much new biomass had been added to the population. This is the annual production of new halibut tissue. We cannot estimate this directly, but a general rule of thumb is that a sport and commercial population gains about 60% of its standing stock weight per year. If our harvesting techniques were perfect we could take all of this production each year as harvest, and keep the standing stock steady from one year to the next. However, inevitably some fish die of disease and parasites, others are eaten by predators, and so on. The annual harvest, therefore, is always less than the annual production. In these nearshore sport and commercial species near San Onofre we estimate the harvest is roughly a quarter of production.

As long as the harvest plus other factors do not take more than the annual production, the population will not decline. However, if, on average, harvest plus other losses are greater than production, the population will decline. If they are less than production, the population will increase, until it approaches a limit (say its food supply), at which time production will begin to decline and the population will level off.

We stress that the numbers given below are in all cases approximate. They give us an indication of the likely size of effects, but they do not tell us precisely what losses will be.

Predictions

1. Nearshore Sport and Commercial Fish

It is probable that, because of SONGS' activities, somewhere between 27 and 60 tons of nearshore sport and commercial fish production will be lost annually (Table 1). We feel the lower figure is more probable than the upper figure. Halibut is the species that will be most affected. Fish move about, so any loss of production will be spread over some area. We do not know how large an area, and provide a comparison between the consequences of spreading the loss over a small (45 km) and a large (300 km) stretch of coastal waters.

A loss of 27 tons would be equivalent to about 6% of the annual production of nearshore sport and commercial fish in the four fish blocks covering about 45 km of coastline near SONGS. It is equivalent to about one-third of the most recently documented (1975) harvest of these species from these four fishing blocks (85 tons). This does not mean that all of the losses will occur in these four blocks, or that the harvest can be expected to decline by either 6% or one-third.

If the losses were to be spread evenly over 300 km (about three-quarters of the length of the California Bight), then the loss in annual production over this area would be 1%. The loss in harvest could be more than 1% of that caught over 300 km. For example, to take an extreme case, if all natural losses are unavoidable, then all of the loss would come out of the harvest, which, for the 1975 harvest, would decline by roughly 10%.

There is quite strong evidence that the stocks of nearshore sport and commercial fish (especially halibut) have declined in the past two decades. We believe that these populations are unlikely to be able to compensate for

(i.e. make up for) significant additional mortality. However, the projected loss of sport and commercial fish, caused by SONGS, is sufficiently small that we believe it will not, in itself, have a significant effect on these populations.

Although SONGS alone is expected to have a minor effect upon the populations of nearshore sport and commercial fish, the cumulative effect of a number of sources of mortality of this order would be expected to contribute to continued decline in these populations. Future planning in the California Bight, therefore, should not evaluate additional installations and other environmental insults as independent events, but should consider their cumulative effects.

2. Fodder Fish

Anchovies probably contribute more than any other species to the diet of nearshore sport and commercial fish. Although enormous numbers of anchovy larvae will be killed by SONGS, we do not expect this vast population to be affected as a result of the operation of SONGS.

Nearshore fodder fish species are also important in the diets of nearshore sport and commercial fish. The two most abundant nearshore fodder fish are queenfish and white croaker. SONGS is expected to cause a loss in production of nearshore fodder fish of at least 300 tons per year.* Unlike the sport and commercial species, there is no evidence that the fodder fish populations are declining, so that we could expect some compensation for these losses. We do not know how much, so we cannot predict a precise net loss. Fodder fish in general move around more than sport and commercial species, and the populations in the entire Bight may well be thoroughly

*All weight figures are wet weight and are in metric tons.

mixed, so that losses would be spread over the Bight (roughly 400 km). If the losses were spread over the Bight, and if no compensation occurred, they would be equivalent to about 7% of the annual production of these fish.

The projected loss of the equivalent of 300 tons of fodder fish production is owing mainly to the loss of larvae in the intakes. We expect there will be additional losses caused by the diffusers carrying larvae to inhospitable environments offshore. These losses could be very large - greater than those caused by the intakes - but we cannot predict them accurately.

The projected intake losses alone are sizeable. While we cannot estimate how the populations will be affected (because we do not know enough about compensation), the accumulation of effects of this order would be expected eventually to cause declines in these stocks. Thus, while SONGS itself may not cause such declines (and we do not know whether it will or not), we would be concerned about accumulating additional losses of this magnitude in the future.

We expect that the direct impingement of juvenile and adult fodder fish (mainly queenfish) in the intakes will cause measurable changes in the age structure and sex ratio of this species to a distance of several kilometers from SONGS.

3. Mechanisms

Fish losses are caused by three main mechanisms: (1) direct impingement of juvenile and adult fish in the intakes, (2) loss of immature stages (especially larvae) in the intakes, and (3) loss of immature stages in the diffusers. Mechanisms (2) and (3) are the most important. The diffusers could kill larvae (a) through subjecting them to turbulent shear and (b) by

carrying inshore larvae to an inhospitable environment offshore (translocation).

Intake losses: Our recent analyses have yielded a critical piece of information that may be important in the placement of intakes. We have evidence that the larvae of nearshore sport and commercial fish species are unlike most nearshore larvae and are quite sparse very close to shore where the intakes are. Because of this peculiar distribution, we estimate the loss of sport and commercial fish production, owing to larval mortality via the intakes, to be only 20 tons per year, rather than 160 tons per year as previously expected, thus reducing the predicted impact to one that is relatively minor.

Diffuser losses: We estimate that relatively few fish larvae will be killed by turbulent shear, and believe that this will be a minor effect. We also do not expect the larvae of sport and commercial species to suffer translocation mortality in the plume. However, translocation may cause very large losses of fodder fish larvae.

4. Upwelling Effects of SONGS

SONGS' diffusers will bring extra nutrients to the surface, and move them offshore. This could result each year in the production of roughly 460 tons of anchovy. We believe this will have a negligible effect on sport and commercial fish production, and virtually no effect on nearshore sport and commercial fish production.

Table 1. Summary of predicted effects of SONGS Units 1, 2 and 3 upon nearshore fish species. Numbers are metric tons per year.

	In biomass	In production	In sport and commercial production
(1) Losses by direct impingement of juvenile and adult fish in intakes			
Fodder fish	31-51	25-41	0-4
Sport and commercial fish	7-12	4-7	4-7
Electric rays	7-13	5-8	---
Other fish	5-8	3-5	---
		Subtotal	4-11
(2) Losses by kill of planktonic stages in intakes			
Fodder fish	358	287	3-29
Sport and commercial fish	34	20	20
		Subtotal	23-49
(3) Damage to kelp bed	0-9	0-3	0-3
		TOTAL	27-63

KELP

Introduction

Kelp beds constitute a distinct and important habitat in the nearshore marine ecosystem in Southern California. Over 760 species of animals (invertebrates and fish) and over 120 species of plants have been found in kelp beds in Southern California. At least two fish species (kelp perch and kelp rockfish) are rarely found outside of kelp beds, and many invertebrate species occur most commonly in this habitat. In the San Onofre kelp bed (SOK) alone we have recorded 164 species of animals and 16 species of plants - certainly an underestimate of the actual diversity. In the three local kelp beds (SOK, San Mateo kelp and Barn kelp) we have recorded 384 species of animals and 36 species of plants. Kelp beds are highly productive of sport fish, including the highly valued kelp bass.

Kelp plants grow very rapidly, and as plants die, or parts of plants break off, they produce food for bottom-dwelling animals. In December 1978, for example, SOK produced an estimated 9 tons of detritus per day.

San Onofre is in an area where kelp beds are (now) rather scarce. However, the local beds maintain ecological continuity between the more extensive beds to the north and south.

Historically, San Onofre kelp bed has exhibited two states: (a) the "normal" state in which much of the available rocky substrate is covered by kelp as is now the case, but the degree of cover varies; (b) periods following catastrophic die-offs of adult plants, during which the bed is non-existent, at very low coverage, or is recovering.

Predictions

(1) It is likely that SONGS Units 2 and 3 will alter the normal state by reducing the density of kelp plants in the offshore portion of the bed. This is the major area of the bed. The reduction could be very small or very large. There are several confounding factors which prevent us from stating a most likely extent of reduction in abundance at present.

(2) SONGS probably will lengthen the periods during which the bed is absent, or very sparse, following catastrophic die-offs.

(3) We expect to see some reduction in the abundance of shrimp species in the canopy in a portion of the kelp bed. No quantitative prediction is possible. This change could alter the diets of fish in the bed.

Mechanisms

Turbidity: SONGS will affect the bed mainly by increasing the turbidity downstream from the points of discharge. This increase will be small in summer, but in spring it is predicted to lower light levels in the water column. The reduction at the bottom in the offshore portion of the bed is predicted to be about 40%. The lower light intensities that result will probably reduce the frequency of successful recruitment of young kelp plants. It is also likely to reduce the growth of kelp plants. Both effects are likely to reduce both the biomass of kelp in the bed and the number of plants.

Fouling: SONGS' plumes are also likely to increase the degree of fouling of kelp plants by various invertebrates that settle on to and live on kelp. Increased turbidity, and perhaps turbulence, are among the mechanisms that could increase fouling. Fouling is likely to 1) decrease the rate

of kelp growth, 2) increase the rate of loss of parts of the plant, and 3) perhaps increase the death rate of plants.

Sea Urchins: Urchin populations may also be increased because SONGS will increase the supply of particulate organic matter that the urchins can use as food. Our studies show that urchins kill a large fraction of kelp plants in parts of the bed, and they probably also interfere with recruitment by grazing on small, young kelp plants.

Sedimentation: The operation of SONGS is not expected to alter the sedimentation rate in SOK.

Temperature: Temperature changes caused by the SONGS plume will be small and are not likely to affect the bed significantly.

Nutrients: Part of the time, the concentration of nutrients may be somewhat increased in the water surrounding adult kelp plants, as a result of upwelling via entrainment. This may increase the growth rate of kelp plants.

Competitors: When kelp is removed from the substrate other plants and animals can grow in its place. These organisms may prevent or slow the re-colonization of kelp, by taking up the space. Although we have information on these organisms, it is not possible to predict whether SONGS will significantly influence these interactions.

Toxic Substances: During the course of the studies at SONGS, circumstantial evidence has been found for the existence of toxic materials in the discharged water from Unit 1. We can make no definitive statement as to whether or not such toxic substances will be discharged by Units 2 and 3, except that chlorine will continue to be used on an intermittent basis.

MYSIDS

Introduction

Mysids are small shrimp-like creatures that live in shallow water just above the ocean floor, or amongst kelp canopy and other benthic algae. At night some of them rise several meters into the water column, and at this time they are more likely to be entrained by SONGS. Unlike true plankton, they can swim against weak currents, and so can maintain their position to some extent.

Mysids were chosen as a target organism for several reasons.

1) They have similar biology to a number of other groups of "hypo-plankton" that live close to the bottom.

2) They are important food items for a number of fodder fish (e.g. queenfish), which in turn are fed on by sport and commercial fish.

3) Like a number of plankton species, some mysid species live only close to shore and will be taken into the SONGS cooling system and will also be transported offshore by the diffusers. However, since they have a longer generation time than plankton, they are likely to recover more slowly from such extra mortality, and are therefore more likely to show local depressions in density. Mysids are therefore expected to be a good "marker" group for the effects of SONGS.

Predictions

1. Our mysid studies indicate that we should see a reduction in density of about 50% for several kilometers away from SONGS, and smaller depressions on the order of 10 km long. There are several factors that prevent us from

being certain about these effects. First, we are forced to make assumptions about the numbers killed by the diffusers, since we cannot measure this loss. Second, we do not know how strong compensation will be.

2. SONGS intakes will kill several billion mysids per year, weighing 50-60 tons. The diffusers could kill several hundred tons of mysids. If, for example, 10% of those entrained by the diffusers were killed by being carried offshore to unfavorable habitat, the annual kill would be rather less than 200 tons. We are unable, at the moment, to give a most probable estimate of diffuser losses.

Mysids constitute about one-half of the total of epibenthic organisms that are subject to entrainment. A similar mortality rate for all of this group would thus give an annual kill of all organisms of this type of about 350 tons.

If these 350 tons were lost to the fodder fish, we could expect an annual loss of fodder fish production on the order of 30 tons. However, the MRC fish study group believes that much of the mysid biomass killed and moved offshore will be eaten by these same fish species in the region of the diffusers. Some mysid material will, of course, fall uneaten to the ocean floor. There it will join food webs that lead in part to benthic fish. These food webs are less efficient than the mysid → fodder fish chain, so we could expect some overall loss of fodder fish production, although much less than 30 tons per year. We do <u>not</u> predict, therefore, that the mysid losses will have a significant effect on sport and commercial fish production.

PLANKTON

Introduction

The plankton is made up mainly of small drifting organisms that are generally moved about passively by currents. Phytoplankton are single-celled plants that form the basis of most animal production in the oceans. Zooplankton are small animals, some of which can swim actively and control their movements to some degree. They include the meroplankton, such as clam larvae, which are the planktonic stages of bottom-dwelling organisms, and holoplankton, which spend their entire life in the plankton. The predictions focus on the plankton as a balanced indigenous community, and as food for fish.

Predictions

1. The plankton studies have established that some zooplankton species are restricted close to shore (within 3-4 km), and it is probable that SONGS will reduce the local density of this group. It is probable that there will also be changes in the relative abundance of species in the zooplankton assemblage in the inner nearshore zone. The magnitude and extent of these changes cannot be predicted, and will depend on mixing rates, the ability of the populations to compensate, and on interactions between species. As an indication of the likely scale of the effects, we expect them to be somewhat less extensive than the predicted mysid effects.

2. SONGS' intakes probably will kill on the order of 10 trillion of the larger zooplankton per year, weighing about 1200 tons. Most of the zooplankton withdrawn at the intakes will enter the benthic food chain and will be lost as a direct food source for fodder fish. The fate of these diverted zooplankton is discussed in the Soft Bottom Community predictions.

We cannot yet estimate precisely the kill of plankton entrained by the diffuser plumes. If 10% of those entrained were to be killed by being moved offshore to unfavorable habitat, the annual kill would be on the order of 4000 tons. This transported plankton will be eaten largely by the same species of fodder fish that would have eaten it inshore, before SONGS began operation. We therefore do not expect to see significant changes in the overall abundance of fodder fish or sport and commercial fish as a consequence of this shift in biomass.

3. About half of the time, the diffuser discharges will bring to the surface, offshore, relatively nutrient-rich water from closer to the shore and nearer the bottom. We estimate that this will result in the annual production of an extra 84,000 tons of phytoplankton in the mid or outer nearshore waters. The fate of this extra biomass is discussed in the Fish predictions.

SOFT BOTTOM COMMUNITIES

Introduction

The soft benthos community is made up largely of invertebrates (worms, clams, crustacea, etc.) that live in and on the sand, silt and mud bottom. These bottom types cover roughly 80% of the area in the general San Onofre region. The distribution and abundance of these species is strongly influenced by the physical characteristics of the sand, silt and mud and by the amount of food material in the area. The communities close to shore (out to a depth of about 10 meters) are less diverse and less abundant than those further offshore. Most of the species are planktonic in their early stages. Although these communities are not as productive of fish, on a per area basis, as are reefs and kelp beds, because they are so extensive they help to support large populations of fodder fish and hence of sport and commercial fish species.

Predictions

1. SONGS Units 1, 2 and 3 will alter the bottom sediments. Close to the diffusers (within 1 km) the sediments will be coarsened and enriched. Beyond this area, in a pattern and at distances that we cannot yet predict, the sediments will become somewhat finer, and they will be enriched. The general result of these changes will be an increase in the abundance, number of species, and, probably, in annual production of biomass in the enriched region.

2. SONGS could have a negative influence on the soft benthos community by killing some of the organisms that live on the bottom but that occasionally rise into the water column. (This group of organisms bears a broad similarity

to mysids.) It will also reduce the number of larvae of some species available for settlement, by killing the early stages that float in the plankton. This could affect the adult density of some species, especially those living in the intertidal and shallow water zones. Among this group, lobster is a sport and commercial species. However, too little is known about the population dynamics of the early stages to hazard a prediction about possible effect on adult densities. We suspect it will not have a significant effect on the overall production of the community.

3. The enrichment of the soft benthos is not expected to influence the production of sport and commercial fish.

HARD BOTTOM COMMUNITIES

Boulders and reefs near SONGS are covered by a variety of organisms in addition to kelp. These include smaller species of algae and sedentary animals that permanently attach to the rock surfaces. Apart from their intrinsic value as part of the community, these organisms provide both a source of food for fish and important habitat structure, and they may compete for attachment surfaces with kelp.

There are distinct inshore (intake depth) and offshore (around SOK depth) communities. Turbidity is higher inshore, and inshore species are more tolerant of this higher turbidity. They also grow more rapidly than offshore species. It is thus possible that increases in turbidity in the offshore portion of SOK will lead to a change in the community such that inshore species will tend to replace the resident offshore species. Conceivably these inshore species could also slow the recruitment of kelp by outcompeting it for space.

While these possibilities exist, there is no strong evidence to suggest they will occur.

RATIONALE

FISH CONTENTS

In this section on fish we do not give a separate rationale for each prediction, since the same types of analyses underlie predictions 1 and 2.

A. The affected fish species

SONGS Units 1, 2 and 3 are most likely to have a significant effect upon fish species that live as adults mainly nearshore (within about 4 km of shore), and that produce planktonic (drifting) eggs and larvae in the same zone. Most species of fish in the SONGS area are of this type. However, most individuals, and most of the total tonnage of fish are Northern anchovies. Anchovies also extend well offshore. There are several hundred billion anchovies in the California Bight, they move enormous distances, and SONGS will not significantly affect the population of this abundant species, although the Plant will kill large numbers of anchovies. They are not considered in most of the analyses below (but see Section I), which concern nearshore species only. A numerically small group of nearshore species either carry their young internally, or have planktonic larvae but lay attached, not free-floating, eggs. This group is also excluded from subsequent analyses.

We will be concerned mainly with those nearshore fish species that produce both planktonic eggs and planktonic larvae. These species fall into one of two groups. (1) Forage or fodder fish. These species eat plankton, small bottom-dwelling organisms, mysid shrimps, etc., and are themselves food for sport and commercial species. The major species in this category are queenfish (Seriphus) and white croaker (Genyonemus).

(2) Sport and commercial fish are the second group. Among nearshore species, halibut and white seabass are the main commercial species while kelp bass and sand bass, and halibut, are the main sport species. These four

species made up over three-quarters of the 1975 sport and commercial catch of nearshore fish in the fish blocks near SONGS.

B. Mechanisms

There are six known or suspected mechanisms through which SONGS can affect fish populations. These are:

(1) Killing juvenile and adult fish as they are taken into the intakes of the cooling system (via impingement and entrapment).

(2) Killing planktonic eggs and larvae that are taken into the intakes.

(3) Killing planktonic eggs and larvae that are caught up (entrained) by water jetting out of the discharge or diffuser systems.

(4) Loss of fish from special habitats (e.g. kelp).

(5) Loss of fish food that is moved by the cooling system.

(6) (Sub)lethal effects of discharged organochlorines.

We have no evidence that mechanisms (5) and (6) will operate to affect sport and commercial fish production, and they will not be discussed further in this Report.

C. Estimation of probable losses of fish

(1) Direct kill of juveniles and adults in intakes

Unit 1 kills, on average, 16.7 tons of fish per year. The fish are disposed of on land. Of these fish, 10.2 tons are fodder fish, 2.5 tons are electric rays (which are of scientific and economic importance), 2.4 tons are nearshore sport and commercial fish species, and 1.6 tons are other species.

The intake structures of Units 2 and 3 have been modified to reduce the fraction of fish taken in by the intakes. In addition, a fish-return

system has been devised to return those caught back to the ocean. This system has not been tested. The MRC fish study group feels that the fish-return system is likely to kill or fatally injure most fish that pass through it. If the new systems are 50% efficient, the total intake mortality will triple. If they are completely inefficient, total intake mortality will increase about 5-fold since all three structures provide about five times as much attractive "reef structure" as Unit 1. (The volume of water taken in by all three units will be six times that taken in by Unit 1.) If the fish-return system is not more than 50% efficient, the annual impingement fish kill will fall between 3 and 5 times that of Unit 1, or 50-84 tons, of which 7-12 tons will be nearshore sport and commercial fish. This is equivalent to 4-7 tons of nearshore sport and commercial fish production.

The losses to Unit 1 already produce measurable effects on queenfish. The population of this species within ½ km of the intake (and perhaps as far as 2 km) has fewer young fish and fewer females than more distant populations. Young and female fish are precisely the groups taken in selectively by the intakes. Two-thirds (by weight) of the fodder fish taken in are queenfish. Some 31-51 tons of fodder fish will be impinged. These fish would otherwise have contributed 25-41 tons of fodder fish production (Table 1).

(2) *Killing of planktonic fish eggs and larvae in intakes*

Most nearshore species spend 2-4 months as planktonic eggs and larvae and throughout this stage can be caught up by the intakes or diffuser water. This is the major source of mortality. It is estimated by a somewhat complex procedure involving a model of fish mortality, and we describe the methods only briefly. There are a number of steps in this procedure.

(a) The density of eggs and larvae of various ages, in water at various depths and distances offshore, is estimated from samples. (There is a tendency for older larvae to occur inshore and nearer the bottom, at diffuser and intake depths.) Next, the rate at which SONGS will withdraw water from each of these locations is estimated (from a model of SONGS hydrodynamic behavior). This gives the number of eggs and larvae that will be entrained. Finally, an assumption is made about the fraction of entrained eggs and larvae that will be killed. All of those passing through the intake are assumed to die. (Similar calculations can be made for those caught up by the diffusers, but we cannot yet estimate the fraction of those taken up that will be killed.)

These various estimates allow calculation of the expected number of eggs and larvae that will be killed per unit time (say, each day), immediately after the Plant is turned on (Fish Appendix 1).

We cannot assume this kill rate will continue indefinitely. For example, some water that has been affected by the Plant may remain in or return to the vicinity and mix with "new" water that moves into the area. When this happens, the local density of eggs and larvae will be lower than elsewhere, and fewer eggs and larvae will be killed per unit time.

A detailed model of the current regime in the SONGS area could be used to estimate the rate of replenishment of water in the area, and hence the local density of eggs and larvae exposed to SONGS. Such a model was not available when the present calculations were made.

(b) Instead, a model was used that simply assumed that SONGS will draw eggs and larvae only from some specified region along the coast. Inside this region, all eggs and larvae are assumed to be equally vulnerable (good mixing

is assumed). No egg or larva outside the region can be killed by SONGS and no eggs or larvae can leave the region. The model has the following features (Fish Appendix 1):

- Eggs are produced in this region at a constant annual rate that is the same as elsewhere. (This is essentially the conservative assumption that, even if SONGS kills many plankters and subsequently lowers adult density in the region, reproductive fish will move in from elsewhere.)

- The model calculates the chance that an egg or larva of a given age, within the region, is killed by SONGS before it reaches the next age class (which is 2.5 days older). This is done for all age classes up to the point when the larva becomes a juvenile (4 months in queenfish, for example). Since eggs and larvae die off extremely rapidly due to natural causes, most of them are not killed by SONGS but die of natural causes. This natural death rate is taken into account by the model.

- The chance of any individual being killed by SONGS before it moves out of its age class depends on the size of the region chosen (the chance is smaller when the region is bigger because within 2.5 days a smaller fraction of the water in the region passes through SONGS). Clearly, if a very small region is chosen, a given individual can be exposed to risk on different occasions since the same parcel of water passes through SONGS many times. In this case, the density is rapidly depleted, the fraction killed is high, and most larvae do not grow very old. On the other hand, the number killed is somewhat smaller.

- Since the natural mortality rate is high, there are always far fewer older larvae than younger larvae and eggs. This is reflected in the predicted

SONGS kill. For example, under one set of assumptions, SONGS will kill in a year 16 billion eggs and 4 billion larvae of nearshore fish.

Clearly the choice of the size of the "affected region" is somewhat arbitrary. Choosing a very small region (say 1 km) is equivalent to assuming virtually no currents along the shore, and hardly any replenishment of the waters around SONGS by "new" water. This will overestimate the degree of local suppression, but will underestimate the number killed - larvae from elsewhere that in reality would get to SONGS are not counted. On the other hand, choosing a very large region (say several hundred kilometers long) is equivalent to assuming that fish eggs and larvae move huge distances in their lifetimes. This would maximize the number killed, but (especially since thorough mixing is assumed) it would spread the effect out very thinly. We feel that this latter scenario is closer to the real situation. 50 km was chosen as a compromise between smaller regions within which complete mixing can be assumed, and larger regions within which all doomed fish larvae are certain to have been produced. SONGS <u>will</u> kill billions of eggs and larvae, and the degree of movement of eggs and larvae will determine whether there is a pronounced local depression or a less obvious, but much more extensive, depression. If there is no re-entrainment of "old" water by SONGS, a choice of 50 km will underestimate the number of eggs and larvae killed.

The result of the model's calculations is a predicted number of eggs and larvae killed per year (breeding season) in each age class.

(c) These predicted losses of eggs and larvae are then converted into an equivalent number of 13 month old fish (Fish Appendix 1). (An age of 13

months is chosen primarily because this corresponds in size to that of the average fodder fish eaten by sport and commercial fish.) The idea involved in calculating 13 month old equivalents is as follows: an egg has roughly 1 chance in a million, under natural conditions, of becoming a 13 month old adult. Therefore, if SONGS kills an egg, this is equivalent to killing only one-millionth of a 13 month old fish, because in all likelihood the egg would have died anyway. However, if SONGS kills a 4 month old larva it has killed the equivalent of .4 of a 13 month old adult, because a 4 month old larva under natural conditions has a 40% chance of becoming a 13 month old adult. It is predicted that SONGS will kill the equivalent of several million 13 month old adults of nearshore fish species.

At the moment, age distributions of larvae are available for only the two major fodder fish species. To estimate losses of sport and commercial species we have therefore assumed that, averaged over the season, the sport and commercial species have the same age distribution as these two fodder fish species. The estimates of sport and commercial losses owing to larval mortality therefore are based on this, as yet untested, assumption.

(3) Diffuser losses

(a) Turbulent shear losses

There is evidence from the literature that fish larvae die when they are subjected to shear forces on the order of several hundred dynes/cm^2 over a period of several minutes. Losses due to this mechanism were estimated in two steps (Fish Appendix 1). First, the fraction of secondarily entrained water that is likely to be subjected to shear forces on the order of 100/cm^2, or greater, was calculated. Second, the number of larvae subjected to this

stress was estimated from known larval densities and from the estimated amount of water entrained. These calculations suggest that only a relatively small number of larvae will be killed in this way.

(b) Translocation losses

Nearshore fodder fish larvae show a very clear pattern, in which density falls off very rapidly several kilometers from shore. The pattern suggests that larvae that are carried farther offshore die. During some parts of the year, SONGS' diffuser plumes are expected to move some inshore water to an area 5 km or more offshore.

The larvae of sport and commercial fish species extend from close to shore to about 7 km offshore. We therefore do not expect SONGS to cause translocation mortality in this group.

At some times of the year, especially when they are older and "more valuable", the larvae of both queenfish and white croakers do not extend beyond 2 km from the shore. We therefore expect large translocation losses of fodder fish larvae, but we are not able to make a quantitative prediction. Some idea of the possible magnitude of these losses can be gained by noting that if 10% of larvae entrained by the diffuser plumes were to be killed, total fodder fish losses would roughly double.

(4) Losses from damage to kelp bed

Damage to the kelp bed and its biota may be anything from negligible to extreme (see Kelp Predictions).

D. Conversion of losses to biomass (weight of standing stock of fish)

The losses of 13 month old "adult-equivalents" were divided between sport and commercial fish and fodder fish according to the frequencies of these two

types in the larvae affected. Among nearshore planktonic spawning species, in general, four-fifths of the larvae are fodder fish and the remaining one-fifth are sport and commercial fish. However, their relative frequencies vary with proximity to the shore and with position in the water column, and these differences were taken into account.

Next, numbers lost were converted to a weight (biomass) for each group (sport and commercial fish live longer than fodder fish and are larger, so the conversions are different) (Fish Appendix 1). The idea here is that, once SONGS has been operating for several years, 1, 2, 3, . . . year old fish are all affected and each year there will be an average loss of fish weight, spread over all ages, in each species.

E. Conversion of losses to annual production

Each year, each fish population produces a certain tonnage of "new" biomass, through reproduction and growth. In a perfectly balanced fishery, each year this same amount of tonnage would be consumed - by natural deaths plus the fish harvest. The annual production of a typical sport and commercial population is reckoned to be about 60% of the standing stock (biomass). Thus, when the equivalent of 100 tons of sport and commercial biomass is lost as larvae and eggs, this is equivalent to a loss in production of 60 tons. Similar calculations are possible for fodder fish, where the figure is thought to be 80%.

F. Conversion of fodder fish losses to sport and commercial losses

Sport and commercial fish depend predominantly on fodder fish and, since the biomass of the latter is expected to be reduced, there should be less food for sport and commercial fish. It is difficult to know how to estimate the

effects on sport and commercial species of this predicted loss of fodder fish production. A standard rule of thumb is to assume that 10 pounds of fodder fish production yields one pound of sport and commercial production - a 10% "transfer efficiency". However, if sport and commercial fish population are being held at relatively low densities, say by fishing (Section G), then changes in food supply may have little or no effect on their production. In addition, the fodder fish losses may be partly or largely compensated for (see next section). These considerations suggest that 10% is too high a figure. We think it unlikely that sport and commercial fish production is totally unrelated to fodder fish production, and so assume a 1% relationship as a lower (and more likely) bound.

G. Compensation and declines in nearshore fish species

It is possible that reductions in larval fish density caused by SONGS would lead to higher survival of the remaining fish larvae (for example, by making more food available to each larva). There is, at the moment, no good evidence for such compensation in marine larval fish, and there are a priori reasons for suspecting such compensation would at best be weak. First, fish larvae are already very sparse. Second, it is likely that "chance" (density independent) factors dominate the mortality of these small organisms. Third, much of their food will be killed along with the larvae themselves.

Another possibility is that juvenile or adult fish might survive, grow, or reproduce better in response to lowered density of juveniles. We think this is possible for fodder fish because there is no evidence that their numbers have been declining. However, we think it unlikely that compensation in nearshore sport and commercial fish would be adequate in the face of significant

extra mortality. The main reason for this view is that these species appear to have declined in Southern California since the mid-60s (Fish Appendix 1).

The evidence for declines in nearshore sport and commercial fish species is by no means unequivocal. We have to rely on indirect measures of fish stocks. The major evidence is from California Department of Fish and Game records of sport and commercial catches. These suggest strongly that halibut, in particular, has declined, that kelp bass and sand bass may have declined, and that the more desirable nearshore sport and commercial species as a group have declined.

Several arguments can be made against these conclusions. Counter-evidence, together with comments, is as follows:

(1) Populations fluctuate naturally, and these species showed strong declines in the 1950s, followed by a recovery.

Populations do fluctuate. But this is not evidence that current declines are "natural" and can be ignored. The declines in the 1950s, for example, may have been caused by loss of kelp bed habitat, and DDT in the Bight, and these two mechanisms are now diminished.

(2) Catches of fish in power plants do not show clear evidence of declines.

However, the data from impingement by power plants suffer several defects. First, such data are highly influenced by catchability of fish (which is influenced by annual variations in the weather), as well as by their density. They usually are available for only a few years in the 1970s, and such variations in catchability could easily obscure real trends. Second, the data are extremely variable, and this could obscure trends over this short period.

Third, the data <u>are</u> for only the 1970s, often not for the whole decade, and the Fish and Game data show that the decline was most precipitous in the mid to late 60s and has been rather slight in the 1970s. (The Fish and Game data are <u>much</u> less variable than the Power Plant data, especially in the 1970s.) Thus, we would not even necessarily expect to see a decline in these Power Plant data.

On balance, we believe the data support the conclusion of a decline in desirable nearshore sport and commercial fish.

H. <u>On-shore off-shore water movements</u>

The predictions have not taken into account the possibility of large scale onshore and offshore movements of water. (MRC is now measuring this phenomenon.) Such movements could create "circulation cells" that would slow down the longshore movement of eggs and larvae (although it is possible that, by choosing water layers, larvae could escape from such cells). This would reduce the estimated loss of larvae, but would create a more detectable local depression in larval density around SONGS.

I. <u>Upwelling caused by SONGS</u>

Some of the water entrained by SONGS' diffusers will come from below 7 m depth. Water at this depth in the region of the diffusers is rich in nutrients, but has low light levels, so that it produces little phytoplankton. The diffuser plume will generally move this (and other inshore water) closer to the surface, where there is more light, and farther offshore. This will result in an absolute increase in phytoplankton production in this region.

We estimate (Fish Appendix 2) that, each year, some 84,000 tons of additional phytoplankton will be produced. Most of this will be eaten by

zooplankton. Although it is not possible to say exactly how this production will pass up the food chain, a reasonable estimate is that half of the phytoplankton will be eaten by microzooplankton, then by macrozooplankton, and then fodder fish. The other half of the phytoplankton will be eaten by macrozooplankton, and then by fodder fish. In this region (roughly 3½ km offshore) the major fodder fish is the anchovy, and most of the new production should pass to this species. A transfer efficiency of 10% would produce, in tons of fodder fish:

$$[4.2 \times 10^4 \times 10^{-2}] + [4.2 \times 10^4 \times 10^{-3}] = 460 \text{ tons.}$$

During these transitions the new production (as phytoplankton and zooplankton) will be moved away from the area of production and thoroughly mixed. The anchovy population is also extremely mobile and well mixed, so this production of anchovies would be expected to be spread over a very large fraction of the Bight population.

460 tons is a miniscule fraction of yearly California anchovy production, which is about 1-2 million tons. We believe it would not result in any real increase in yield to sport and commercial fish. It should be remembered that we have made a similar argument for ignoring anchovy losses: each year, SONGS will kill on the order of 10 times as many anchovy larvae as other fodder fish larvae, and the fodder fish losses themselves are equivalent to more than 300 tons of production, but we predict no effect from these losses. Clearly, in "production equivalents", the anchovy losses are much greater than 300 tons, but we believe it is sensible to assume that perturbations of this order, spread over the whole anchovy population, will have no effect on adult anchovy standing stock, and hence production.

As discussed in Section F, the transfer efficiency from fodder fish to sport and commercial fish probably lies somewhere between 1% and 10%, and we have argued it is likely to be close to 1%. If the increase in anchovy production were to be passed on, we would expect it to produce an extra 5-46 tons of sport and commercial fish, and believe the lower figure much more likely. Most of this production would not be in nearshore sport and commercial fish, since the mass of the anchovy population is offshore.

KELP CONTENTS

I. Biology of Kelp

We begin by looking at the basic population dynamics of the San Onofre kelp bed.

(A) "Normal" conditions

It appears that, even in the absence of catastrophic events, the kelp bed is rarely in a "steady-state" or equilibrium condition. It is instead dominated by physical and oceanographic conditions that are highly variable. In the present study (1976 to 1980), only by the end of 1979 did SOK cover most of the cobble substrate available. Naturally,the amount of kelp (number of plants and areal extent) on any section of the bed fluctuates in response to changes in bottom conditions, storms that tear adult plants from their sites of attachment, water temperature, availability of light and nutrients, grazing by sea urchins and probably fish, fouling, and periodic recruitment. Patches of kelp within the bed increase and decrease and even disappear and reappear under normal conditions.

Recruitment of new plants is a major dynamic event that is episodic, in response to seasonal and annual variation in physical and chemical conditions. It appears that recruitment occurs, on average, only once every three years. (However, recruitment rate has been examined, in this and other studies, for a total of only 12 years or so.) Although kelp has a complex life cycle (Figure 1), for present purposes there are only two important processes affecting recruitment of adults: (i) the ability of the tiny male and female stages (gametophytes) to reproduce and hence produce the microscopic first stage of the actual kelp plant (sporophyte); (ii) the ability of juvenile plants to grow up into adult kelp plants. Experiments have shown that light

is an essential factor (but not the only factor) controlling these two processes.

We need to look briefly at the dynamics of the life cycle.

(1) Reproduction, and recruitment of juvenile plants

The adult plants produce minute propagules (zoospores) that settle on the bottom and become either tiny male or female stages called gametophytes. Each adult plant produces extremely large numbers of these propagules, perhaps continually throughout the year. Thus it is probable that there are gametophytes present, most of the time, in abundance, on suitable areas of the bottom close to adult plants. The critical factor is the occurrence of a combination of suitable physical conditions (including, at least, adequate light and nutrients) that allow gametophytes to reproduce. The gametophytes that do reproduce, produce microscopically small kelp plants. This type of life cycle is known as alternation of generations. In kelp the microscopic gametophytes are the sexual stage. The sporophyte (the actual kelp plant) is the asexual stage. It is also microscopically small to begin with, but passes through juvenile and subadult stages to become the massive adult kelp plant.

Gametophytes are killed by a variety of factors - abrasion, burial by sediments, and grazing by animals - and only a small fraction of them survive to produce sporophytes (Kelp Appendix 1, p. 150). Even so, after a successful reproductive "set", there are thousands of tiny sporophytes per square meter of cobble substrate. Unfortunately, it is extremely difficult to study these microscopically small plants in natural conditions. Quantitative studies have been done only on larger plants that have reached a height of

more than 10 cm (4 inches). At about 40 cm (16 inches) the plant becomes a juvenile (Figure 1). Once again, a variety of factors kill most of the sporophytes before they become juvenile plants.

It appears that the physical environment affects these processes in the following way. Reproduction by gametophytes requires adequate light and, probably, a high concentration of nutrients in the bottom water. When these conditions prevail, the gametophytes absorb sunlight and nutrients each day, until they mature to a reproductive condition. Field experiments show that very few sporophytes ever appear from gametophytes planted out more than 40 days. Thus, in the field, 40 days apparently is the maximum period during which this stage can accumulate the sunlight needed for survival and reproduction. Over this period they need an average of at least .43 Einsteins per m^2 per day (Kelp Appendix 2, p. 5). (Under good field conditions it is likely that the average successful gametophyte manages to accumulate enough light in about 20 days.) The critical question for sporophyte recruitment, in any given year, is therefore: during the period in which gametophytes are present, what is the probability (a) that enough light can be accumulated during at least one 40-day period (called a "light window"), and (b) that nutrients are also adequate during the light window?

It appears that these two conditions co-occur only rarely. (a) The frequency of light windows varies with the situation. In a very sparse part of the kelp bed, where adults were absent and vegetation had been cleared, all of the spring season consisted of light windows (Kelp Appendix 3, Table 1, p. 5). However, in darker portions of the bed, where adults are present in abundance, none of the 40-day periods appeared to have received adequate light

on the bottom. With a light understory of other algae, and heavy adult canopy, about 30% of 40-day periods were light windows on the bottom.

(b) It appears likely that nutrients are adequate only during periods of upwelling. In any given spring these periods last for only a few days, and occur not more than a few times per season (Kelp Appendix 1, Figure E1, p. 260).

Suitable conditions for reproduction occur mainly in the spring, although occasionally also in the fall. It appears that adequate conditions for reproduction occur, on average, only once every three years (Kelp Appendix 2). At any one time the bed is thus generally dominated by a "cohort" of adult plants from a single episode of reproduction.

As discussed below, SONGS is predicted to decrease the frequency at which conditions become suitable for reproduction. We cannot predict whether or not SONGS will affect the number of sporophytes or juvenile plants that arise from any given successful reproductive set. It is likely, however, that some factors will not have much effect on the number produced:

(a) Each adult plant produces enormous numbers of gametophytes. Thus, unless the density of adult plants is catastrophically reduced, we assume that there will be enough gametophytes present to replenish the bed even when adult density is low. (This is equivalent to assuming there is density "compensation" in the survival of these small stages.) There must be some very low density of adult plants at which replenishment through a single reproductive set is not possible, but we make the conservative assumption that it is very low, lower than is encountered during "normal" conditions.

(b) With respect to light levels, reproduction is all-or-nothing. When adequate light is available, the number of tiny new plants (sporophytes) produced is independent of the light level. The number produced appears, instead, to be associated with the amount of nitrogen in the bottom waters, and this is not expected to be affected by SONGS.

The survival of sporophytes to the juvenile stage is determined by a range of factors (abrasion, sedimentation, grazing).

(2) Survival from juvenile to adult stage

Juveniles frequently suffer a higher death rate than adults (Kelp Appendix 1, pp. 93 and 95), so anything that prolongs the juvenile stage will reduce both the eventual number of adults and the average density of kelp plants. Light affects the growth rate, and so does fouling. These factors are discussed later.

The growth rate of juvenile kelp plants is highly variable. Some plants in a group develop from juvenile to adult in less than three months, while others take more than 13 months. The survivorship from juvenile to adult stage is also highly variable, and depends on, among other factors, both the initial number of juveniles and the number of adults present. The fraction surviving tends to be higher when (a) fewer juveniles are present initially (Kelp Appendix 1, p. 82), and (b) fewer adults are present (Kelp Appendix 1, p. 84, and Kelp Appendix 2, p. 10). These relationships reflect an important result: except when very low densities of juveniles are present, the final number of adults present is roughly constant. (This means there is strong "compensation" or "density-dependence". If some factor reduces juvenile density, the number of adults produced may be relatively unaffected.)

(3) Summary of "normal" kelp population dynamics

A final piece of information completes the picture of "normal" kelp bed population dynamics, namely that the average adult plant survives for about 12 months (Kelp Appendix 2, p. 11). That is, if we start out at some point in time with a cohort of adults produced by a successful reproductive "set" a year or more earlier, we can expect roughly half to die within 12 months. By the end of two years roughly 25% of these adults will remain alive, and by the end of three years, roughly 12½% will remain alive. At this time, on average, we could expect another cohort of adults to appear. In reality, of course, the dynamics would not follow this average pattern, but would vary around it. For example, deaths occur mainly in winter storms, which vary in their severity from year to year; again, reproductive sets will sometimes be spaced one or two years apart, and sometimes four or five years apart.

The number of kelp plants in the bed thus fluctuates, rising rapidly after a successful recruitment event, and declining thereafter. However, the canopy area of the bed will not clearly follow this pattern since the surviving plants will continue to grow. The canopy area can thus increase even though the number of plants may be decreasing.

(B) Catastrophes

We know little about the frequency of catastrophes in the SONGS area before the 1950s. Certainly the kelp beds in the general area were more extensive and continuous when they were observed at various times earlier in the century than they have been since (Kelp Appendix 1, p. 12). It is likely that much of the cobble in this area has been covered by sediments since then. We do not know, however, if the beds were severely reduced between the infrequent

observations made before 1950.

Two catastrophic die-offs have occurred since 1956 (Kelp Appendix 1, p. 12). The first, in 1958-59, was associated with high summer temperatures (but may have been caused by associated low levels of nutrients). At this time 90% of Southern California kelp beds were destroyed. SOK was not re-established for a period of 12 years (by 1972). In 1976, again a year of unusually high temperatures, SOK suffered a partial die-off, being reduced to less than 10% of its former extent, and only in the offshore segment did plants remain. Recruitment occurred about a year later, and recovery of the canopy took almost two more years.

There are two means by which kelp disperses and, hence, beds recover or become re-established. First, the adult plant casts its microscopic offspring varying distances. Many offspring probably fall very close (a few meters) to the plant. (Observations at SOK show that some offspring may be dispersed one or two hundred meters from the bed, but we do not know if these were offspring from plants attached in the bed, or from plants that became detached and drifted from the bed.) Secondly, adult plants, torn loose in storms, drift and sometimes cast spores on suitable substrate far from their point of origin. Re-establishment of a bed therefore depends on chance events, and seems more likely when a source of "colonists" is close by. This is one reason why the longshore continuity of beds is important. Recovery of a kelp bed that has been drastically reduced, but not exterminated, depends mainly on local reproduction. Observations at SOK, in the very successful reproductive season of 1978, suggest that a large "set" of new plants can arise from quite a sparse kelp bed, and that recovery can be rapid if the catastrophic

die-off is followed quickly by successful recruitment. By contrast, the 1958 catastrophe suggests that major catastrophes can be followed by very long recovery periods because no or extremely few plants survive locally.

II. Estimating the Effects of SONGS Units 2 and 3

(A) Predicted effects on kelp reproduction

The two major factors affecting reproduction are light and nutrients. Increased turbidity caused by SONGS' discharge will reduce the light in SOK during spring, the main reproductive season. The probable effects on reproduction were estimated by first calculating the expected reduction in light and, second, by calculating how this should affect reproduction. SONGS is not expected to alter nutrients on the bottom, where reproduction occurs.

The probable levels of light that will prevail in the kelp bed once Units 2 and 3 are operating were calculated in four steps (Kelp Appendix 1, pp. 222-241, and Turbidity Appendix). First, ambient light levels near the bottom were recorded. Second, a computer simulation model of water movements near SONGS, including those caused by SONGS' intake and diffuser systems, was developed. This was based on information obtained from current meters placed in the ocean near SONGS, and from a physical model of SONGS-induced water movements produced for Southern California Edison. Third, measurements of natural turbidity levels were made in spring and summer. This information allowed prediction of expected levels of turbidity in the kelp bed for these two seasons. Finally, measurements of light and turbidity levels in the field yielded a strong quantitative relationship between light and turbidity. The calculations predict (conservatively) that in spring, in the (most important) offshore half of the bed, subsurface light levels on average will be reduced

by from 25% to 55%, with a roughly 40% reduction being most likely. No significant reduction in light is expected in the already turbid inshore segment. The offshore half of the bed has been the most persistent during catastrophe, has the densest canopy cover, and constitutes 70% of the total SOK canopy cover. Subsurface light will be much less affected in late summer.

A 40% reduction in subsurface light will reduce the number of 40-day light windows, and hence the probability of recruitment. The amount of reduction depends on the prevailing light regime. In a clear part of the bed, where all 40-day periods are suitable, a 40% reduction in light would cut the number of light windows by 20-30%. At other parts of the bed, where light windows are already scarce, the reduction could be close to 100%. We will use a 20% reduction as a conservative estimate, since the most critical recruitment events occur when the bed is sparse and therefore ambient light levels will be high.

To estimate the potential effect of this reduction in underwater illumination on reproduction, a model of reproduction is useful. A crude model, assuming that only one coincidence of adequate light and nutrients is needed to provide successful recruitment in a season, is as follows. In a season of D days, there is, each day, probability w that the day is the first of a light window, probability n that nutrients are adequate, and probability g that there is an adequate supply of gametophytes. The probability that a given day will initiate successful recruitment is then wgn. If 40-day periods can be treated independently, then the probability that at least one day in the season will initiate recruitment is $1-(1-wgn)^D$ (Kelp Appendix 4).

This model can be used to estimate how a reduction in the number of light windows will affect recruitment. Suppose we reduce the number of light windows to a fraction (p) of their original number (in the case of a 20% reduction, p = .8). The probability a given day will begin a light window then becomes pw, and our model is $1-(1-pwgn)^D$. We assume that only when SOK is destroyed is g < 1, so except when the bed is absent, the model becomes $1-(1-pwn)^D$.

If wgn, or wn, is small, $(1-pwgn)^D \approx 1-Dpwgn$, and the reduction in the probability of successful recruitment will be by a factor close to p. Otherwise the reduction will be less than p. There are three cases: normal SOK population dynamics, SOK absent (when it is destroyed), and SOK reduced (when it is at very low densities).

In normal times there is very little light in the bed and w is small. Furthermore, those partially shaded areas that do provide some windows suffer a greater than 20% reduction in windows. Thus a 20% reduction seems to be a conservative estimate. Note, with p = .8, the average time between recruitment events increases by a factor of 1/p = 1.25. That is, the average time between recruitment events would be expected to increase from about three years to almost four years.

In the absent phase, g is very small, since recruitment depends on the rare event of a drifting kelp plant dropping spores on suitable substrate. Thus a 25% increase in the time to recruitment is a reasonable estimate. Even in the reduced phase, when w is intermediate and g ≈ 1, n is likely to be very small and the time between recruitment events should increase by 25%.

Overall, therefore, it is reasonable to predict a 20% reduction in the probability of successful recruitment, and therefore a 25% increase in the average time between recruitment events.

(B) Predicted effects on kelp growth and survival

Light and fouling of kelp plants are the major factors that are expected to affect kelp growth. We discussed expected changes in light, above. Here we first describe fouling and then discuss the relationships among light, fouling, and growth and survival of kelp.

Fouling: Several species of small invertebrates settle and attach to kelp plants. Some build tubes from particles in the water, others merely live on the kelp blades. Under normal conditions in SOK, fouling of juvenile kelp plants is rather light, although the fouling organisms are present.

Several experimental studies show that the abundance of these fouling organisms on kelp plants and other surfaces is greater the closer they are to the discharge plume of Unit 1. This increase is caused by (probably several) factors associated with the plume, including increased particles in the water, and increased turbulence which stimulates the planktonic stages of some organisms to settle. It is also associated with lower light levels, but is probably not caused directly by reduced light.

There is evidence (Kelp Appendices 2 and 5) that increased fouling can reduce the growth of kelp plants, and damages them by causing them to lose blades, causing fronds to sink, and attracting fish and other predators.

The relationships between light, fouling and growth were examined in an experiment in which juvenile kelp plants were transplanted to the Unit 1 plume and to other areas in which underwater light levels varied (Kelp Appen-

dix 1, pp. 101-121; Kelp Appendix 2, Table 11; Kelp Appendix 3, p. 6). A multiple regression of growth rate (Δ log length in cm/day), versus irradiance (E/m^2/d) and percent cover by Membranipora (a bryozoan that is a major fouling organism), explained 99% of the variance in growth in the experimental juvenile plants at four locations at different distances from the SONGS Unit 1 discharge.

This experiment suggests very strongly that decreases in light and increases in fouling will have a detrimental effect on kelp growth. Unfortunately, the relationships among the three factors (light, fouling and growth) are complex, and this complexity prevents us from making a confident quantitative prediction. The uncertainty arises because (1) the effects of light and fouling on growth are confounded, (2) the relationship between growth and light is different inshore and at SOK, (3) growth and light do not always show a consistent relationship, and (4) we cannot predict quantitatively how fouling will change at SOK.

(1) Lower light was always associated with greater fouling in this experiment, and so we cannot tell how much of the reduction in growth was caused by each of these factors. Fouling alone explained 95.3% of the variance in growth, and light explained 99.5% of the remaining variance, a significant fraction, so we know light has some effect. Light alone explains 99.7% of the variance in growth, and fouling explains 93.1% of the remaining variance (which is not a statistically significant fraction). We have, so far, been unable to separate the effects of these two factors upon growth.

(2) The relation between kelp growth and light in SOK is different from the experimental relationship established inshore. At a given light level

kelp grows faster in SOK than it does inshore.

(3) There is one pair of observations in SOK that shows kelp growing at similar rates at different light levels (Annual Report, p. 110, Table 4.2).

(4) Fouling appears to be increased by an increasing concentration of particles in the water, and by turbulence. We do not know the quantitative relationships involved, and we do not have a precise prediction for these two variables under SONGS' operation. Furthermore, the organisms may 1) behave differently, 2) be a different mix of species, and 3) differ in abundance at SOK and inshore. Thus, we cannot predict the extent of fouling at SOK once SONGS Units 2 and 3 begin operation.

Experiments now underway should help resolve the relationship between light and growth.

In spite of difficulties of interpretation, however, the transplant experiment predicts that kelp growth will be reduced when SONGS 2 and 3 are operating. Reduced growth would be expected to (a) reduce the average size of plants, and so reduce kelp biomass and cover, and (b) reduce the number of kelp plants. We next explore question (b).

Reduced growth should reduce plant density because death rates of juvenile and sub-adult stages are generally higher than those for adults, and plants would spend longer in the high death rate phases. According to one set of calculations, this would lead to a 70% reduction in the number of plants produced from a cohort of new juveniles (Kelp Appendix 2, pp. 13-17). If compensation operation, the reduction could be as small as 25%.

We cannot place much reliance on these particular figures because different sets of plausible assumptions and relationships give us different

estimates that range from a negligible effect to an even greater than 70% reduction in abundance (Kelp Appendix 5). Furthermore, we still have the problems of the confounding effects of fouling, and one pair of observations of similar growth at different light levels in SOK.

No firm quantitative prediction can be made about growth and survivorship.

(C) Other factors associated with SONGS

(1) Sedimentation

Sedimentation appears to reduce the recruitment of new plants by smothering them and increasing abrasion. However, SONGS is expected to have no effect on the sedimentation rate on the bottom at SOK.

(2) Sea urchins

Sea urchins (Lytechinus) have caused a large amount (about 45%) of adult mortality in parts of the bed. They also appear to interfere with recruitment by grazing on the microscopic and very small stages of kelp.

SONGS will probably increase the amount of particulate organic matter (POC) at SOK. Schroeter et al. (Kelp Appendix 5) show that urchins grow more inshore than offshore, and argue that this was caused by higher POC levels there. They conjecture that SONGS will therefore increase urchin populations, and hence grazing pressure, in SOK. This seems a reasonable prediction, but we cannot be certain it will occur because other factors (predation, etc.) also affect the abundance of sea urchins.

(3) Toxins

Reduced growth and settlement of various organisms in the Unit 1 discharge plume have led investigators to postulate that the plume contains

small quantities of toxin(s) - perhaps copper or chlorine. Southern California Edison claims that Unit 1 releases extremely small amounts of copper, that copper will be virtually absent from the plumes of Units 2 and 3, and that these units will also use little chlorine.

There are no usable data on toxins from SONGS, and we cannot evaluate their possible role. This point requires investigation.

(4) Temperature

SONGS is expected to have very little effect on water temperatures in SOK (a less than 0.5°C average increase, a maximum of a 1°C increase, and a non-detectable increase over most of the bed).

(5) Nutrients

The concentration of nutrients is expected to increase in SOK in surface and mid waters at some periods of the year. We have no quantitative prediction of this effect, nor do we know the relationship between nutrient levels and adult plant growth. This mechanism could lead to greater plant growth (Plankton Appendix 2).

(D) Overall effects on the kelp bed

The predicted reduction of recruitment, and an increase in mortality, would lead to a reduced density of kelp plants in the offshore portion of the bed. These two effects plus reduced growth of individual plants and greater grazing by urchins would reduce the amount (biomass and cover) of kelp in the bed. Increased midwater nutrients could cause an increase in kelp growth. We cannot make a quantitative estimate of the overall effects.

(E) Effects on shrimp in the kelp canopy

Experiments carried out at various distances from Unit 1 discharge

showed that shrimp densities on settling plates were lower close to the discharge. These spatial differences tended to disappear when SONGS was not operating. It was also shown that the death rate of shrimp in experimental containers was greater closer to the Plant.

The mechanism causing these effects is not known, so no quantitative predictions of the effects of Units 2 and 3 can be made.

Shrimp are important in the diets of various fish species that live in SOK (Kelp Appendix 5, pp. 12-13).

MYSIDS

1. Annual loss of mysids

From the field sampling program we know how mysid densities change as one goes offshore. Several species, constituting most of the mysid population, are restricted to within 3 or 4 km of the shore (Mysid Appendix 1). Maximum mysid density occurs in the intake zone.

These data, plus information on the rate of SONGS' intake of water, allow us to calculate how many mysids will be taken into SONGS' intakes. Sampling at Unit 1, and laboratory studies, suggest that all mysids taken into the cooling system will be killed.

We are much less certain of the number that will be killed by the discharge plume, which will entrain about 10 times its own volume of water. There are two possible sources of mortality. First, some mysids will die from turbulent shear forces created by the discharging water. We believe this will be a relatively minor source of mortality. Second, some mysids will be carried further offshore in the plume and deposited offshore of their normal habitat. There is as yet no reliable method for predicting the number of mysids dying in this way.

2. Mysid depression

(a) Depression caused by intake and diffuser mortality

If mysid mortality is of the order calculated in Section 1, we would expect there to be a lowering of mysid density downstream from the Plant. The extent and depth of the depression depends upon the rate of mixing with water that has not passed through the Plant, and on the ability of surviving mysids to compensate with increased reproduction, growth or survival.

The probable extent of the depression was estimated using a model that combines a description of water movements and the biology of the mysids (Mysid Appendix 4). The model describes both the ambient current regime and SONGS' plume, and moves mysids about accordingly. It incorporates the natural mortality rate of mysids (as determined from samples) and imposes on this rate the expected SONGS-induced mortality. The model incorporates 100% intake mortality and 20% mortality in the plume. (The model assumed that this was caused by turbulent shear. It is more likely that any diffuser losses will be caused by translocation; however, we use the output as an indication of the scale of possible effects.)

The model predicts that, for much of the year, depressions on the order of 50% should exist out to 5 km or more from the Plant, and that lesser depressions should extend for more than 10 km.

We need to view these predictions with caution. The model is not a precise description of reality; in particular, it becomes less accurate as it predicts events more distant from the Plant. Also, the amount of translocation mortality is not known. What the model does tell us is that we can expect to see a measurable depression in mysid density, at least several km long, for much of the year, and it probably indicates the maximum size of the depression that could be caused by these mechanisms.

(b) Depression caused by an unknown factor

The Mysid Study group has data suggesting that Unit 1 presently causes a depression in mysid density of almost 50% that extends 6 km downstream (Mysid Appendix 3). This is the difference observed in the longshore pattern of abundance between samples taken when the Plant is on, and when it is off.

There is statistical support for this claim, but there is a difficulty in that the "Plant on" samples were taken in October, while the "Plant off" samples were taken in spring, and the general level of mysid abundance was greatly different at these two seasons. Samples are being taken now, while the Plant is off, to resolve this issue.

The Committee feels there is a further problem with these results. Even if it can be shown statistically that a depression occurs when the Plant is on, but not when it is off, we know of no mechanism that is likely to produce such an effect. (The actual kill via intake and plume mortality would not depress the population for such a distance, and the plume from Unit 1 rarely extends more than 3 km from the Plant.) One suggested mechanism is that organochlorine compounds from the Plant adhere to very small particles and settle out over a distance of 6 km. We have no evidence concerning this mechanism. If the new studies confirm the existence of this depression, further work will be required on this question.

If indeed there is a depression to 6 km caused by Unit 1, then it may be reasonable to expect that the enormous additional kill rate of Units 2 and 3 will extend the depression to 10 km or so. Notice, however, that there is no evidence that the plume from Units 2 and 3 will extend further downcoast than that from Unit 1. Thus there is no certainty that the additional intake and plume losses from Units 2 and 3 would extend an already existing depression.

3. Significance of mysid losses

Mysid populations are extensive along the coast, and our predictions do not imply that SONGS would have a significant effect on the coastal populations. As stated in the "Predictions", we do not expect these effects to have a major

impact on the local populations of fodder fish, although this is certainly a prediction that we need to check when Units 2 and 3 begin operating.

PLANKTON

1. The evidence that some zooplanktonic species are restricted close to shore can be found in Plankton Appendix 1. The centers of abundance of the inner nearshore species are in the areas of the intake and diffusers, and these species are therefore subject to greater SONGS pressures than other less restricted species. Some of the zooplankton restricted to the inner nearshore tend to live closer to the bottom where the longshore currents are slower (MRC Interim Report 1979-02 (II), p. 17), and as a consequence their longshore replacement (mixing) rates could be lower than those for other species. In addition, some of the non-restricted species could be replaced by individuals from farther offshore. All of this would favor the non-restricted species in the recovery from SONGS losses and would tend to promote a shift in relative abundance.

2. Synoptic samples taken in the intake and discharge ports of SONGS Unit 1 demonstrate that few of the withdrawn zooplankton occur in the discharged waters (MRC Interim Report 1979, and Plankton Appendix 2). Presumably, they are consumed during their journey through the intake conduit by the benthic organisms that live on the inner walls. These benthic organisms are purged from the cooling system during heat treatment and reverse flow, and become part of the inshore benthic food chain. The estimates of plankton densities used in predicting intake losses can be found in Plankton Appendix 2.

The estimate of zooplankton entrainment by diffusers is based on total macrozooplankton (zooplankton greater than .2 mm in width) plus the microzooplanktonic species Euterpina acutifrons. Euterpina was included because

it forms a major part of the diets of most fish larvae and some fodder fish in the area. Using the field samples from 20 dates for macrozooplankton and from 5 dates for Euterpina, the mean concentrations were calculated for different positions expected to be affected by diffuser entrainment (Plankton Appendix 2). This estimate of about 4 x 10^4 metric tons of zooplankton entrained per year was based on the assumption that equal entrainment occurred at all depths over the full length of the diffusers. The assumption that 10% of those entrained are killed results in an estimate of 4000 metric tons.

Most of the zooplankton biomass moved offshore by diffuser entrainment is likely to be eaten by adult and juvenile anchovies, top smelt, and blacksmiths. According to the MRC Fish Group, the blacksmith should increase in abundance because the diffuser rip-rap provides new habitat and the diffuser plume provides a continual source of zooplankton. In the absence of SONGS these secondarily entrained zooplankton would have been available to the same predators and to the late larval stages of the fodder fish Genyonemus and Seriphus.

3. The diffuser discharges will result in replacement of part of the offshore surface water by a plume consisting of a mixture of nutrient-rich waters from closer to shore and nearer the bottom. The detailed methods used in estimating the amount of nitrate plus nitrite added to the surface waters, and the conversion of these estimates to estimated phytoplankton production, are explained in Plankton Appendix 3.

SONGS will induce a real net increase over present primary production off San Onofre. First, in surface and mid waters where chlorophyll is high, nutrients are low, suggesting that when nutrients get into the high chlorophyll

waters they are taken up rapidly. Conversely, the presence of deeper waters high in nutrients and low in chlorophyll presumably indicates that the phytoplankton there are utilizing nutrients at a lower rate (Plankton Appendix 3). Therefore the nutrients in the bottom waters upwelled by the diffusers will be utilized at a far higher rate when they reach the surface.

Second, the waters replacing the entrained waters will also be high in nutrients and low in productivity. During periods of moderate to strong longshore currents, entrained water will be replaced primarily from longshore and similar depths. Under very sluggish conditions most of the entrained waters will come from offshore. In both cases, the water will be rich in nutrients (Plankton Appendix 3).

SOFT BOTTOM COMMUNITIES

The basis for the predictions can be found in Soft Bottom Communities Appendices 1 and 2.

1. Probable sediment effects were estimated by establishing the existing statistical relationships among abundance, diversity and characteristics of the sediments. Probable changes in the sediments were estimated (very approximately) from information about the weights of various materials in the SONGS' plumes, from information about water movements, and from information about the settling rates of various classes of materials.

2. Some 17% of the benthic species at some time rise into the water column and are at risk to entrainment by the intake or the discharging water. Too little is known about this group to make a firm quantitative estimate of losses, but we expect them to be roughly the same as mysid losses.

We are very uncertain about possible losses of planktonic larvae and the potential effects. This group of plankton is very poorly known. We do have data showing that the larvae of some intertidal and nearshore species are restricted inshore. However, we cannot estimate losses of benthic larvae because we do not know how to estimate mortality caused by the plume. Finally, although we know for some rocky bottom species that have been studied, that larval settlement far exceeds the number needed to maintain the adult population, we do not know if this is always the case, or if it is true for soft bottoms. If it were, likely reductions in larval settlement would have no effect on adult numbers.

It is possible that some intertidal and shallow water species will show reduced adult densities close to SONGS. However, it seems likely that total

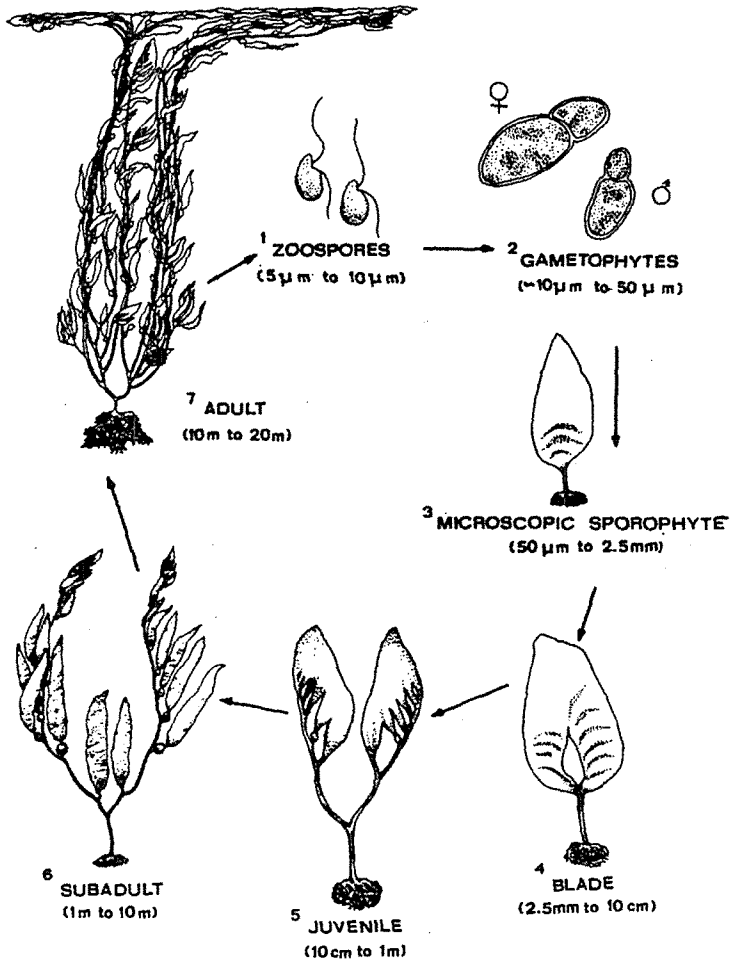
densities will not be significantly reduced, and that any reduction of a particular species will be made up by increased density of others.

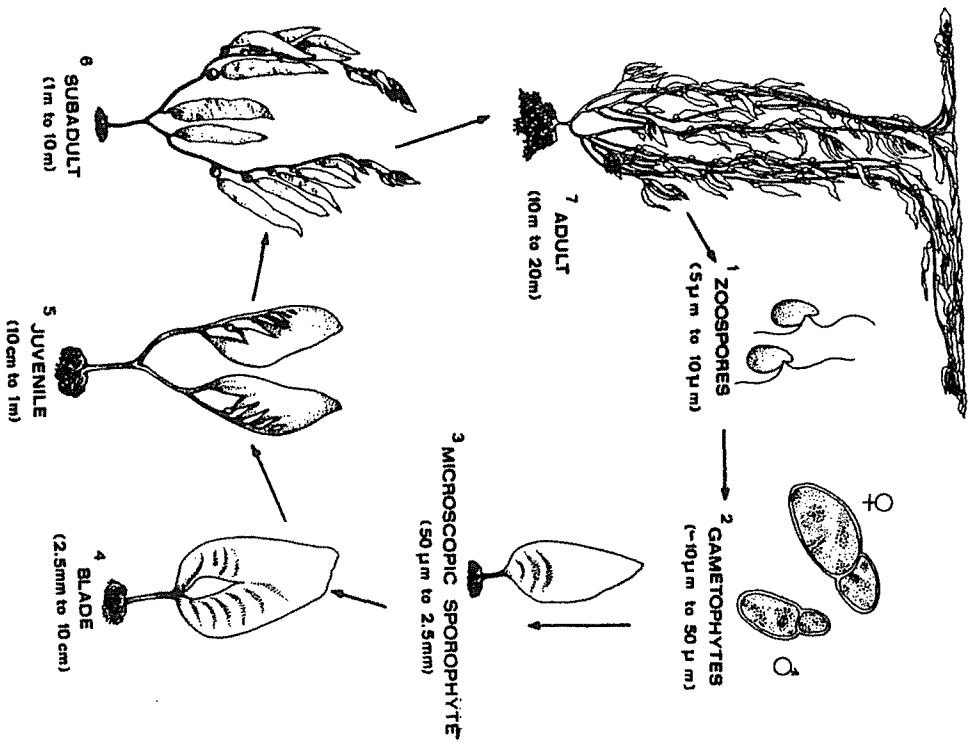
3. The enrichment of bottom sediments should have virtually no effect on the production of sport and commercial fish. The enrichment derives from SONGS' killing of organisms in the water column, and so represents a shift of material. The food chains on the soft bottom eventually lead to the same group of sport and commercial fish species as do planktonic food chains; however, there should be some additional losses of this material as it passes up the benthic food chain.

HARD BOTTOM COMMUNITIES

The Hard Benthos Project (Hard Benthos Appendix) has shown clear differences between nearshore and offshore communities on the underside of experimental panels, and some degree of similarity between the communities on panels and on natural boulders. There is also a correlation between these differences and turbidity; and the inshore species grow faster than offshore species at high turbidity.

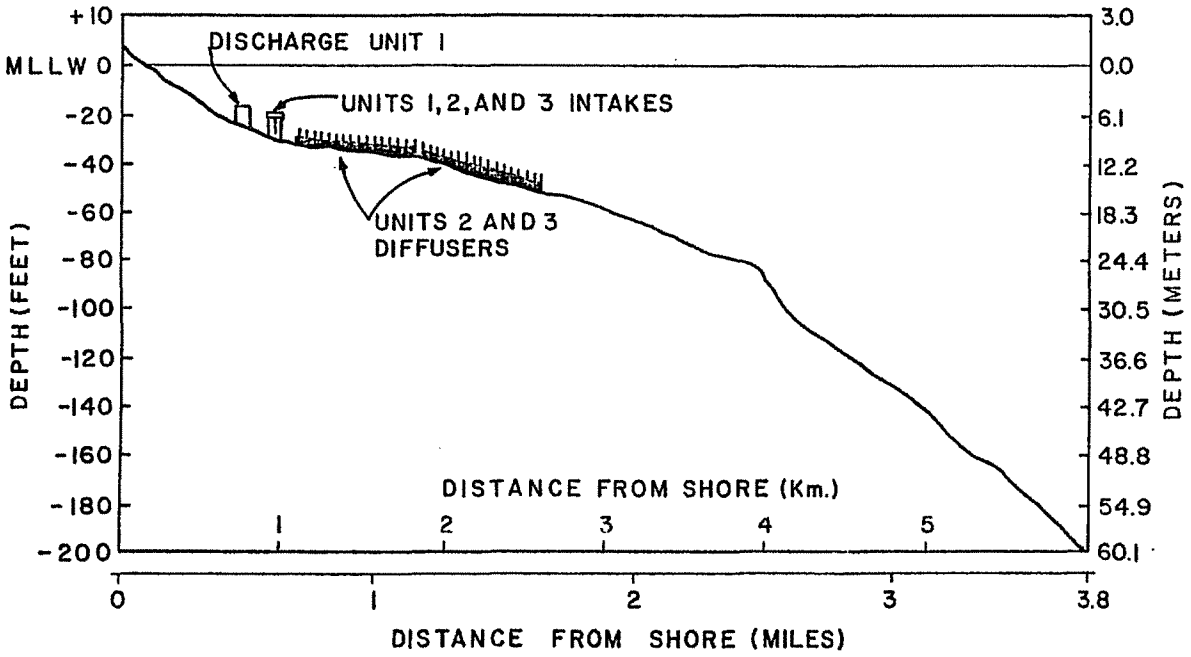
We believe there is no strong evidence that major changes will occur in this community. Several factors prevent us from making quantitative predictions, including the lack of close similarity between experimental panels and the tops of boulders, and the lack of quantitative relationships between possible changes and turbidity levels.





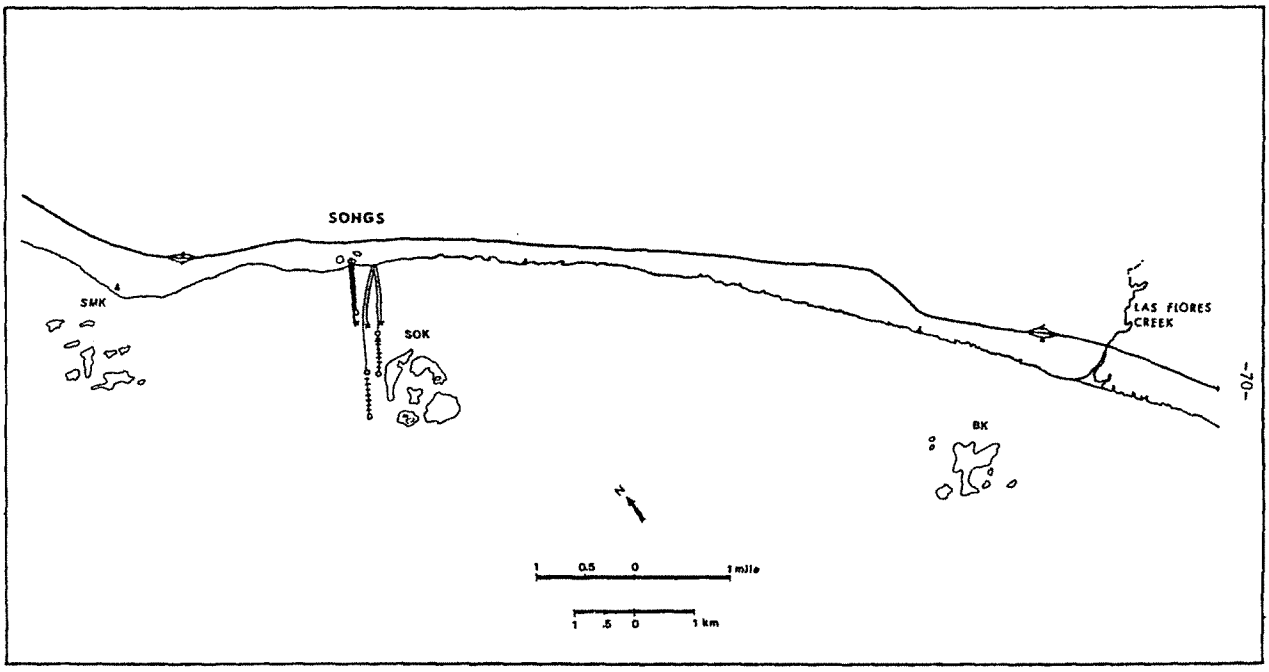
A diagrammatic representation of the Macrocystis life cycle. Stage names and approximate sizes are given.

-68-

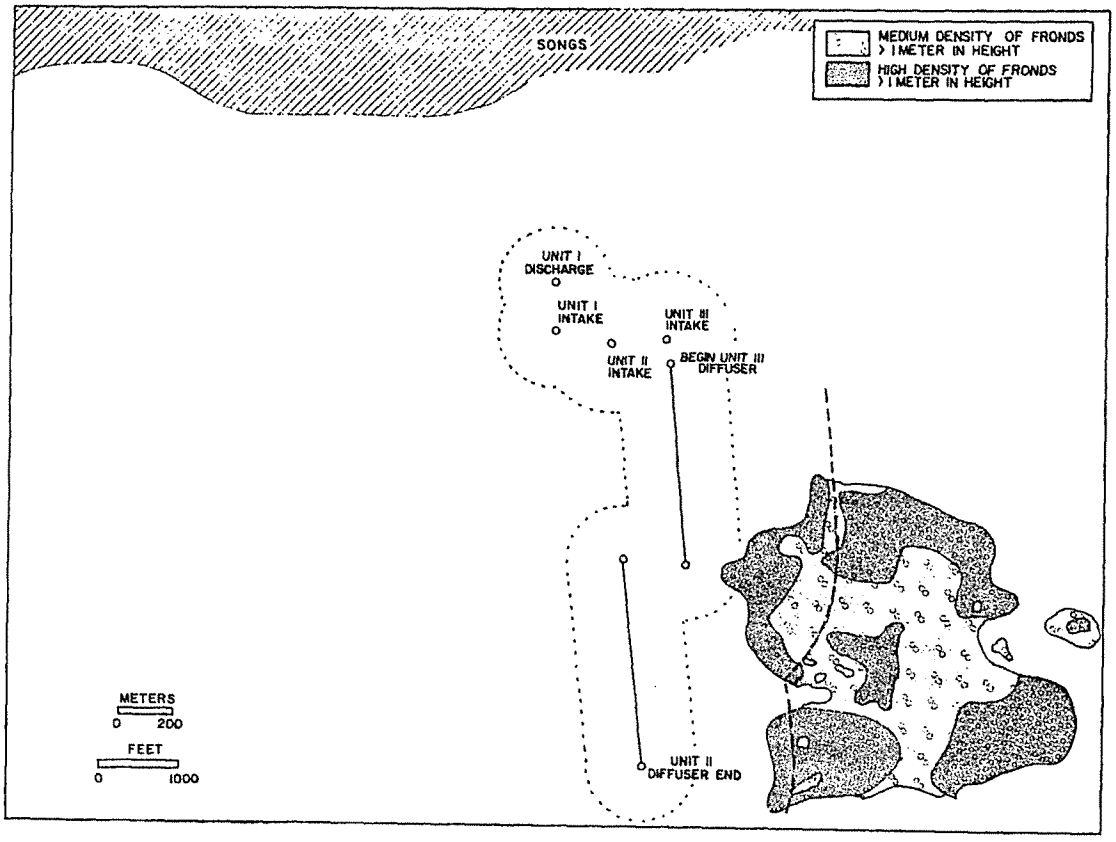


-69-

Figure 1. Offshore profile of the cooling system of SONGS Units 1, 2 and 3. (Modified from Figure II-3, Southern California Edison, San Diego Gas and Electric Company, Thermal Effect Study, San Onofre Nuclear Generating Station Units 2 and 3, Vol. 2, September, 1973.)



Map 1. Map of the region near SONGS. The kelp beds shown are the high density portions of San Mateo (SMK), San Onofre (SOK), and Barn (BK) kelp beds, as measured in December, 1978.



Map 2. Map of the coast near San Onofre showing the cooling systems of SONGS Units 1, 2 and 3 and the medium to high density areas of kelp measured in December, 1978, within the San Onofre Kelp (SOK) bed. The boundaries of the areas where the sediments are modified are indicated by dashed lines. The dotted line delimits the area within 1,900 feet of the diffusers as specified in the Coastal Commission Permit of February 28, 1974, Page 3, Item C.

APPENDIX F

EVACUATION MODEL

APPENDIX F

EVACUATION MODEL

"Evacuation," used in the context of offsite emergency response in the event of substantial amount of radioactivity release to the atmosphere in a reactor accident, denotes an early and expeditious movement of people to avoid exposure to the passing radioactive cloud and/or to acute ground contamination in the wake of the cloud passage. It should be distinguished from "relocation" which denotes a post-accident response to reduce exposure from long-term ground contamination. The Reactor Safety Study[1] (RSS) consequence model contains provision for incorporating radiological consequence reduction benefits of public evacuation. Benefits of a properly planned and expeditiously carried out public evacuation would be well manifested in reduction of acute health effects associated with early exposure; namely, in the number of cases of acute fatality and acute radiation sickness which would require hospitalization. The evacuation model originally used in the RSS consequence model is described in WASH-1400[1] as well as in NUREG-0340.[2] However, the evacuation model which has been used herein is a modified version[3] of the RSS model and is, to a certain extent, site-emergency-planning oriented. The modified version is briefly discussed below.

The model utilizes a circular area with a specified radius (such as a 16-km (10-mi) plume exposure pathway emergency planning Zone (EPZ)), with the reactor at the center. It is assumed that people living within portions of this area would evacuate if an accident should occur involving imminent or actual release of significant quantities of radioactivity to the atmosphere.

Significant atmospheric releases of radioactivity would in general be preceded by one or more hours of warning time (postulated as the time interval between the awareness of impending core melt and the beginning of the release of radioactivity from the containment building). For the purpose of calculation of radiological exposure, the model assumes that all people who live in a fan-shaped area (fanning out from the reactor) within the circular zone, with the downwind direction as its median (i.e., those people who would potentially be under the radioactive cloud that would develop following the release) would leave their residences after a specified amount of delay time* and then evacuate. The delay time is reckoned from the beginning of the warning time and is the sum of the time required by the reactor operators to notify the responsible authorities; the time required by the authorities to interpret the data, decide to evacuate, and direct the people to evacuate; and the time required for the people to mobilize and get underway.

The model assumes that each evacuee would move radially outward in the downwind direction with an average effective speed* (obtained by dividing the zone radius by the average time taken to clear the zone after the delay time), over a fixed distance* from the evacuee's starting point, which is somewhat greater than the zone radius. This distance is selected to be 24 km (15 mi) when the selected zone radius is 16 km (10 mi). After reaching the end of the travel distance the evacuee is assumed to receive no further radiation exposure. Persons who are outside the evacuation radius are assumed to remain in place for seven days prior to relocating, unless remaining for that long a period of time would produce a dose greater than 200 rem to the whole body. In that case, relocation takes place after 24 hours, with a dose appropriate to that time period.

The model incorporates a finite length of the radioactive cloud in the downwind direction, which would be determined by the product of the duration over which the atmospheric release would take place and the average windspeed during the release. It is assumed that the front and the back of the cloud formed would move with an equal speed, which would be the same as the prevailing windspeed; therefore, its length would remain constant at its initial value. At any time after the release, the concentration of radioactivity is assumed to be uniform over the length of the cloud. If the delay time were less than the warning time, then all evacuees would have a headstart, i.e., the cloud would be trailing behind the evacuees initially. On the other hand, if the delay time were more than the warning time, then depending on initial locations of the evacuees, there are possibilities that (a) an evacuee will still have a headstart, (b) the cloud would be already overhead when an evacuee starts to leave, or (c) an evacuee would be initially trailing behind the cloud. However, this initial picture of cloud-people disposition would change as the evacuees travel, depending on the

*Assumed to be constant value for all evacuees.

relative speed and position between the cloud and the people. The cloud and an evacuee might overtake one another one or more times before the evacuee would reach his or her destination. In the model, the radial position of an evacuating person, while stationary or in transit, is compared to the front and the back of the cloud as a function of time to determine a realistic period of exposure to airborne radionuclides. The model calculates the time periods during which people are exposed to radionuclides on the ground while they are stationary and while they are evacuating. Because radionuclides would be deposited continually from the cloud as it passed a given location, a person who is under the cloud would be exposed to ground contamination less concentrated than if the cloud had completely passed. To account for this, at least in part, the revised model assumes that persons are (a) exposed to the total ground contamination concentration which is calculated to exist after complete passage of the cloud after they are completely passed by the cloud, (b) exposed to one half the calculated concentration when anywhere under the cloud; and (c) not exposed when they are in front of the cloud. The model provides for use of different values of the shielding protection factors for exposure due to airborne radioactivity and contaminated ground. Breathing rates for stationary and moving evacuees during delay and transit periods are specifically included.

It is realistic to expect that authorities would evacuate persons at distances from the site where exposures above the threshold for causing acute fatality could occur, regardless of the EPZ distance. Figure F-1 illustrates the reduction in acute fatalities that can occur by extending evacuation to distances up to 48 km (30 mi) from the San Onofre site. (The evacuation distance used in the Reactor Safety Study[1] was 40 km (25 mi).) Also illustrated in Figure F-1 is a more pessimistic case for which no early evacuation is assumed. For this case, all persons within 16 km (10 mi) of the plant are assumed to be exposed for the first 24 hours following an accident and are then relocated. Compared to the pessimistic scenario, evacuation of a 48 km (30-mi) zone shows a reduction in acute fatalities of a factor of 10 at 10^{-8} probability.

The model has the same provision for calculation of the economic cost associated with implementation of evacuation as in the original RSS model. For this purpose, the model assumes that for atmospheric releases lasting three hours or less, all people living within a circular area of 8-km (5 mi) radius centered at the reactor plus all people within a 45-degree angular sector within the plume exposure pathway EPZ and centered on the downwind direction will be evacuated and temporarily relocated. However, for releases exceeding three hours, the cost of evacuation is based on the assumption that all people within the plume exposure pathway EPZ would be evacuated and temporarily relocated. For either of these situations, the cost of evacuation and relocation is assumed to be $125 (1980 dollars) per person which includes cost of food, and temporary sheltering for a period of one week.

REFERENCES

1. "Reactor Safety Study," WASH-1400, USNRC Report NUREG-75/014, October 1975.*

2. "Overview of the Reactor Safety Study Consequences Model," USNRC Report NUREG-0340, October 1977.*

3. "A Model of Public Evacuation for Atmospheric Radiological Releases," SAND 78-0092, June 1978.**

*Available from the NRC/GPO Sales Program, Washington, DC 20555, and the National Technical Information Service, Springfield, VA 22161.
**Available for inspection and copying for a fee in the NRC Public Document Room, 1717 H St. N.W., Washington, DC 20555.

☆U.S. GOVERNMENT PRINTING OFFICE: 1981—341-742:1059

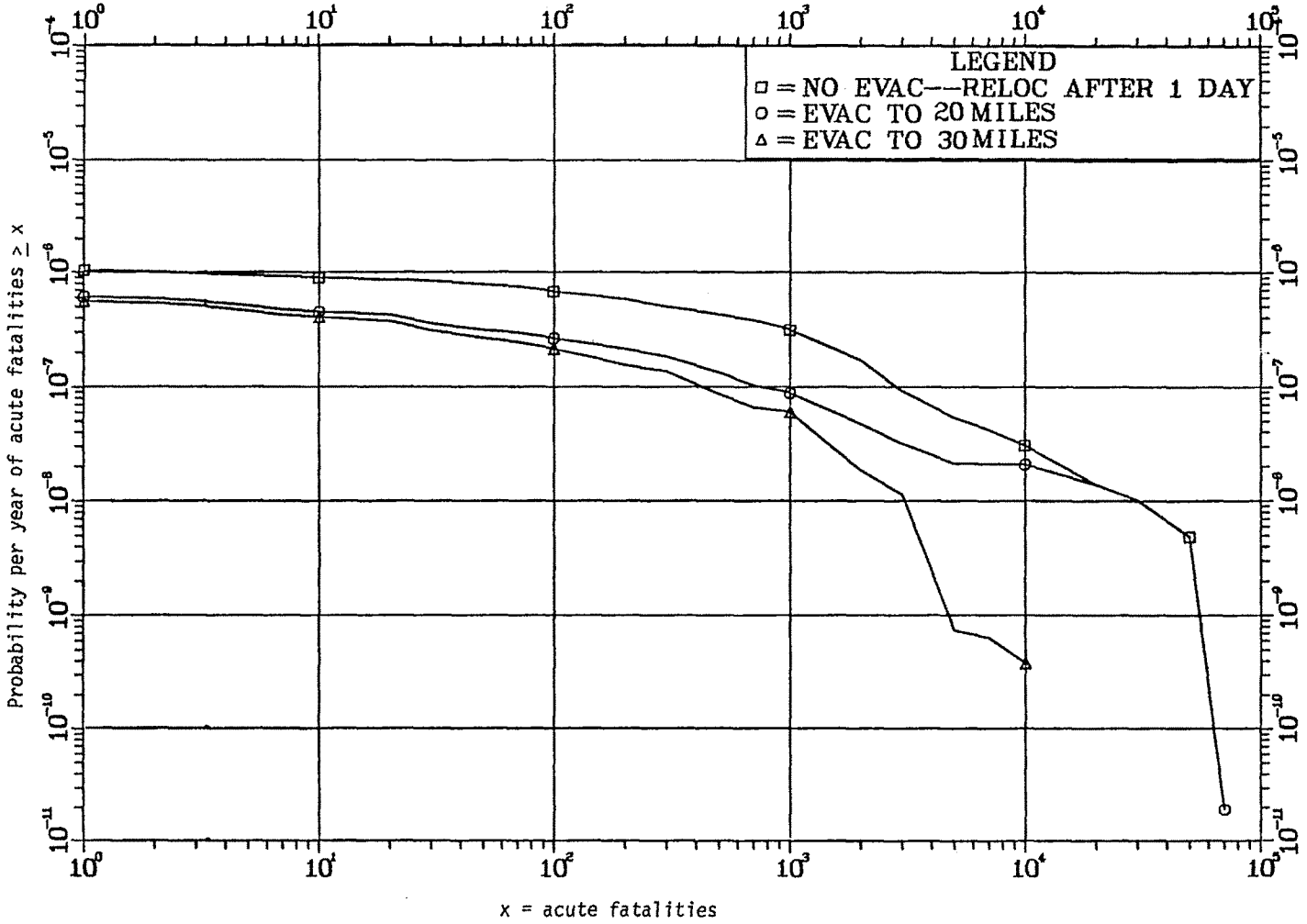


Figure F-1. Probability distribution of acute fatalities. (See Section 7.1.4.6 for discussion of uncertainties in risk estimates.)
(To change miles to kilometers, multiply by 1.6.)

NRC FORM 335 (7-77) U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

1. REPORT NUMBER *(Assigned by DDC)*: NUREG-0490

4. TITLE AND SUBTITLE *(Add Volume No., if appropriate)*: Final Environmental Statement related to operation of San Onofre Nuclear Generating Station, Units 2 and 3

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3. RECIPIENT'S ACCESSION NO.

7. AUTHOR(S)

5. DATE REPORT COMPLETED: MONTH April, YEAR 1981

9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*:
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

DATE REPORT ISSUED: MONTH April, YEAR 1981

6. *(Leave blank)*

8. *(Leave blank)*

12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*:
Same as 9. above

10. PROJECT/TASK/WORK UNIT NO.

11. CONTRACT NO.

13. TYPE OF REPORT: Final Environmental Statement

PERIOD COVERED *(Inclusive dates)*

15. SUPPLEMENTARY NOTES: Pertains to Docket Nos. 50-361/362

14. *(Leave blank)*

16. ABSTRACT *(200 words or less)*

A Final Environmental Statement related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3 by Southern California Edison Company, et al (Docket Nos. 50-361/362), located in San Diego, California, has been prepared by the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission. The statement reports on the staff's review of the impact of operation of the plant. Also included are comments of state and federal government agencies on the Draft Environmental Statement and its Supplement for this project and staff responses to these comments. The NRC staff has concluded, based on a weighing of environmental, technical and other factors, that operating licenses could be granted.

17. KEY WORDS AND DOCUMENT ANALYSIS

17a. DESCRIPTORS

17b. IDENTIFIERS/OPEN-ENDED TERMS

18. AVAILABILITY STATEMENT: Unlimited

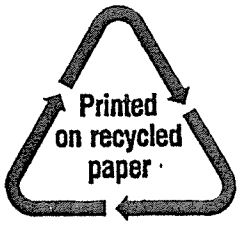
19. SECURITY CLASS *(This report)*: Unclassified

21. NO. OF PAGES

20. SECURITY CLASS *(This page)*: Unclassified

22. PRICE: $

NRC FORM 335 (7-77)



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provides matching funds for cooperative agreements that generally do not exceed $50,000.

MLI. For FY 1996, $709,000 was available for this program. This program will provide funds for cooperative agreements that generally do not exceed $30,000. Cost sharing is encouraged.

Application Forms

IMS mails application forms and program information in General Operating Support. Conservation Project Support and Professional Services Program application packets to museums and other institutions on its mailing list. Applicants may obtain application packets by writing or telephoning the Institute of Museum Services, 1100 Pennsylvania Avenue, NW., Room 609, Washington, DC 20506, (202) 606–8539. Deaf and hearing impaired individuals may call the TTY Line, (202) 606–8636.

To received an application for the Conservation Assessment Program contact the National Institute for Conservation, 3299 K Street, NW., Suite 403, Washington, DC 20007 (202) 625–1495.

To receive an application for the Museum Assessment Programs contact the American Association of Museums, 1225 Eye Street, NW., Washington, DC 20005 (202) 289–1818. After November 18, 1996, contact 1575 Eye Street, NW., Washington, DC 2005 (202) 289–1818.

(Catalog of Federal Domestic Assistance No. 45.301 Institute of Museum Services)

Dated: September 13, 1996.

Diane B. Frankel,

Director, Institute of Museum Services.

[FR Doc. 96–24681 Filed 9–25–96; 8:45 am]

BILLING CODE 7036–01–M

NATIONAL FOUNDATION FOR THE ARTS AND THE HUMANITIES

President's Committee on the Arts and the Humanities: Meeting XXXVII

Pursuant to Section 10(a)(2) of the Federal Advisory Committee Act (Public Law 92–463), as amended, notice is hereby given that a meeting of the President's Committee on the Arts and the Humanities will be held on October 4, 1996 from 9:30 a.m. to 3:00 p.m. This meeting will be held at the National Gallery of Art, West Building on 6th Street and Constitution Avenue NW., Washington, DC. The meeting will be located in the Lecture Hall, which is to the right through the Galleries. Visitors should use the 6th Street Entrance.

This meeting will be open to the public on a space available basis and will begin with an opening statement by the Chairman. The Executive Director will provide an update on Committee activities and a briefing discussion will be held regarding the report requested by the President. Following a lunch break, the Committee will discuss recommendations to be included in the report.

The President's Committee on the Arts and the Humanities was created by Executive Order in 1982 to advise the President, the two Endowments, and the IMS on measures to encourage private sector support for the nation's cultural institutions and to promote public understanding of the arts and the humanities.

If, in the course of discussion, it becomes necessary for the Committee to discuss non-public commercial or financial information of intrinsic value, the Committee will go into closed session pursuant to subsection (c)(4) of the Government in the Sunshine Act, 5 U.S.C. 552b.

Any interested persons may attend as observers, on a space available basis, but seating is limited in meeting rooms and the staff of the National Gallery will need to know in advance who will be attending. Therefore, for this meeting, individuals wishing to attend are required to notify the staff of the President's Committee in advance at (202) 682–5409 or write to the Committee at 1100 Pennsylvania Avenue NW., Suite 526, Washington, DC 20506.

Dated: September 18, 1996.

Kathy Plowitz-Worden,

Panel Coordinator, Panel Operations, National Endowment for the Arts.

[FR Doc. 96–24682 Filed 9–25–96; 8:45 am]

BILLING CODE 7537–01–M

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50–361 and 50–362]

Southern California Edison; San Onofre Nuclear Generating Station, Units 2 and 3; Environmental Assessment and Finding of No Significant Impact

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of amendments to Facility Operating License Nos. NPF–10 and NPF–15, issued to Southern California Edison (the licensee) for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, located in San Diego County, California.

Environmental Assessment

Identification of the Proposed Action

By letter dated December 6, 1995, the licensee proposed to change the technical specifications (TSs) to allow an increase in fuel enrichment (Uranium 235) up to 4.8 weight percent. The present TS permit a maximum enrichment of 4.1 weight percent.

Need for Proposed Action

The licensee intends to load fuel into the core during Cycle 9 and subsequent refueling outages which does not currently meet the TSs. By increasing the fuel enrichment, the licensee will implement the fuel strategies developed for SONGS Units 2 and 3.

Environmental Impact of the Proposed Action

The Commission has completed its evaluation of the proposed revision to the TSs and concludes that storage and use of fuel enriched with U–235 up to 4.8 weight percent at SONGS Units 2 and 3 is acceptable. The safety considerations associated with higher enrichments have been evaluated by the NRC staff and the staff has concluded that such changes would not adversely affect plant safety. The proposed changes have no adverse effect on the probability of any accident. As a result, there is no increase in individual or cumulative radiation exposure.

The environmental impacts of transportation resulting from the use of higher enrichment and extended irradiation are discussed in the staff assessment entitled "NRC Assessment of the Environmental Effects of Transportation Resulting from Extended Fuel Enrichment and Irradiation." This assessment was published in the **Federal Register** on August 11, 1988 (53 FR 30355) as corrected on August 24, 1988 (53 FR 32322) in connection with the Shearon Harris Nuclear Power Plant, Unit I: Environmental Assessment and Finding of No Significant Impact. As indicated therein, the environmental cost contribution of an increase in fuel enrichment of up to 5 weight percent U–235 and irradiation limits of up to 60 Gigawatt Days per Metric Ton (GWD/MT) are either unchanged, or may in fact be reduced from those summarized in Table S–4 as set forth in 10 CFR 51.52(c). These findings are applicable to the proposed amendment for SONGS Units 2 and 3. Accordingly, the Commission concludes that this proposed action would result in no significant radiological environmental impact.

With regard to potential nonradiological impacts, the proposed

changes involve systems located within the restricted area as defined in 10 CFR Part 20. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, the Commission concludes that there are no significant nonradiological environmental impacts associated with the proposed amendment.

The Notice of Consideration of Issuance of Amendment to Facility Operating License, Proposed No Significant Hazards Consideration Determination, and Opportunity for a Hearing in connection with this action was published in the **Federal Register** on April 10, 1996 (61 FR 15997).

Alternative to the Proposed Action

Since the Commission concluded that there are no significant environmental effects that would result from the proposed action, any alternative with equal or greater environmental impacts need not be evaluated.

The principal alternative would be to deny the requested amendment. This would not reduce environmental impacts of plant operation and would result in reduced operational flexibility.

Alternative Use of Resources

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for SONGS Units 2 and 3, dated April 1981 (NUREG–0490).

Agencies and Persons Contacted

In accordance with its stated policy, on September 19, 1996, the Commission consulted with the California State official, Mr. Steve Hsu of the State Department of Health Services, regarding the environmental impact of the proposed action. The State official had no comments.

Finding of No Significant Impact

Based upon the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to this action, see the application for license amendment dated December 6, 1995. Copies are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC 20555, and at the temporary local public document room located at the Science Library, University of California, Irvine, California 92713.

Dated at Rockville, Maryland, this 19th day of September 1996.

For the Nuclear Regulatory Commission.

Mel B. Fields,

Project Manager, Project Directorate IV–2 Division of Reactor Projects III/IV, Office of Nuclear Reactor Regulation.

[FR Doc. 96–24694 Filed 9–25–96; 8:45 am]

BILLING CODE 7590–01–P

Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves; Issued

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of issuance.

SUMMARY: The Nuclear Regulatory Commission (NRC) has issued Generic Letter 96–05 to all holders of operating licenses (except those licenses that have been amended to possession-only status) or construction permits for nuclear power reactors, to (1) discuss the periodic verification of the capability of safety-related motor-operated valves to perform their safety functions consistent with the current licensing basis of nuclear power plants, (2) request that each addressee of this generic letter establish a program, or ensure the effectiveness of its current program, to verify on a periodic basis that safety-related MOVs continue to be capable of performing their safety functions within the current licensing basis of the facility, and (3) require addressees to provide to the NRC a written response relating to implementation of the requested action. This generic letter is available in the NRC Public Document Room under accession number 9609100488.

DATES: The generic letter was issued on September 18, 1996.

ADDRESSEES: Not applicable.

FOR FURTHER INFORMATION CONTACT: Thomas G. Scarbrough, at (301) 415–2794.

SUPPLEMENTARY INFORMATION: NRC regulations require that components that are important to the safe operation of a nuclear power plant, including motor-operated valves (MOVs), be treated in a manner that provides assurance of their performance. Appendix A, "General Design Criteria for Nuclear Power Plants," and Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50) include broad-based requirements in this regard. In 10 CFR 50.55a(f), the NRC requires licensees to comply with Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code).

Nuclear power plant operating experience, valve performance problems and MOV research have revealed that the focus of the ASME Code on stroke time and leak-rate testing for MOVs was not sufficient for ensuring the long-term capability of MOVs to perform their design-basis safety functions in light of the design of the valves and the conditions under which they must function. For this reason, on June 28, 1989, the NRC staff issued Generic Letter (GL) 89–10, "Safety-Related Motor-Operated Valve Testing and Surveillance." In GL 89–10, the staff requested that certain actions be taken to ensure the capability of MOVs in safety-related systems to perform their intended functions. The staff issued seven supplements to GL 89–10 that provided additional guidance and information.

GL 89–10 and its supplements provide only limited guidance regarding periodic verification and the measures appropriate to assure preservation of design-basis capability. This generic letter provides more complete guidance regarding periodic verification of safety-related MOVs and supersedes GL 89–10 and its supplements with regard to MOV periodic verification. Although this guidance could have been provided in a supplement to GL 89–10, the staff has prepared this new generic letter to allow closure of the staff review of GL 89–10 programs as promptly as possible.

Dated at Rockville, Maryland, this 18th day of September 1996.

For the Nuclear Regulatory Commission.

Thomas T. Martin,

Director, Division of Reactor Program Management Office of Nuclear Reactor Regulation.

[FR Doc. 96–24695 Filed 9–25–96; 8:45 am]

BILLING CODE 7590–01–P

OFFICE OF MANAGEMENT AND BUDGET

1996 List of Designated Federal Entities and Federal Entities

AGENCY: Office of Management and Budget.

ACTION: Notice.

SUMMARY: This notice provides a list of Designated Federal Entities and Federal Entities, as required by the Inspector General Act of 1978 (IG Act), as subsequently amended.

FOR FURTHER INFORMATION CONTACT: Suzanne Murrin (telephone: 202–395–1040), Office of Federal Financial

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in the proceeding on the petitioner's interest. The petition must also identify the specific aspect(s) of the subject matter of the proceeding as to which petitioner wishes to intervene. Any person who has filed a petition for leave to intervene or who has been admitted as a party may amend the petition without requesting leave of the Board up to 15 days prior to the first prehearing conference scheduled in the proceeding, but such an amended petition must satisfy the specificity requirements described above.

Not later than 15 days prior to the first prehearing conference scheduled in the proceeding, a petitioner shall file a supplement to the petition to intervene that must include a list of the contentions that the petitioner seeks to have litigated in the hearing. Each contention must consist of a specific statement of the issue of law or fact to be raised or controverted. In addition, the petitioner shall provide a brief explanation of the bases of the contention and a concise statement of the alleged facts or expert opinion that support the contention and on which the petitioner intends to rely in proving the contention at the hearing. The petitioner must also provide references to those specific sources and documents of which the petitioner is aware and on which the petitioner intends to rely to establish those facts or expert opinion. The petitioner must provide sufficient information to show that a genuine dispute exists with the applicant on a material issue of law or fact. Contentions shall be limited to matters within the scope of the amendments under consideration. The contention must be one that, if proven, would entitle the petitioner to relief. A petitioner who fails to file such a supplement that satisfies these requirements with respect to at least one contention will not be permitted to participate as a party.

Those permitted to intervene become parties to the proceeding, subject to any limitations in the order granting leave to intervene, and have the opportunity to participate fully in the conduct of the hearing, including the opportunity to present evidence and cross-examine witnesses.

Requests for a hearing and petitions for leave to intervene must be filed with the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, Attention: Rulemakings and Adjudications Staff, or may be delivered to the Commission's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, by the above date. A copy of the petition should also be sent to the Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, and to Mary O'Reilly, Attorney, FirstEnergy Legal Department, FirstEnergy Corporation, 76 S. Main Street, Akron, OH 44308, attorney for the licensee.

Nontimely filings of petitions for leave to intervene, amended petitions, supplemental petitions and/or requests for a hearing will not be entertained absent a determination by the Commission, the presiding officer, or the presiding Atomic Safety and Licensing Board that the petition and/or request should be granted based upon a balancing of the factors specified in 10 CFR 2.714(a)(1)(i)–(v) and 2.714(d).

If a request for a hearing is received, the Commission's staff may issue the amendments after it completes its technical review and prior to the completion of any required hearing if it publishes a further notice for public comment of its proposed finding of no significant hazards consideration in accordance with 10 CFR 50.91 and 50.92.

For further details with respect to this action, see the application for amendments dated January 18, 2001 (ADAMS Accession No. ML010230096), as supplemented by letters dated February 20 (ADAMS Accession No. ML010540305) and April 12, 2001 (ADAMS Accession No. ML011130105), which are available for public inspection at the Commission's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and accessible electronically through the ADAMS Public Electronic Reading Room link at the NRC Web site (*http://www.nrc.gov*). If there are problems accessing the document located in ADAMS, contact the PDB Reference staff at 1–800–397–4209 or 301–415–4737, or send an e-mail to pdr@nrc.gov.

Dated at Rockville, Maryland, this 31st day of May 2001.

For the Nuclear Regulatory Commission.

Lawrence J. Burkhart,

Project Manager, Section 1, Project Directorate I, Division of Licensing Project Management, Office of Nuclear Reactor Regulation.

[FR Doc. 01–15371 Filed 6–18–01; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50–361 and 50–362]

Southern California Edison; San Onofre Nuclear Generating Station, Unit Nos. 2 and 3; Environmental Assessment and Finding of No Significant Impact

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an amendment to Facility Operating Licenses Nos. NPF–10 and NPF–15, issued to Southern California Edison Company (SCE or the licensee), for operation of the San Onofre Nuclear Generating Station (SONGS), Units Nos. 2 and 3, located in San Diego County, California.

Environmental Assessment

Identification of Proposed Action

The proposed action would amend the facility license and the technical specifications for SONGS Units 2 and 3, to allow SCE to increase the maximum reactor core power level for each unit from 3390 megawatts thermal (MWt) to 3448 MWt, which is an increase of 1.42 percent of rated core thermal power for SONGS Units 2 and 3.

The proposed action is in accordance with the licensee's application for amendment dated April 3, 2001, and supplemented April 23, May 11, May 25, and May 31, 2001.

The Need for the Proposed Action

The proposed action would permit an increase in the licensed core thermal power from 3390 MWt to 3448 MWt and is needed to allow an increase in the net electrical output of SONGS Units 2 and 3 and, thus, provide additional electrical power to service domestic and commercial areas of the licensee's grid.

Environmental Impacts of the Proposed Action

In support of its request for the proposed power uprate, SCE evaluated the radiological effects of the proposed action, and specifically evaluated its radioactive waste management systems including system/component activity inventories and activity releases associated with the liquid, gaseous, and solid waste management systems, as well as the process and effluent radiological monitoring and sampling systems. In addition, SCE evaluated the non-radiological effects of the proposed action. Based on its review of the licensee's evaluation of the environmental impacts, the NRC staff concludes that the proposed increase in power would not result in a significant

environmental impact as discussed below.

Radiological Environmental Assessment

Radioactive Waste (Radwaste) Management

SCE has evaluated the system/component activity inventories and activity releases associated with the liquid, gaseous, and solid waste management systems, as well as the process and effluent radiological monitoring and sampling systems. SONGS radwaste management and radiation protection analyses are based on the Units 2 and 3 Cycle 1 core activity inventory profile with one percent fuel cladding defects. The licensee has determined that the activity inventories of Cycle 1 core isotopes (primarily some iodine and noble gas isotopes) are greater than the core activity inventories associated with 102 percent of current licensed power, i.e., 3458 MWt. The licensee has also evaluated the dose contributions of iodine, noble gas, and particulate core isotopes for the power uprate conditions. Based on its evaluation, the licensee determined that the core and system activity profiles of record bound (i.e., are equal to, or more severe than) the core and system activity source terms at the proposed uprated power level. Therefore, the licensee has concluded that its operation of the radwaste systems at SONGS Units 2 and 3 will not be impacted by operation at uprated power conditions and the effluents discharged would continue to meet the requirements of 10 CFR part 20 and 10 CFR part 50, Appendix I. Based on the above, the staff has determined that the proposed power uprate will not appreciably affect the ability to process liquid or gaseous radioactive effluents and there are no significant environmental effects from radiological releases.

Dose Consideration

SCE evaluated the effects of power uprate on the radiation sources within the plant and radiation levels during normal and post-accident conditions. Based on its evaluation, the licensee determined that SONGS Units 2 and 3 dose contributions and the activity inventories of Cycle 1 core isotopes (primarily some iodine and noble gas isotopes) are greater than the dose consequences and core activity inventories associated with the 102 percent of the current licensed power, i.e., 3458 MWt, and therefore bound the proposed uprated power level. Further occupational doses for normal operations will be maintained within acceptable limits by the site's as-low-as-reasonably-achievable program, which is required by 10 CFR 20.1101(b).

Therefore, the NRC staff concludes that the radiological doses would remain below the 10 CFR part 100 guidelines and all radiological safety margins are maintained.

Summary

The proposed power uprate will not significantly increase the probability or consequences of accidents, will not involve any new radiological release pathways, will not result in a significant increase in occupational or public radiation exposure, and will not result in significant additional fuel cycle environmental impacts. Accordingly, the NRC staff concludes that there are no significant radiological environmental impacts associated with the proposed action.

Non-Radiological Environmental Assessment

The licensee reviewed the non-radiological environmental impacts of the requested power uprate based on information submitted in the Environmental Report, Operating License Stage, the NRC Final Environmental Statement (FES) related to the operation of San Onofre Nuclear Station, Units 2 and 3, (NUREG–0490, dated April 1981), and the requirements of the Environmental Protection Plan. Based on this review, the licensee concluded that the proposed power uprate would have no significant effect on the non-radiological elements of concern and the plant will be operated in an environmentally acceptable manner as established by the FES. In addition, the licensee states that existing Federal, State, and local regulatory permits presently in effect accommodate the power uprate without modification.

The SONGS units are cooled by once-through cooling water systems, withdrawing cooling water from the Pacific Ocean and discharging it to the ocean through separate underwater diffusers on the ocean bottom. The licensee determined that the differential temperature developed by the cooling system will increase by approximately 0.3°F, increasing the calculated differential to approximately 19.2 °F. The limit on differential temperature allowed by the California Regional Water Quality Control Board, San Diego Region, is 25 °F and includes an allowance of 0.4 °F for increases in thermal power level. The licensee also evaluated other environmental discharges and determined that the small increase in reactor power will not have significant impact on the environment.

SONGS operates in compliance with a National Pollution Discharge Elimination System (NPDES) Permit, which requires all effluents to be closely monitored to assure compliance with the permit levels. Effluent increases due to the power uprate of SONGS Units 2 and 3 are not expected. With regard to potential non-radiological impacts, the proposed action would not change the method of operation at SONGS or the methods of handling effluents. No changes to land use would result and the proposed action does not involve any historic sites. Therefore, no new or different types of non-radiological environmental impacts are expected. Accordingly, the NRC staff concludes that there are no significant non-radiological environmental impacts associated with the proposed action.

Alternatives to the Proposed Action

As an alternative to the proposed action, the NRC staff considered denial of the proposed action (i.e., the ''no-action'' alternative). Denial of the application would result in no change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources

This action does not involve the use of any resources not previously considered in the FES for SONGS Units 2 and 3 dated March 1973.

Agencies and Persons Consulted

In accordance with its stated policy, on June 7, 2001, the NRC staff consulted with the California State official, Mr. Steve Hsu, of the Radiologic Health Branch of the State Department of Health Services, regarding the environmental impact of the proposed action. The State official had no comments.

Finding of No Significant Impact

On the basis of the environmental assessment, the NRC staff concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated April 3, 2001, and the supplements dated April 23, May 11, May 25, and May 31, 2001, which may be examined, and/or copied for a fee, at the NRC's Public Document Room, located at One White Flint North, 11555

Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, *http://www.nrc.gov,* (the Electronic Reading Room). If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1–800–397–4209, or 301–415–4737, or by e-mail to *pdr@nrc.gov.*

Dated at Rockville, Maryland this 13th day of June 2001.

For the Nuclear Regulatory Commission.

Joseph E. Donoghue,

Senior Project Manager, Project Directorate IV, Section 2, Division of Licensing Project Management, Office of Nuclear Reactor Regulation.

[FR Doc. 01–15370 Filed 6–18–01; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Discrimination Task Group; Notice of Meetings

In August 2000, the NRC announced the formation of a Discrimination Task Group, which is evaluating the NRC processes used in the handling of discrimination allegations and violations of employee protection standards (Applicable regulations include 10 CFR 30.7, 10 CFR 40.7. 10 CFR 50.7, 10 CFR 60.9, 10 CFR 61.9, 10 CFR 70.7, 10 CFR 76.7, 10 CFR 72.10, 10 CFR 150.20). The group is a management-level review group which is evaluating the Commission's handling of discrimination cases.

The group has developed draft recommendations for changes to the regulatory requirements, the enforcement policy or other agency guidelines as appropriate. The draft recommendations have been released for public comment and can be obtained via the Office of Enforcement web site at http://www.nrc.gov/OE/. Following a pubic comment period on the draft that expires on August 17, 2001, the Task Group will develop a Commission Paper outlining the final recommendations for NRC offices to consider in making changes to their processes.

The Task Group is holding several public stakeholder meetings in various areas of the country to solicit comment on the draft recommendations for changes in the Agency's handling of discrimination issues.

—A public meeting will be held in Chattanooga, TN, on June 25, 2001, at the USNRC Technical Training Center, Osborne Office Center, 5746 Marlin Road, Chattanooga TN 37411 This will be an evening meeting from 7 p.m. to 9 p.m.

—A public meeting will be held, on July 11, 2001, at the USNRC Region III offices located 801 Warrenville Road, Lisle, IL 60532. This will be an evening meeting from 7 p.m. to 9 p.m.

—A public meeting will be held, on July 12, 2001, in Paducah, KY, at the Paducah Community College Engineering Building, Crounse Hall Main Lecture Hall, 4810 Alben Barkely Drive, Paducah, KY. This will be an evening meeting from 7 p.m. to 9 p.m.

—A public meeting will be held on August 9, 2001, at the San Luis Obispo Public Library, Library Conference Room, 995 Palm Street, San Luis Obispo CA. This will be an evening meeting from 7 p.m. to 9 p.m.

—A public meeting will be held on August 14, 2001, at the Waterford Town Hall, 15 Rope Ferry Road, Waterford, CT This will be an evening meeting from 7 p.m. to 9 p.m.

—A public meeting will be held on August 16, 2001, at the USNRC offices in the TWFN Auditorium, located at 11555 Rockville Pike, Rockville, Maryland. The meeting will start at 9:30 a.m.

These meetings are open to the members of the public. Oral or written views regarding the NRC's draft recommendations for improving processes for handling employee protection issues may be presented by the members of the public, including members of the nuclear industry. Persons desiring to make prepared oral presentations or statements should notify Mr. Barry Westreich (Telephone 301/415–3456, e-mail BCW@nrc.gov) five days prior to the meeting date, if possible, so that appropriate arrangements can be made to allow necessary time during the meeting for such a presentation or statements. Use of still, motion picture, and television cameras as well as audio recording devices will be permitted during these meetings.

Further information regarding topics of discussion, whether the meeting has been canceled, rescheduled, or relocated; may be obtained via the Office of Enforcement web site at *http://www.nrc.gov/OE* or by contacting Mr. Barry Westreich between 8 a.m. and 4:30 p.m. EDT.

For those unable to attend one of the public meetings on this issue, comments on the draft report can be submitted via the Office of Enforcement web site at *http://www.nrc.gov/OE.* and may also be submitted in writing addressed to Barry Westreich, Office of Enforcement, U.S. Nuclear Regulatory Commission 11555 Rockville Pike, Rockville, MD, 20852.

This meeting will not be transcribed but, if needed, a meeting report will be available electronically for public inspection on the Office of Enforcement web site at *http://www.nrc.gov/OE* and in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC web site at *http://www.nrc.gov/NRC/ADAMS/index.html* (the Public Electronic Reading Room). The Task Group Charter and other pertinent documents related to Task Group Activities will also be periodically posted and updated on the Office of Enforcement web site.

Dated at Rockville, Maryland this 11th Day of June 2001.

For the Nuclear Regulatory Commission.

Frank Congel,

Director, Office of Enforcement.

[FR Doc. 01–15372 Filed 6–18–01; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Public Workshop on Future Licensing Activities

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of public workshop.

SUMMARY: The Nuclear Regulatory Commission (NRC) has scheduled a public workshop to inform the public of the current and proposed activities of the NRC staff regarding future applications and to solicit public concerns and feedback on identified issues and challenges.

DATES: July 25, 2001, from 9 a.m.–8 p.m.; July 26, 2001, from 9 a.m.–1 p.m.

ADDRESSES: The workshop will be held in the NRC's Auditorium at Two White Flint North, 11545 Rockville Pike, Rockville, Maryland 20852–2738.

FOR FURTHER INFORMATION CONTACT: Contact Eric Benner, Mail Stop O–12D1, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001. Members of the public may pre-register for this meeting by contacting Eric Benner at (800) 368–5642, ext. 1171, or by Internet at *ejb1@nrc.gov* by July 20, 2001.

The NRC maintains an Agencywide Documents Access and Management System (ADAMS) which provides text and image files of NRC's public documents. These documents may be accessed through the NRC's Public

EXHIBIT 33

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-361, 50-362, and 72-41; NRC-2015-0023]

Southern California Edison Company

San Onofre Nuclear Generating Station, Units 2 and 3

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft environmental assessment and finding of no significant impact; request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing for public comment a draft environmental assessment (EA) and finding of no significant impact (FONSI) related to a request to amend Facility Operating License Nos. NPF-10 and NPF-15 and Docket No. 72-41, issued to the Southern California Edison Company (SCE or "the licensee"), for operation of the San Onofre Nuclear Generating Station, Units 2 and 3 (hereinafter "SONGS" or "the facility"), including the general-license Independent Spent Fuel Storage Installation (ISFSI), located in San Diego County, California. The requested amendment would permit licensee security personnel to use certain firearms and ammunition feeding devices not previously permitted, notwithstanding State, local and certain Federal firearms laws or regulations that otherwise prohibit such actions.

DATES: Submit comments by **December 10, 2015**. Comments received after this date will be considered if it is practical to do so, but the Commission is able to ensure consideration only for comments received before this date. Any potential party as defined in § 2.4 of title 10 of the

Code of Federal Regulations (10 CFR), who believes access to sensitive unclassified non-safeguards information (SUNSI) is necessary to respond to this notice must request document access by **November 20, 2015**.

ADDRESSES: You may submit comments by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID **NRC-2015-0023**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual in the FOR FURTHER INFORMATION CONTACT section of this document.
- **Mail comments to:** Cindy Bladey, Office of Administration, Mail Stop: OWFN-12-H08, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Marlayna Vaaler, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-3178, Marlayna.Vaaler@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID **NRC-2015-0023** when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID **NRC-2015-0023**.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in the SUPPLEMENTARY INFORMATION section. The applications for amendments for SONGS, dated August 28, 2013, as supplemented by a letter dated February 10, 2015, contain SUNSI and are being withheld from public disclosure.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

B. Submitting Comments

Please include Docket ID **NRC-2015-0023** in your comment submission.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC posts all comment submissions at http://www.regulations.gov as well as entering the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment submissions into ADAMS.

II. Introduction

The NRC is considering a request to amend Facility Operating License Nos. NPF-10 and NPF-15 and Docket No. 72-41, issued to SCE for the operation of SONGS, Units 2 and 3, including the general-license ISFSI, located in San Diego County, California, in accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit." Therefore, as required by 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments," and 10 CFR 51.33, "Draft finding of no significant impact; distribution," the NRC has prepared a draft EA documenting its finding. The requested amendment would permit licensee security personnel to use certain firearms and ammunition feeding devices not previously permitted, notwithstanding State, local, and certain Federal firearms laws or regulations that otherwise prohibit such actions.

III. Draft Environmental Assessment and Finding of No Significant Impact

Identification of the Proposed Action:

The proposed action would permit security personnel at SONGS during the performance of their official duties, to transfer, receive, possess, transport, import, and use certain firearms and large capacity ammunition feeding devices not previously permitted to be owned or

possessed, notwithstanding State, local, and certain Federal firearms laws, or regulations that otherwise prohibit such actions.

The proposed action is in accordance with the SONGS application dated August 28, 2013 (ADAMS Accession No. ML13242A277), as supplemented by letters dated December 31, 2013 (ADAMS Accession No. ML14007A496), May 15, 2014 (ADAMS Accession No. ML14139A424), and February 10, 2015 (ADAMS Accession No. ML15044A047).

The Need for the Proposed Action:

The proposed action would allow the transfer, receipt, possession, transportation, importation, and use of those firearms and devices needed in the performance of official duties required for the protection of SONGS and associated special nuclear materials, consistent with the SONGS NRC-approved security plan.

Environmental Impacts of the Proposed Action:

The NRC has completed its evaluation of the proposed action and concludes that the proposed action would only allow the use of those firearms and devices necessary to protect SONGS and associated special nuclear materials, consistent with the SONGS NRC-approved security plan. Therefore, the proposed action would not significantly increase the probability or consequences of any accidents. In addition, the proposed action would not change the types or the amounts of any effluents that may be released offsite. There would also be no significant increase in occupational or public radiation exposure. Therefore, there would be no significant radiological environmental impacts associated with the proposed action.

The proposed action would not impact land, air, or water resources, including biota. In addition, the proposed action would not result in any socioeconomic or environmental justice impacts or impacts to historic and cultural resources. Therefore, there would also be no significant non-radiological environmental impacts associated with the proposed action.

Accordingly, the NRC concludes that the issuance of the requested amendment would not result in significant environmental impacts.

The NRC will publish in the *Federal Register* a copy of the final EA as part of the final FONSI.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to the proposed action, the NRC staff considered denying the proposed action (i.e., the "no-action" alternative). Denial of the license amendment request would result in no change to current environmental conditions at SONGS.

Alternative Use of Resources:

The proposed action would not involve the use of any resources.

Agencies and Persons Consulted:

The staff did not consult with any Federal agency or California state agencies regarding the environmental impact of the proposed action.

IV. Finding of No Significant Impact

The licensee has requested a license amendment to permit licensee security personnel, in the performance of their official duties, to transfer, receive, possess, transport, import, and use certain firearms and large capacity ammunition feeding devices not previously permitted to be owned or possessed, notwithstanding State, local, and certain Federal firearms laws or regulations that would otherwise prohibit such actions.

On the basis of the information presented in this environmental assessment, the NRC concludes that the proposed action would not cause any significant environmental impact and would not have a significant effect on the quality of the human environment. In addition, the NRC has determined that an environmental impact statement is not necessary for the evaluation of this proposed action.

Other than the licensee's letter dated August 28, 2013, there are no other environmental documents associated with this review. This document is available for public inspection as indicated above.

Dated at Rockville, Maryland, this 3rd day of November, 2015.

For the Nuclear Regulatory Commission.

/RA/

Bruce A. Watson, CHP, Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety and Safeguards

EXHIBIT 34

NUREG-1757, Vol. 3, Rev. 1

Consolidated Decommissioning Guidance

Financial Assurance, Recordkeeping, and Timeliness

Final Report

Office of Federal and State Materials and
Environmental Management Programs

AVAILABILITY OF REFERENCE MATERIALS IN NRC PUBLICATIONS

NRC Reference Material

As of November 1999, you may electronically access NUREG-series publications and other NRC records at NRC's Public Electronic Reading Room at http://www.nrc.gov/reading-rm.html.
Publicly released records include, to name a few, NUREG-series publications; *Federal Register* notices; applicant, licensee, and vendor documents and correspondence; NRC correspondence and internal memoranda; bulletins and information notices; inspection and investigative reports; licensee event reports; and Commission papers and their attachments.

NRC publications in the NUREG series, NRC regulations, and *Title 10, Energy*, in the Code of *Federal Regulations* may also be purchased from one of these two sources.

1. The Superintendent of Documents
   U.S. Government Printing Office
   Mail Stop SSOP
   Washington, DC 20402–0001
   Internet: bookstore.gpo.gov
   Telephone: 202-512-1800
   Fax: 202-512-2250
2. The National Technical Information Service
   Springfield, VA 22161–0002
   www.ntis.gov
   1–800–553–6847 or, locally, 703–605–6000

A single copy of each NRC draft report for comment is available free, to the extent of supply, upon written request as follows:

Address: U.S. Nuclear Regulatory Commission
Office of Administration
Publications Branch
Washington, DC 20555-0001
E-mail: DISTRIBUTION.SERVICES@NRC.GOV
Facsimile: 301–415–2289

Some publications in the NUREG series that are posted at NRC's Web site address http://www.nrc.gov/reading-rm/doc-collections/nuregs are updated periodically and may differ from the last printed version. Although references to material found on a Web site bear the date the material was accessed, the material available on the date cited may subsequently be removed from the site.

Non-NRC Reference Material

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, and transactions, *Federal Register* notices, Federal and State legislation, and congressional reports. Such documents as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings may be purchased from their sponsoring organization.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at—

The NRC Technical Library
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852–2738

These standards are available in the library for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from—

American National Standards Institute
11 West 42nd Street
New York, NY 10036–8002
www.ansi.org
212–642–4900

Legally binding regulatory requirements are stated only in laws; NRC regulations; licenses, including technical specifications; or orders, not in NUREG-series publications. The views expressed in contractor-prepared publications in this series are not necessarily those of the NRC.

The NUREG series comprises (1) technical and administrative reports and books prepared by the staff (NUREG–XXXX) or agency contractors (NUREG/CR–XXXX), (2) proceedings of conferences (NUREG/CP–XXXX), (3) reports resulting from international agreements (NUREG/IA–XXXX), (4) brochures (NUREG/BR–XXXX), and (5) compilations of legal decisions and orders of the Commission and Atomic and Safety Licensing Boards and of Directors' decisions under Section 2.206 of NRC's regulations (NUREG–0750).

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-1757, Vol. 3, Rev. 1

Consolidated Decommissioning Guidance

Financial Assurance, Recordkeeping, and Timeliness

Final Report

Manuscript Completed: February 2012
Date Published: February 2012

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Office of Federal and State Materials and
Environmental Management Programs

ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) consolidated and updated numerous decommissioning guidance documents into this three-volume NUREG. Specifically, the three volumes address the following topics:

(1) "Decommissioning Process for Materials Licensees";

(2) "Characterization, Survey, and Determination of Radiological Criteria"; and

(3) "Financial Assurance, Recordkeeping, and Timeliness."

This three-volume NUREG series replaces NUREG-1727 ("NMSS Decommissioning Standard Review Plan," issued September 2000) and NUREG/BR-0241 ("NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees," issued March 1997). This NUREG series is intended for use by NRC staff, licensees, and others.

Volume 3 of this NUREG series provides guidance on the technical aspects of compliance with requirements for timeliness in decommissioning of materials facilities, the requirements for financial assurance for decommissioning, and the recordkeeping requirements related to eventual decommissioning.

Licensees should use this guidance in preparing decommissioning plans, license termination plans, final status surveys, and other technical decommissioning reports for submittal to the NRC. The NRC staff will use this guidance in reviewing these documents and related license amendment requests.

Volume 3 is intended to apply only to the decommissioning of materials facilities licensed under Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 30, 40, 70, and 72.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in this NUREG are covered by the requirements of 10 CFR Parts 19, 20, 30, 33, 34, 35, 36, 39, 40, 51, 70, 72, and 150, which were approved by the Office of Management and Budget under approval numbers 3150-0044, 0014, 0017, 0015, 0007, 0010, 0158, 0130, 0020, 0021, 0009, 0132, and 0032.

PUBLIC PROTECTION NOTIFICATION

If a means used to impose an information collection does not display a currently valid Office of Management and Budget control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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FOREWORD

The staff of the U.S. Nuclear Regulatory Commission (NRC) suggests that licensees contact the NRC or the appropriate Agreement State authority to ensure understanding of the actions that should be taken to initiate and complete decommissioning at a facility.

In September 2003, the NRC staff consolidated and updated the policies and guidance of its decommissioning program in a three-volume NUREG series, NUREG-1757, "Consolidated Decommissioning Guidance." This NUREG series provides guidance on planning and implementing license termination under the NRC's License Termination Rule (LTR), in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," Subpart E, "Radiological Criteria for License Termination"; complying with the radiological criteria for license termination; and complying with the requirements for financial assurance and recordkeeping for decommissioning and timeliness in decommissioning of materials facilities.

NUREG-1757, Volume 3, Revision 1, "Consolidated Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness," addresses demonstrations of compliance with the financial assurance, recordkeeping, and timeliness criteria in 10 CFR Parts 30, 40, 70, and 72. Volume 3 identifies issues related to demonstrating compliance with financial assurance and decommissioning recordkeeping and timeliness requirements that licensees may wish to consider, provides guidance on addressing these issues, and describes methods and approaches that are acceptable to the NRC staff. The staff periodically updates NUREG-1757, so that it reflects current NRC decommissioning policy.

In 2003, the NRC staff conducted an analysis of decommissioning issues and presented results and recommendations to the Commission. One of the recommendations included changes to financial assurance requirements to address the need for more detailed reporting of licensee financial assurance mechanisms to fund site decommissioning activities and protection of the committed funds in cases of financial distress. The Commission approved the staff's recommendations, and in 2007, the Commission approved publication of a proposed rule for public comment that would implement those recommendations. The objective of the rulemaking was to improve decommissioning planning and reduce the number of funding shortfalls caused in the past by (1) overly optimistic decommissioning assumptions, (2) lack of adequate updating of cost estimates during operation, and (3) licensees falling into financial distress with financial assurance funds unavailable for decommissioning.

The proposed rule on Decommissioning Planning was published for public comment in the *Federal Register* on January 22, 2008 (73 FR 3812). Draft guidance on financial assurance, compatible with the proposed changes to financial assurance requirements in the proposed rule, was released for public comment concurrently with the proposed rule. The draft guidance document was modeled on the financial assurance guidance in NUREG-1757, Volume 3.

The staff finalized the Decommissioning Planning Rule and associated guidance, after consideration of public comments, and published the final rule on June 17, 2011 (76 FR 35512). The NRC staff's responses to public comments on the draft financial assurance guidance are

included as Appendix B to this NUREG report. The final Decommissioning Planning Rule and NUREG-1757, Volume 3, Revision 1, will become effective on December 17, 2012. Prior to the effective date of this NUREG report, the NRC staff, licensees, and others seeking guidance on the technical aspects of compliance with requirements for timeliness in decommissioning of materials facilities, the requirements for financial assurance for decommissioning, and the recordkeeping requirements related to eventual decommissioning should reference the original version of NUREG-1757, Volume 3, dated September 2003.

The current document, Revision 1 of Volume 3, incorporates changes based on the final Decommissioning Planning Rule. This volume has also been updated to reflect other NRC staff changes. Table 1 describes the most significant changes to the guidance in this volume.

Table 1. Summary of Major Changes to Volume 3, Revision 1

Subject	Affected Sections of Volume 3	
	Previous version	Rev. 1 (current)
Elimination of Discussion of Site Decommissioning Management Plan Sites	Section 2.4	Section 2.4
New Guidance on Returning, Canceling, or Reducing Financial Assurance Instruments		Chapter 8
Elimination of Escrow Account	Sections 4.3.2.2, A.1.4, A.5	Section A.1.4
Elimination of Government Fund	Sections 4.3.2.3, A.1.4, A.6	Section A.1.4
Elimination of Certificate of Deposit	Sections 4.3.2.4, 6.3, A.1.4, A.7	Section A.1.4
Elimination of Deposit of Government Securities	Sections 4.3.2.5, 6.3, A.1.4, A.8	Section A.1.4
Elimination of Line of Credit	Sections 4.3.2.8, A.1.4, A.11	Section A.1.4
Addition of Requirements on Subsurface Residual Radioactivity	Chapter 4, Section A.1.3	Chapter 4, Section A.1.3
Addition of Evaluation Criteria for Cost Estimates	Sections 4.1, A.3	Sections 4.1, A.3
Addition of Requirements for Revisions to Cost Estimates	Section A.3.2	Section A.3.2
Revisions to the Financial Test for Parent Company Guarantees	Sections 4.3.2, A.13	Sections 4.3.2, A.8
Revisions to the Financial Test for Self-Guarantees	Sections 4.3.2, A.14	Sections 4.3.2, A.9
Incorporation of New Prescribed Amounts for Certification	Sections A.1.3, A.2.1; Attachments 1 and 2	Sections A.1.3, A.2.1; Attachments 1 and 2
Revisions to Financial Instruments that may be Used for License Termination Under Restricted Conditions	Section A.18.2.2	Section A.13.2.2.
Update of Appendix B: NRC Responses to Comments	Appendix B	Appendix B

The primary decommissioning guidance documents used by licensees and the NRC staff are NUREG-1757 and NUREG-1700, Revision 1, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans," issued April 2003. Table 2 below describes the general applicability of these documents. NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," issued February 1996, which contains guidance for non-power reactor licensees and NRC staff, includes a section on decommissioning and license termination.

Table 2. Content and Applicability of Key Decommissioning Guidance Documents

Volume and Status[1]	Title	Licensees to Which the Guidance Applies
NUREG-1757, Vol. 1, Rev. 2; September 2006	"Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees"	Fuel cycle, fuel storage, and materials licensees.[2] Limited applicability to reactor licensees.
NUREG-1757, Vol. 2, Rev. 1; September 2006[3]	"Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria"	All licensees that are subject to the LTR (fuel cycle, fuel storage, materials, and reactor licensees).
NUREG-1757, Vol. 3, Rev. 1, February 2012	"Consolidated Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness"	Fuel cycle, fuel storage, and materials licensees. Limited applicability to uranium recovery licensees.[4]
NUREG-1700, Rev. 1, April 2003	"Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans"	Power reactor licensees.

[1] Versions listed are current as of February 2012. Please refer to the NRC's Public Electronic Reading Room at http://www.nrc.gov/reading-rm/doc-collections/nuregs to obtain the most up-to-date version.

[2] Licensees regulated under 10 CFR Parts 30, 40, 60, 61, 63, 70, and 72 (for 10 CFR Parts 60, 61, and 63, only the ancillary surface facilities that support radioactive waste disposal activities). Because uranium recovery facilities are not subject to 10 CFR Part 20, Subpart E, refer to NUREG-1620, Rev. 1, Section 5, and NUREG-1569, Rev. 1, Section 6.5, for decommissioning guidance for uranium recovery facilities that are subject to 10 CFR Part 40, Appendix A.

[3] On August 16, 2007 (72 FR 46102), certain portions of ALARA-related guidance in Volume 2 were retracted. The NRC staff intends to update the guidance to address these retractions.

[4] Licensees regulated under 10 CFR Parts 30, 40, 60, 61, 63, 70, and 72 (for 10 CFR Parts 60, 61, and 63, only the ancillary surface facilities that support radioactive waste disposal activities). For uranium recovery facilities, only the guidance on recordkeeping and timeliness for decommissioning in this volume is applicable. Guidance on financial assurance for uranium recovery facilities under 10 CFR Part 40 is provided in the Branch Technical Position (BTP), "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities," (issued October 1988).

NUREG-1757 is intended for use by applicants, licensees, NRC license reviewers, and other NRC personnel. It is also available to Agreement States and the public.

This NUREG is not a substitute for NRC regulations, and compliance with it is not required. The NUREG describes approaches that are acceptable to the NRC staff. However, methods and solutions different than those in this NUREG will be acceptable, if they provide a basis for concluding that the decommissioning actions are in compliance with NRC regulations.

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ABBREVIATIONS

The following terms are defined for the purposes of this three-volume NUREG report.

ACAP	Alternative Cover Assessment Program
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act (of 1954, as amended)
AEC	U.S. Atomic Energy Commission (became Energy Resource Development Agency and Nuclear Regulatory Commission)
ALARA	As low as reasonably achievable
ALCD	Alternative Landfill Cover Demonstration
ANSI	American National Standards Institute
APF	Assigned Protection Factors
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
Bq	becquerel
BRT	Bankruptcy Review Team
BTP	Branch Technical Position
CAM	Continuous Air Monitor
CATX	Categorical Exclusion
CEDE	Committed Effective Dose Equivalent
CEO	Chief Executive Officer
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFO	Chief Financial Officer
CFR	Code of Federal Regulations
Ci	curie
cpm	counts per minute
DCGLs	Derived Concentration Guideline Levels
DFP	Decommissioning Funding Plan
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DP	Decommissioning Plan

dpm	disintegrations per minute
DQA	Data Quality Assessment
DQO	Data Quality Objective
DURLD	Decommissioning and Uranium Recovery Licensing Directorate (Nuclear Regulatory Commission)
DWMEP	Division of Waste Management and Environmental Protection (Nuclear Regulatory Commission)
EA	Environmental Assessment
Eh	redox potential
EIS	Environmental Impact Statement
EMC	Elevated Measurement Comparison
EML	DOE Environmental Measurements Laboratory (formerly the Health and Safety Laboratory)
EPA	U.S. Environmental Protection Agency
EPPAD	Environmental Protection and Performance Assessment Directorate (Nuclear Regulatory Commission)
EPA/NRC MOU	Memorandum of Understanding between the Environmental Protection Agency and the Nuclear Regulatory Commission dated October 9, 2002
ER	Environmental Report
FEP	Feature, Event, and/or Process
FFIEC	Federal Financial Institutions Examination Council
FHLM	Federal Home Loan Mortgage Corporation
FNMA	Federal National Mortgage Association
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FSME	Office of Federal and State Materials and Environmental Management Programs (Nuclear Regulatory Commission)
FSS	Final Status Survey
FSSP	Final Status Survey Plan
FSSR	Final Status Survey Report
FUSRAP	Formerly Utilized Sites Remedial Action Program
GEIS	Generic Environmental Impact Statement
GNMA	Government National Mortgage Association
GPO	Government Printing Office

HEPA	high-efficiency particulate air
HSA	Historical Site Assessment
IC	Institutional Control
ICRP	International Commission on Radiological Protection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
ISCORS	Interagency Steering Committee on Radiation Standards
ISFSI	Independent Spent Fuel Storage Installation
ISO	International Organization for Standardization
ISR	In-situ uranium recovery facility
LA	License Amendment
LA/RC	legal agreement and restrictive covenant
LBGR	Lower Bound [of the] Gray Region
LLD	lower limit of detection
LPDR	Local Public Document Room
LTC	long-term control
LTP	License Termination Plan
LTR	License Termination Rule
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols Manual
MARSSIM	Multi-Agency Radiological Survey and Site Investigation Manual (NUREG-1575)
mCi	millicurie
MCL	Maximum Contaminant Level
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
MIP	Master Inspection Plan
MOU	Memorandum of Understanding
mrem	millirem
mSv	millisievert
NAIC	National Association of Insurance Commissioners
NAS	National Academy of Sciences

NCRP	National Council on Radiation Protection and Measurements
NCS	Nuclear Criticality Safety
NCSA	Nuclear Criticality Safety Analysis
NEPA	National Environmental Policy Act
NIST	National Institute of Standards and Technology
NMMSS	Nuclear Materials Management and Safeguards System
NMSS	Office of Nuclear Material Safety and Safeguards (Nuclear Regulatory Commission)
NOAA	National Oceanic and Atmospheric Administration
NORM	Naturally Occurring Radioactive Material
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation (Nuclear Regulatory Commission)
OC	Office of Controller
OCC	Office of the Comptroller of the Currency
OCFO	Office of the Chief Financial Officer (Nuclear Regulatory Commission)
OE	Office of Enforcement (Nuclear Regulatory Commission)
OGC	Office of the General Counsel (Nuclear Regulatory Commission)
OSHA	U.S. Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
pCi	picocurie
PDF	Probability Density Function
PDR	Public Document Room (Nuclear Regulatory Commission)
P&GD	Policy and Guidance Directive
pH	hydrogen power
PM	Project Manager
PMF	probable maximum flood
PMP	probable maximum precipitation
PPE	personal protective equipment
PSR	Partial Site Release
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance and Quality Control
RAI	Request for Additional Information

RCRA	Resource Conservation and Recovery Act
REMP	Radiological Environmental Monitoring Program
RF	Resuspension Factor
RG	Regulatory Guide (also known as Reg Guide)
RIS	Regulatory Issue Summary
ROD	Record of Decision
RSO	Radiation Safety Officer
RSSI	Radiation Site Survey and Investigation [Process]
RWP	Radiation Work Permit
SCP	Site Characterization Plan
SCR	Site Characterization Report
SDMP	Site Decommissioning Management Plan
SDWA	Safe Drinking Water Act
SER	Safety Evaluation Report
SOPs	Standard Operating Procedures
SRP	[NMSS Decommissioning] Standard Review Plan (NUREG-1727)
SSAB	site-specific advisory board
Sv	sievert
TAR	Technical Assistance Request
TDS	Total Dissolved Solids
TEDE	Total Effective Dose Equivalent
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
TI	Transport Index
TLD	Thermoluminescent Dosimeter
TOC	Total Organic Carbon
TODE	Total Organ Dose Equivalent
TRU	Transuranic(s) [radionuclides]
UECA	Uniform Environmental Covenants Act
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture

ABBREVIATIONS

USGS	U.S. Geological Survey
WAC	waste acceptance criteria
WRS	Wilcoxon Rank Sum [test]

GLOSSARY

The following terms are defined for the purposes of this three-volume NUREG report.

Acceptance Review. The evaluation the NRC staff performs upon receipt of a license amendment request to determine if the information provided in the document is sufficient to begin the technical review.

Activity. The rate of disintegration (transformation) or decay of radioactive material. The units of activity are the curie (Ci) and the becquerel (Bq) (see Title 10 of the *Code of Federal Regulations* (10 CFR) Section 20.1003, "Definitions").

Affected Parties. Representatives of a broad cross-section of individuals and institutions in the community or vicinity of a site that may be affected by the decommissioning of the site.

ALARA. Acronym for "as low as reasonably achievable," which means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical, consistent with the purpose for which the licensed activity is undertaken, and taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to the benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest (see 10 CFR 20.1003).

Alternate Criteria. Dose criteria for residual radioactivity that are greater than the dose criteria described in 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use," and 10 CFR 20.1403, "Criteria for License Termination under Restricted Conditions," as allowed in 10 CFR 20.1404, "Alternate Criteria for License Termination." The Commission must approve alternate criteria.

Aquifer. A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs.

Background Radiation. Radiation from cosmic sources, naturally occurring radioactive material, including radon (except as a decay product of source or special nuclear material), and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. Background radiation does not include radiation from source, byproduct, or special nuclear materials regulated by the NRC (see 10 CFR 20.1003).

Broad Scope Licenses. A type of specific license authorizing receipt, acquisition, ownership, possession, use, and transfer of any chemical or physical form of the byproduct material specified in the license, but not exceeding quantities specified in the license. The requirements for specific domestic licenses of broad scope for byproduct material are found in 10 CFR Part 33, "Specific Domestic Licenses of Broad Scope for Byproduct Material." Examples of broad scope licensees are large universities and large research and development facilities.

Byproduct Material. (1) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or using special nuclear material. (2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition. (3)(i) Any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or (ii) Any material that—(A) Has been made radioactive by use of a particle accelerator, and (B) Is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity. (4) Any discrete source of naturally occurring radioactive material, other than source material, that—(i) The Commission, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security and (ii) Before, on, or after August 8, 2005, is extracted or converted after extraction for use in a commercial, medical, or research activity (see 10 CFR 20.1003).

Categorical Exclusion (CATX). A category of regulatory actions which do not individually or cumulatively have a significant effect on the human environment and which the Commission has found to have no such effect in accordance with procedures set out in 10 CFR 51.22, "Criterion for Categorical Exclusion; Identification of Licensing and Regulatory Actions Eligible for Categorical Exclusion or Otherwise Not Requiring Environmental Review," and for which, therefore, neither an environmental assessment nor an environmental impact statement is required (see 10 CFR 51.14(a)).

Certification Amount of Financial Assurance. See *prescribed amount of financial assurance*.

Certification of Financial Assurance. The document submitted to certify that financial assurance has been provided as required by regulation.

Characterization Survey. A type of survey that includes facility or site sampling, monitoring, and analysis activities to determine the extent and nature of residual radioactivity. Characterization surveys provide the basis for acquiring necessary technical information to develop, analyze, and select appropriate cleanup techniques.

Cleanup. See *decontamination.*

Closeout Inspection. An inspection performed by the NRC, or its contractor, to determine if a licensee has adequately decommissioned its facility. Typically, a closeout inspection is performed after the licensee has demonstrated that its facility is suitable for release in accordance with NRC requirements.

Confirmatory Survey. A survey conducted by the NRC, or its contractor, to verify the results of the licensee's final status survey. Typically, confirmatory surveys consist of measurements at a

fraction of the locations previously surveyed by the licensee, to determine whether the licensee's results are valid and reproducible.

Critical Group. The group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances (see 10 CFR 20.1003).

DandD Code. The Decontamination and Decommissioning (DandD) software package, developed by the NRC, that addresses compliance with the dose criteria of 10 CFR Part 20, "Standards for Protection Against Radiation," Subpart E, "Radiological Criteria for License Termination." Specifically, DandD embodies the NRC's guidance on screening dose assessments to allow licensees to perform simple estimates of the annual dose from residual radioactivity in soils and on building surfaces.

Decommission. To remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) release of the property for unrestricted use and termination of the license or (2) release of the property under restricted conditions and termination of the license (see 10 CFR 20.1003).

Decommissioning Funding Plan (DFP). A document that provides a detailed site-specific cost estimate for decommissioning, based on the costs of an independent contractor to meet the criteria for unrestricted use in 10 CFR 20.1402 (except that, if the applicant or licensee can demonstrate its ability to meet the restricted use provisions of 10 CFR 20.1403, then the cost estimate may be based on meeting the 20.1403 criteria); key assumptions used to develop the cost estimate; the method for assuring funds for decommissioning; the means for adjusting both the cost estimate and funding level over the life of the facility; the volume of material containing residual radioactivity that will require remediation; and the certification of financial assurance and the signed originals of the financial instruments provided as financial assurance.

Decommissioning Groups. For the purposes of this guidance document, the categories of decommissioning activities that depend on the type of operation and the residual radioactivity.

Decommissioning Plan (DP). A detailed description of the activities that the licensee intends to use to assess the radiological status of its facility, to remove radioactivity attributable to licensed operations at its facility to levels that permit release of the site in accordance with the NRC's regulations and termination of the license, and to demonstrate that the facility meets the NRC's requirements for release. A DP typically consists of several interrelated components, including (1) site characterization information, (2) a remediation plan that has several components, including a description of remediation tasks, a health and safety plan, and a quality assurance plan, (3) site-specific cost estimates for the decommissioning, and (4) a final status survey plan (see 10 CFR 30.36(g)(4)).

Decontamination. The removal of undesired residual radioactivity from facilities, soils, or equipment prior to the release of a site or facility and termination of a license. Also known as remediation, remedial action, and cleanup.

Derived Concentration Guideline Levels (DCGLs). Radionuclide-specific concentration limits used by the licensee during decommissioning to achieve the regulatory dose standard that permits the release of the property and termination of the license. The DCGL applicable to the

average concentration over a survey unit is called the $DCGL_W$. The DCGL applicable to limited areas of elevated concentrations within a survey unit is called the $DCGL_{EMC}$.

Dose (or *Radiation Dose*). A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in other paragraphs of 10 CFR 20.1003. In this NUREG report, dose generally refers to *total effective dose equivalent (TEDE)*.

Durable Institutional Controls. A legally enforceable mechanism for restricting land uses to meet the radiological criteria for license termination (10 CFR Part 20, Subpart E). Durable institutional controls are reliable and sustainable for the time period needed.

Effluent. Material discharged into the environment from licensed operations.

Environmental Assessment. A concise public document for which the Commission is responsible that serves to (1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact, (2) aid the Commission's compliance with the National Environmental Policy Act (NEPA) when no environmental impact statement is necessary, and (3) facilitate preparation of an environmental impact statement when one is necessary (see 10 CFR 51.14(a)).

Environmental Impact Statement. A detailed written document that ensures the policies and goals defined in NEPA are considered in the actions of the Federal Government. It discusses significant impacts and reasonable alternatives to the proposed action.

Environmental Monitoring. The process of sampling and analyzing environmental media in and around a facility (1) to confirm compliance with performance objectives and (2) to detect radioactive material entering the environment to facilitate timely remedial action.

Environmental Report (ER). A document submitted to the NRC by an applicant for a license amendment request (see 10 CFR 51.14(a)). The ER is used by NRC staff to prepare environmental assessments and environmental impact statements. The requirements for ERs are specified in 10 CFR 51.45–51.69.

Exposure Pathway. The route by which radioactivity travels through the environment to eventually cause radiation exposure to a person or group.

Exposure Scenario. A description of the future land uses, human activities, and behavior of the natural system as related to a future human receptor's interaction with (and therefore exposure to) residual radioactivity. In particular, the exposure scenario describes where humans may be exposed to residual radioactivity in the environment, what exposure group habits determine exposure, and how residual radioactivity moves through the environment.

External Dose. That portion of the dose equivalent received from radiation sources outside the body (see 10 CFR 20.1003).

Final Status Survey (FSS). Measurements and sampling to describe the radiological conditions of a site or facility, following completion of decontamination activities (if any) and in preparation for release of the site or facility.

Final Status Survey Plan (FSSP). The description of the final status survey design.

Final Status Survey Report (FSSR). The results of the final status survey conducted by a licensee to demonstrate the radiological status of its facility. The FSSR is submitted to NRC for review and approval.

Financial Assurance. A guarantee, or other financial arrangement, provided by a licensee that funds for decommissioning will be available when needed. This is in addition to the licensee's regulatory obligation to decommission its facilities.

Financial Assurance Mechanism. Financial instruments used to provide financial assurance for decommissioning.

Floodplain. The lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands. Areas subject to a 1 percent or greater chance of flooding in any given year are included (see 10 CFR 72.3, "Definitions").

Footprint. The portion of a site undergoing decommissioning, which is comprised of all of the areas of soil containing residual radioactivity, where intentional mixing is proposed to meet the release criteria. This definition is applicable only to proposed intentional mixing cases.

General Licenses. Licenses that are effective without the filing of applications with the NRC or the issuance of licensing documents to particular persons.

Ground Water. Water contained in pores or fractures in either the unsaturated or saturated zones below ground level.

Historical Site Assessment (HSA). The identification of potential, likely, or known sources of radioactive material and radioactive contamination based on existing or derived information for the purpose of classifying a facility or site, or parts thereof, as impacted or non-impacted (see 10 CFR 50.2, "Definitions").

Hydraulic Conductivity. The volume of water that will move through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

Hydrology. Study of the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Impact. The positive or negative effect of an action (past, present, or future) on the natural environment (land use, air quality, water resources, geological resources, ecological resources, aesthetic and scenic resources) and the human environment (infrastructure, economics, social, and cultural).

Impacted Areas. The areas with some reasonable potential for residual radioactivity in excess of natural background or fallout levels (see 10 CFR 50.2).

Inactive Outdoor Area. The outdoor portion of a site not used for licensed activities or materials for 24 months or more.

Infiltration. The process of water entering the soil at the ground surface. Infiltration becomes percolation when water has moved below the depth at which it can be removed (to return to the atmosphere) by evaporation or transpiration.

Institutional Controls. Measures to control access to a site and minimize disturbances to engineered measures established by the licensee to control the residual radioactivity. Institutional controls include administrative mechanisms (e.g., land use restrictions) and may include, but are not limited to, physical controls (e.g., signs, markers, landscaping, and fences).

Karst. A type of topography that is formed over limestone, dolomite, or gypsum by dissolution, characterized by sinkholes, caves, and underground drainage.

Leak Test. A test for leakage of radioactivity from sealed radioactive sources. These tests are made when the sealed source is received and on a regular schedule thereafter. The frequency is usually specified in the sealed source and device registration certificate and/or license.

Legacy Site. An existing decommissioning site that is complex and difficult to decommission for a variety of financial, technical, or programmatic reasons.

License Termination Plan (LTP). A detailed description of the activities a reactor licensee intends to use to assess the radiological status of its facility, to remove radioactivity attributable to licensed operations at its facility to levels that permit release of the site in accordance with the NRC's regulations and termination of the license, and to demonstrate that the facility meets the NRC's requirements for release. An LTP consists of several interrelated components including (1) a site characterization, (2) identification of remaining dismantlement activities, (3) plans for site remediation, (4) detailed plans for the final radiation survey, (5) a description of the end use of the facility, if restricted, (6) an updated site-specific estimate of remaining decommissioning costs, and (7) a supplement to the environmental report, pursuant to 10 CFR 51.33, "Draft Finding of No Significant Impact; Distribution," describing any new information or significant environmental change associated with the licensee's proposed termination activities (see 10 CFR 50.82, "Termination of License").

License Termination Rule (LTR). The LTR refers to the final rule on "Radiological Criteria for License Termination," published by the NRC as Subpart E to 10 CFR Part 20 in the *Federal Register* on July 21, 1997 (62 FR 39058).

Licensee. A person who possesses a license, or a person who possesses licensable material and whom the NRC could require to obtain a license.

MARSSIM. The "Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM)" (NUREG-1575) is a multi-agency consensus manual that provides information on planning, conducting, evaluating, and documenting building surface and surface soil final status

radiological surveys for demonstrating compliance with dose- or risk-based regulations or standards.

Model. A simplified representation of an object or natural phenomenon. The model can be in many possible forms, such as a set of equations or a physical, miniature version of an object or system constructed to allow estimates of the behavior of the actual object or phenomenon when the values of certain variables are changed. Important environmental models include those estimating the transport, dispersion, and fate of chemicals in the environment.

Monitoring. Monitoring (radiation monitoring, radiation protection monitoring) is the measurement of radiation levels, concentrations, surface area concentrations, or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses (see 10 CFR 20.1003).

mrem/y (millirem per year). One one-thousandth (0.001) of a rem per year. (See also *sievert*.)

National Environmental Policy Act (NEPA). The National Environmental Policy Act of 1969, which requires Federal agencies, as part of their decision-making process, to consider the environmental impacts of actions under their jurisdiction. Both the Council on Environmental Quality (CEQ) and the NRC have promulgated regulations to implement NEPA requirements. CEQ regulations are contained in 40 CFR Parts 1500 to 1508, and NRC requirements are provided in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

Naturally Occurring Radioactive Material (NORM). The natural radioactivity in rocks, soils, air, and water. NORM generally refers to materials in which the radionuclide concentrations have not been enhanced by or as a result of human practices. NORM does not include uranium or thorium in source material.

Non-impacted Areas. The areas with no reasonable potential for residual radioactivity in excess of natural background or fallout levels (see 10 CFR 50.2).

Pathway. See *exposure pathway*.

Performance-Based Approach. Regulatory decisionmaking that relies upon measurable or calculable outcomes (i.e., performance results) to be met, but provides more flexibility to the licensee as to the means of meeting those outcomes.

Permeability. The ability of a material to transmit fluid through its pores when subjected to a difference in head (pressure gradient). Permeability depends on the substance transmitted (oil, air, water, and so forth) and on the size and shape of the pores, joints, and fractures in the medium and the manner in which they are interconnected.

Porosity. The ratio of openings, or voids, to the total volume of a soil or rock expressed as a decimal fraction or as a percentage.

Potentiometric Surface. The two-dimensional surface that describes the elevation of the water table. In an unconfined aquifer, the potentiometric surface is at the top of the water level. In a

confined aquifer, the potentiometric surface is above the top of the water level because the water is under confining pressure.

Prescribed Amount of Financial Assurance. An amount of financial assurance based on the authorized possession limits of the NRC license, as specified in 10 CFR 30.35(d), 40.36(b), or 70.25(d).

Principal Activities. Activities authorized by the license that are essential to achieving the purpose(s) for which the license was issued or amended. Storage during which no licensed material is accessed for use or disposal and activities incidental to decontamination or decommissioning are not principal activities (see 10 CFR 30.4, "Definitions").

Probabilistic. Refers to computer codes or analyses that use a random sampling method to select parameter values from a distribution. Results of the calculations are also in the form of a distribution of values. The results of the calculation do not typically include the probability of the scenario occurring.

Reasonable Alternatives. Those alternatives that are practical or feasible from a technical and economic standpoint.

Reasonably Foreseeable Land Use. Land use scenarios that are likely within 100 years, considering advice from land use planners and stakeholders on land use plans and trends.

rem. The special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert) (see 10 CFR 20.1004).

Remedial Action. See *decontamination*.

Remediation. See *decontamination*.

Residual Radioactivity. Radioactivity in structures, materials, soils, ground water, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of 10 CFR Part 20 (see 10 CFR 20.1003).

RESRAD Code. A computer code developed by the U.S. Department of Energy and designed to estimate radiation doses and risks from RESidual RADioactive materials in soils.

RESRAD-BUILD Code. A computer code developed by the U.S. Department of Energy and designed to estimate radiation doses and risks from RESidual RADioactive materials in BUILDings.

Restricted Area. Any area to which access is limited by a licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials (see 10 CFR 20.1003).

Risk. Defined by the "risk triplet" of a scenario (a combination of events and/or conditions that could occur) or set of scenarios, the probability that the scenario could occur, and the consequence (e.g., dose to an individual) if the scenario were to occur.

Risk-Based Approach. Regulatory decision making that is based solely on the numerical results of a risk assessment. (Note that the Commission does not endorse a risk-based regulatory approach.)

Risk-Informed Approach. Regulatory decision making that represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to public health and safety.

Risk Insights. Results and findings that come from risk assessments.

Robust Engineered Barrier. A manmade structure that is designed to mitigate the effect of natural processes or human uses that may initiate or accelerate release of residual radioactivity through environmental pathways. The structure is designed so that the radiological criteria for license termination (10 CFR Part 20, Subpart E) can be met. Robust engineered barriers are designed to be more substantial, reliable, and sustainable for the time period needed without reliance on active ongoing maintenance.

Safety Evaluation Report. The NRC staff's evaluation of the radiological consequences of a licensee's proposed action to determine if that action can be accomplished safely.

Saturated Zone. That part of the earth's crust beneath the regional water table in which all voids, large and small, are ideally filled with water under pressure greater than atmospheric.

Scoping Survey. A type of survey that is conducted to identify (1) radionuclide contaminants, (2) relative radionuclide ratios, and (3) general levels and extent of residual radioactivity.

Screening Approach/Methodology/Process. The use of (1) predetermined building surface concentration and surface soil concentration values, or (2) a predetermined methodology (e.g., use of the DandD code) that meets the radiological decommissioning criteria without further analysis, to simplify decommissioning in cases where low levels of residual radioactivity are achievable.

Sealed Source. Any special nuclear material or byproduct material encased in a capsule designed to prevent leakage or escape of the material.

sievert (Sv). The SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 sievert = 100 rem) (see 10 CFR 20.1004).

Site. The area of land, along with structures and other facilities, as described in the original NRC license application, plus any property outside the originally licensed boundary added for the purpose of receiving, possessing, or using radioactive material at any time during the term of the

license, as well as any property where radioactive material was used or possessed that has been released prior to license termination.

Site Characterization. Studies that enable the licensee to sufficiently describe the conditions of the site, separate building, or outdoor area to evaluate the acceptability of the decommissioning plan.

Site Characterization Survey. See *characterization survey*.

Site Decommissioning Management Plan (SDMP). The program established by the NRC in March 1990 to help ensure the timely cleanup of sites with limited progress in completing the remediation of the site and the termination of the facility license. In 2004, the NRC eliminated the SDMP because the original intent of the SDMP and SDMP Action Plan had been achieved. As of 2004, all sites are managed under the Comprehensive Decommissioning Program. SDMP sites typically had buildings, former waste disposal areas, large volumes of tailings, ground water contamination, and soil contaminated with low levels of uranium or thorium or other radionuclides.

Site-Specific Dose Analysis. Any dose analysis that is done other than by using the default screening tools.

Smear. A radiation survey technique which is used to determine levels of removable surface contamination. A medium (typically filter paper) is rubbed over a surface (typically an area of 100 cm^2), followed by a quantification of the activity on the medium. Also known as a "swipe."

Source Material. Uranium or thorium, or any combination of uranium and thorium, in any physical or chemical form, or ores that contain by weight one-twentieth of one percent (0.05 percent) or more of uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material (see 10 CFR 20.1003).

Source Term. A conceptual representation of the residual radioactivity at a site or facility.

Special Nuclear Material. (1) Plutonium, uranium-233 (U-233), uranium enriched in the isotope 233 or in the isotope 235, and any other material that the Commission, pursuant to the provisions of Section 51 of the Atomic Energy Act, determines to be special nuclear material, but does not include source material, or (2) any material artificially enriched by any of the foregoing but does not include source material (see 10 CFR 20.1003).

Specific Licenses. Licenses issued to a named person who has filed an application for the license under the provisions of 10 CFR Parts 30, 32 through 36, 39, 40, 61, 70, and 72. Examples of specific licenses are industrial radiography, medical use, irradiators, and well logging.

Survey. An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present (see 10 CFR 20.1003).

Survey Unit. A geographical area consisting of structures or land areas of specified size and shape at a site for which a separate decision will be made as to whether the unit attains the site-specific, reference-based cleanup standard for the designated pollution parameter. Survey units are generally formed by grouping contiguous site areas with similar use histories and having the same contamination potential (classification). Survey units are established to facilitate the survey process and the statistical analysis of survey data.

Technologically Enhanced Naturally Occurring Radioactive Material (TENORM). Naturally occurring radioactive material with radionuclide concentrations increased by or as a result of past or present human practices. TENORM does not include background radioactive material or the natural radioactivity of rocks and soils. TENORM does not include uranium or thorium in source material.

Timeliness. Specific time periods stated in NRC regulations for decommissioning unused portions of operating nuclear materials facilities and for decommissioning the entire site upon termination of operations.

Total Effective Dose Equivalent (TEDE). The sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (CEDE) (for internal exposures) (see 10 CFR 20.1003).

Transmissivity. The rate of flow of water through a vertical strip of aquifer, which is one unit wide and which extends the full saturated depth of the aquifer.

Unrestricted Area. An area, access to which is neither limited nor controlled by the licensee (see 10 CFR 20.1003).

Unsaturated Zone. The subsurface zone in which the geological material contains both water and air in pore spaces. The top of the unsaturated zone typically is at the land surface, otherwise known as the "vadose zone."

Vadose Zone. See *unsaturated zone*.

1. PURPOSE, APPLICABILITY, AND ROADMAP

1.1 PURPOSE AND APPLICABILITY

The purpose of this volume is to provide guidance to the U.S. Nuclear Regulatory Commission (NRC) staff and licensees on the following:

- **recordkeeping and timeliness in decommissioning; and**
- **financial assurance for decommissioning.**

This NUREG provides guidance regarding decommissioning leading to termination of a license. Licensees of Agreement States should contact the appropriate regulatory authority. This volume is also intended to be used in conjunction with NRC Inspection Manual Chapter 2602, "Decommissioning Oversight and Inspection Program for Fuel Cycle Facilities and Materials Licensees."

This volume of NUREG-1757 is being issued to describe and make available to licensees and the public: (1) guidance on technical aspects of compliance with specific parts of the Commission's regulations, (2) methods acceptable to the NRC staff for implementing these regulations, and (3) some of the techniques and criteria used by the NRC staff in evaluating licensee submittals. This guidance is not a substitute for regulations, and compliance with the guidance is not required. Methods and solutions different from those described in this volume will be acceptable if they provide a basis for the NRC staff to conclude that the licensee's decommissioning actions are in compliance with the Commission's regulations. Licensees should note that approaches consistent with the guidance in this volume may be easier for NRC staff to review, potentially resulting in more effective and efficient staff reviews.

This volume applies to the timeliness and recordkeeping requirements for licensees under Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 30, 40, 70, and 72. It also applies to financial assurance requirements for licensees under 10 CFR Parts 30, 40, 70, and 72, with the exception of licensees (uranium recovery facilities) subject to Criteria 9 and 10 of Appendix A, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content," to 10 CFR Part 40, "Domestic Licensing of Source Materials."

This volume does not apply to licensees under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Regulatory Guide 1.159, Revision 1, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," issued October 2003, provides guidance on financial assurance for these licensees.

Other documents address the decommissioning financial assurance requirements for other types of licensees. Guidance on financial assurance for uranium recovery facilities under 10 CFR Part 40 is provided in the Branch Technical Position (BTP), "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and

Control of Uranium Recovery Facilities," (issued October 1988). Information on low-level waste disposal facilities under 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," is provided in Revision 2 of NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," (issued January 1991), and Revision 3 of NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," (issued April 1994).

1.2 ROADMAP TO THIS VOLUME

This volume contains guidance on three areas of regulation: (1) timeliness in decommissioning, (2) recordkeeping for decommissioning, and (3) financial assurance. In addition, the standard format and content for financial instruments is contained in Appendix A to this volume.

- Chapter 1 contains the document roadmap and reference lists. Table 1.1 identifies various source documents used to develop the guidance in this volume. Source documents that have been superseded are identified in Table 1.2 in Section 1.3.3.
- Chapter 2 contains guidance on timeliness. Figure 2.1 summarizes the requirements for compliance with timeliness requirements.
- Chapter 3 contains guidance on recordkeeping. A list of documents to retain is contained in Section 3.4.
- Chapter 4 contains guidance on financial assurance. A brief outline of the steps necessary to prepare a financial assurance demonstration is found at the end of Section 4.0 under the heading "How to Use Chapter 4."
- Chapter 5 directs the reader to NUREG-1556, "Consolidated Guidance About Materials Licenses," Volume 15, "Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Material Licenses," issued November 2000, for guidance on handling bankruptcy situations.
- Chapter 6 provides procedures for drawing on financial assurance instruments.
- Chapter 7 provides a procedure for approving disbursements of funds from a decommissioning trust.
- Chapter 8 provides guidance on returning, canceling, or reducing financial assurance instruments.
- Appendix A contains detailed guidance on drafting and preparing the package for submittal of financial instruments. Checklists in each section of Appendix A are provided to summarize the necessary elements of each package.
- Appendix B contains the NRC's response to public comments on the version of NUREG-1757, Volume 3 that was published for comment.

Table 1.1 Origin of Guidance in this Volume

Section of this Guidance		Section of SRP or Other Guidance
1.0	Purpose, Applicability, and Roadmap	N/A
1.1	Purpose and Applicability	N/A
1.2	Roadmap to this Volume	N/A
1.3	Documents Referenced in this NUREG	N/A
Part I: Timeliness and Recordkeeping		
2.0	Timeliness in Decommissioning Overview	NRC AL 96-05, Rev. 1 & NUREG/BR-0241, Sec. 3
2.1	Initiation of the Decommissioning Process	NRC AL 96-05, Rev. 1 & NUREG/BR-0241, Sec. 3
2.2	Extension or Alternative Schedule for Decommissioning	NRC AL 96-05, Rev. 1 & NUREG/BR-0241, Sec. 3
2.3	Completion of the Decommissioning Process	NRC AL 96-05, Rev. 1
2.4	Application of the Timeliness Rule to Special Cases	NRC AL 96-05, Rev. 1, IN 96-47, & NUREG/BR-0241, Sec. 6
2.5	Enforcement	NRC AL 96-05, Rev. 1
2.6	Review Criteria for Extension or Alternative Time Schedule Requests	NRC AL 96-05, Rev. 1
3.0	Recordkeeping Overview	N/A
3.1	Recordkeeping Requirements During Licensed Operations	IN 96-47; DG-3001
3.2	Recordkeeping Information for Decommissioning Plans	N/A
3.3	Record Disposition Requirements at License Termination or Transfer	61 FR 24669
3.4	NRC Staff Record Retention Requirements	NUREG/BR-0241, Sec. 5 & Appendix D
Part II: Financial Assurance		
4.0	Financial Assurance Overview	NUREG-1727, Sec. 15.0
4.1	Cost Estimate (As Contained in a Decommissioning Funding Plan or Decommissioning Plan)	NUREG-1727, Sec. 15.1
4.2	Prescribed Amount	NUREG-1727, Sec. 15.2
4.3	Financial Assurance Mechanisms	NUREG-1727, Sec. 15.3

Table 1.1 Origin of Guidance in this Volume (continued)

Section of this Guidance		Section of SRP or Other Guidance
Part III: Bankruptcy, Bankruptcy Review Team, and Drawing on Financial Assurance Instruments		
5.0	Bankruptcy Overview	N/A
5.1	Bankruptcy	N/A
5.2	Bankruptcy Review Team	NUREG-1556, App. H
6.0	Procedures for Drawing on Financial Assurance Instruments	NUREG-1556, App. I
6.1	Letter of Credit	NUREG-1556, App. I
6.2	Surety Bond	NUREG-1556, App. I
6.3	Parent Company Guarantee	NUREG-1556, App. I
6.4	Self-Guarantee	NUREG-1556, App. I
7.0	Procedure for Approving Disbursements from Decommissioning Funds	N/A
8.0	Returning, Canceling, or Reducing Financial Assurance Instruments	Management Directive 8.12
Appendix A	Standard Format and Content of Financial Assurance Mechanisms for Decommissioning	NUREG-1727, App. F
Appendix B	NRC Response to Comments	N/A

1.3 DOCUMENTS REFERENCED IN THIS NUREG

This section provides the referenced and superseded documents list for this volume. While Chapter 4 of Volume 1 and Chapter 1 of Volume 2 of this NUREG series provided lists of decommissioning references, Section 1.3.3 provides a complete list of superseded documents for this NUREG series.

Use of References Cited in this Volume

This volume refers to a number of other documents for guidance. In some cases, this volume will state that the referenced guidance is approved by NRC staff. However, in some cases, the documents are only referenced for information. In these cases, the specific applicability to a facility should be determined by the licensee, in consultation with NRC staff, as appropriate.

1.3.1 DOCUMENTS REFERENCED BY VOLUME 3

- Department of the Treasury. Circular 570, "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies." Washington, DC. July 2010.
- U.S. Nuclear Regulatory Commission. Branch Technical Position, "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities." Washington, DC. October 1988.
- ———. Inspection Manual Chapter 2602, "Decommissioning Oversight and Inspection Program for Fuel Cycle Facilities and Materials Licensees." Washington, DC. July 2008.
- ———. Management Directive 8.12, "Decommissioning Financial Assurance Instrument Security Program." NRC: Washington, DC. April 3, 1998.
- ———. NUREG/CR-6477, "Revised Analyses of Decommissioning Reference Non-Fuel-Cycle Facilities." NRC: Washington, DC. September 1997.
- ———. NUREG-0910, "NRC Comprehensive Records Disposition Schedule." Washington, DC. March 2005.
- ———. NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility." Washington, DC. January 1991.
- ———. NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility." Washington, DC. April 1994.
- ———. NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors." Washington, DC. February 1996.
- ———. NUREG-1556, "Consolidated Guidance About Materials Licenses," Vol. 15, "Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Material Licenses." Washington, DC. November 2000.

- ———. NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Applications." Washington, DC. June 2003.
- ———. NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." Washington, DC. August 2000.
- ———. NUREG-1600, "General Statement of Policy and Procedure for NRC Enforcement Actions." NRC: Washington, DC. May 2000.
- ———. NUREG-1620, "Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978." Washington, DC. June 2003.
- ———. NUREG-1700, "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans." Washington, DC. April 2003.
- ———. Draft Regulatory Guide-3001, "Records Important for Decommissioning for Licensees Under 10 CFR Parts 30, 40, 70, and 72." Washington, DC. July 1989.
- ———. Regulatory Guide 1.159, Revision 1, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors." NRC: Washington, DC. October 2003.
- ———. Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning." NRC: Washington, DC. June 2008.

The following documents are not specifically referenced in Volume 3, but represent guidance on decommissioning cost estimating for various facilities and cost components.

- U.S. Nuclear Regulatory Commission. NUREG/CR-0129, "Technology, Safety and Costs of Decommissioning a Reference Small Mixed Oxide Fuel Fabrication Plant." Washington, DC. February 1979.
- ———. NUREG/CR-1266, "Technology, Safety and Costs of Decommissioning a Reference Uranium Fuel Fabrication Plant." Washington, DC. October 1988.
- ———. NUREG/CR-1757, "Technology, Safety and Costs of Decommissioning a Reference Uranium Hexafluoride Conversion Plant." Washington, DC. October 1981.
- ———. NUREG/CR-2210, "Technology, Safety and Costs of Decommissioning a Reference Independent Spent Fuel Storage Installation." Washington, DC. January 1984.
- ———. NUREG/CR-2241, "Technology and Costs of Termination Surveys Associated with Decommissioning of Nuclear Facilities." Washington, DC. February 1982.
- ———. NUREG/CR-3293, "Technology, Safety and Costs of Decommissioning Reference Nuclear Fuel Cycle and Non Fuel Cycle Facilities Following Postulated Accidents." Washington, DC. May 1985.
- ———. NUREG/CR-5884, Vols. 1 and 2, "Revised Analyses of Decommissioning for the Reference Pressurized Water Reactor Power Station." Washington, DC. November 1995.

- ———. NUREG/CR-6054, "Estimating Pressurized Water Reactor Decommissioning Costs: A User's Manual for the PWR Cost Estimating Computer Program (CECP) Software." Washington, DC. November 1995.
- ———. NUREG/CR-6174, Vols. 1 and 2, "Revised Analyses of Decommissioning for the Reference Boiling Water Reactor Power Station." Washington, DC. July 1996.
- ———. NUREG/CR-6270, "Estimating Boiling Water Reactor Decommissioning Costs: A User's Manual for the BWR Cost Estimating Computer Program (CECP) Software." Washington, DC. June 1996.
- ———. NUREG/CR-6280, "Technology, Safety, and Costs of Decommissioning a Reference Large Irradiator and Reference Sealed Sources." Washington, DC. January 1996.
- ———. NUREG-1307, Rev. 10, "Report on Waste Burial Charges." Washington, DC. October 2002.

1.3.2 DOCUMENTS SUPERSEDED BY VOLUME 3

- U.S. Nuclear Regulatory Commission. Administrative Letter 96-05, Rev. 1, "Compliance with the Rule 'Timeliness in Decommissioning of Material Facilities.'" Washington, DC. July 14, 1998.
- ———. Information Notice 96-47, "Recordkeeping, Decommissioning Notifications for Disposals of Radioactive Waste by Land Burial Authorized under Former 10 CFR 20.304, 20.302, and Current 20.2002." NRC: Washington, DC. August 16, 1996.
- ———. NUREG/BR-0241, "NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees." NRC: Washington, DC. March 1997.
- ———. NUREG-1727, "NMSS Decommissioning Standard Review Plan." NRC: Washington, DC. September 2000.

1.3.3 DOCUMENTS SUPERSEDED BY NUREG-1757, VOLUMES 1, 2, AND 3

This NUREG series supersedes the Regulatory Guides (RGs), Policy and Guidance Directives (P&GDs), Branch Technical Positions (BTPs), and NUREGs listed in Table 1.2.

Table 1.2 List of Documents Superseded by this NUREG Series

Document Identification	Title	Date
RG 3.65	"Standard Format and Content Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70"	06/1989
RG 3.66	"Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72"	06/1990
P&GD FC 90-2	"Standard Review Plan for Evaluating Compliance with Decommissioning Requirements for Source, Byproduct, and Special Nuclear Material License Applications"	04/1991
P&GD FC 91-2	"Standard Review Plan: Evaluating Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70"	08/1991
P&GD FC 83-3	"Standard Review Plan for Termination of Special Nuclear Material Licenses of Fuel Cycle Facilities"	03/1983
NRC Memorandum	"Draft Staff Guidance for Dose Modeling of Proposed Partial Site Releases"	09/28/2001
BTP	"Draft Branch Technical Position on Site Characterization for Decommissioning"	11/1994
NUREG-1500	"Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC Staff's Draft for Comment"	08/1994
NUREG/CR-5849	"Manual for Conducting Radiological Surveys in Support of License Termination"	06/1992
NUREG/BR-0241	"NMSS Handbook for Decommissioning Fuel Cycle and Materials Facilities"	03/1997
NUREG-1727	"NMSS Decommissioning Standard Review Plan"	09/2000

The Standard Review Plan (SRP) (NUREG-1727) and the Handbook (NUREG/BR-0241) have been incorporated into this NUREG series. This three-volume NUREG series supersedes NUREG/BR-0241 and NUREG-1727 in their entirety.

PART I: TIMELINESS AND RECORDKEEPING

2. TIMELINESS IN DECOMMISSIONING OVERVIEW

"Timeliness in Decommissioning of Material Facilities" (known hereafter as the Timeliness Rule) established criteria for timely decommissioning upon termination of operations by amending 10 CFR Parts 2, 30, 40, 70, and 72. The Timeliness Rule establishes requirements for notifying the NRC of pending decommissioning actions and cessations in licensee operations, establishes requirements for when decommissioning plans (DPs) need to be submitted, and establishes requirements for completing decommissioning activities. Chapter 5 of Volume 1 of this NUREG series provides an overview of the decommissioning process, which includes a brief discussion of the timing of decommissioning and the Timeliness Rule. This section of Volume 3, however, provides more detailed information regarding the timing of decommissioning and the Timeliness Rule.

The decommissioning timeliness requirements described in this chapter apply to uranium recovery licensees, with the exception of tailings and waste disposal areas (see the more detailed discussion in Section 2.4). However, any discussion in this chapter of the decommissioning *process* required by the License Termination Rule (LTR) does not apply to uranium recovery licensees, since, under 10 CFR 20.1401(a), the LTR does not apply to such licensees.

Note that the regulations also allow licensees to request relief from the timeliness requirements when justified. The effective date of the Timeliness Rule was August 15, 1994 (59 FR 36026; July 15, 1994).

The Timeliness Rule applies to situations when (1) the licensee has decided to permanently cease principal activities at the entire site, or at any separate building or outdoor area, or (2) no principal activities have been conducted in such areas for a period of 24 months, even if no decision has been made to permanently cease principal activities. Further, the criteria apply to all licensees for whom the authorization to perform licensed activities has expired or been revoked.

The purpose of the Timeliness Rule is to avoid future problems and reduce potential risk, to the public and environment, that may result from delayed decommissioning of inactive facilities and sites. Specific concerns that prompted the Timeliness Rule include the potential risk of safety practices becoming lax because of attrition of key personnel and lack of management interest at facilities once operations cease, as well as the potential for bankruptcy, corporate takeover, or other unforeseen changes in a company's financial status that may complicate or delay decommissioning.

This chapter contains guidance on compliance with Timeliness Rule requirements. The contents of this chapter are as follows:

2.4 Application of the Timeliness Rule to Special Cases

2.5 Enforcement

2.6 Review Criteria for Extension or Alternative Time Schedule Requests

Figures 2.1a and 2.1b present flowcharts to assist in determining compliance with the Timeliness Rule. If licensees find that they are out of compliance, they must take all necessary corrective actions to restore compliance. Licensees may contact the NRC for assistance in determining whether their actions meet regulatory requirements and for regulatory guidance documents containing NRC recommendations of adequate methods of compliance.

Licensees who notify the NRC in accordance with the Timeliness Rule should provide such notices to the appropriate offices listed in 10 CFR 30.6, 40.5, and 70.5.

2.1 INITIATION OF THE DECOMMISSIONING PROCESS

There are four situations that lead to the requirement for a licensee to notify the NRC and to initiate the decommissioning process. These occurrences include the following:

1. The license to conduct a principal activity has expired or been revoked. (A principal activity is one that is essential to achieving the purpose for which a license was issued or amended. Storage, during which no licensed material is accessed for use or disposal, and activities incidental to decontamination or decommissioning are not principal activities.)
2. The licensee has made the decision to permanently cease principal activities at the entire site or in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area (this includes inactive burials, and land used for waste disposal under 10 CFR 20.302, 20.304, or the current 20.2002) is unsuitable for release in accordance with the requirements in Subpart E, "Radiological Criteria for License Termination," of 10 CFR Part 20, "Standards for Protection Against Radiation." See Volume 2 of this NUREG report for guidance on unsuitable release: Chapter 5 and Appendices H and I offer general guidance for dose modeling, and Appendix J offers specific guidance on burials.
3. There has been a 24-month duration in which no principal activities have been conducted under the license (regardless of the level of contamination), whether or not a decision was made to permanently cease principal activities.
4. There has been a 24-month duration in which no principal activities have been conducted in any separate building or outdoor area (including inactive burial grounds) that is unsuitable for release in accordance with the requirements in Subpart E of 10 CFR Part 20, whether or not a decision was made to permanently cease principal activities.

A licensee is required to assess the dose consequences of unused outdoor areas, including onsite buried material and unused separate buildings, in order to determine whether the area is suitable for release in accordance with 10 CFR Part 20, Subpart E.

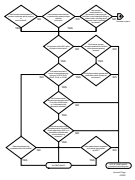

Figure 2.1a Determining Compliance with the Timeliness Rule (1 of 2)

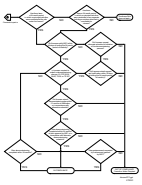

Figure 2.1b Determining Compliance with the Timeliness Rule (2 of 2)

Within 60 days of the occurrence of any of the above, the licensee is required to inform the NRC of the occurrence in writing. In addition, the licensee is required to begin decommissioning the facility ***or*** within 12 months, submit a DP to the NRC for review. If no DP is needed, the licensee is to begin decommissioning within the 60-day notification period. When a DP is required, the written notification serves to initiate the decommissioning process, and the licensee must submit a DP within 12 months of the notification date. The licensee must begin decommissioning in accordance with the DP, following the NRC's approval of the DP.

MULTIPLE LICENSES AT A SITE OR MULTIPLE ACTIVITIES ON A LICENSE

If there are multiple licenses at a site, the requirements of the Timeliness Rule apply to each individual license. In situations where a license has expired, but principal activities will continue under other licenses in the same building or outdoor area, the licensee would need to submit an alternative schedule request to delay decommissioning until all licensed activities are terminated in that building or outdoor area. The NRC may find this delay acceptable provided that the radioactive material from the expired license is not significantly migrating, the licensee has sufficient financial assurance for decommissioning, and adequate controls are in place to ensure protection of the public and the environment.

If there are multiple activities authorized under the same license, the requirements of the Timeliness Rule apply to the license and not to each individual activity. That is, an individual activity could permanently cease without necessarily requiring the licensee to initiate the decommissioning process. As long as at least one principal activity continues, the licensee is not required to decommission its entire site. However, parts of the licensee's site may require initiation of the decommissioning process, even if principal activities continue in other parts of the site. If a building or an area is unsuitable for release under NRC requirements, then the licensee should either submit an extension request, or initiate the decommissioning process for that building or area when (1) a decision is made to permanently cease principal activities in a separate building or outdoor area, or (2) no principal activity has been conducted in such areas for 24 months.

TIMELINESS REQUIREMENTS FOR A DECOMMISSIONING PLAN

If the licensee is required to submit a DP pursuant to license condition or under 10 CFR 30.36(g), 40.42(g), or 70.38(g), the plan must be submitted to the NRC within 12 months of the notification date, unless the licensee has submitted an alternative schedule request. The NRC may approve an alternate schedule for the submittal of the DP, in accordance with 10 CFR 30.36(g)(2), 40.42(g)(2), 70.38(g)(2), and 72.54(f)(2). For additional information on an alternative schedule for decommissioning, see Section 2.6.

DECOMMISSIONING SCHEDULE REQUIREMENTS

If the licensee is required to submit a DP, then decommissioning must be initiated upon the NRC's approval of the plan. Decommissioning must be completed (including the submittal of a complete final survey report), and a request for license termination submitted (when decommissioning involves the entire site), as soon as practicable but no later than 24 months

after the initiation of decommissioning, unless a delay or postponement has been requested by the licensee and granted by the NRC. (Note that 10 CFR 170.31, "Schedule of Fees for Materials Licenses and Other Regulatory Services, Including Inspections, and Import and Export Licenses," contains the fee schedule for NRC review of DPs.) Decommissioning by a licensee not required to submit a DP must also be completed, and a request for license termination submitted (when decommissioning involves the entire site), as soon as practicable but no later than 24 months after the initiation of decommissioning, unless a delay or postponement has been requested by the licensee and granted by the NRC.

2.2 EXTENSION OR ALTERNATIVE SCHEDULE FOR DECOMMISSIONING

The licensee may request to delay initiation of the decommissioning process. This request must be provided to the NRC within 30 days of the occurrence of any of the situations described in Section 2.1 and contain justification for the proposed delay. Pursuant to 10 CFR 30.36(f), 40.42(f), 70.38(f), and 72.54(f)(1), the NRC may grant a request to delay initiation of the decommissioning process. The decommissioning process does not start until the NRC makes a determination on the request.

For additional information regarding the criteria that the NRC staff will use to review requests for alternative time schedules for initiation of decommissioning activities, see Section 2.6.

2.3 COMPLETION OF THE DECOMMISSIONING PROCESS

As the final step in decommissioning, the licensee shall certify the disposition of all licensed material, including accumulated wastes, and conduct a radiation survey of the premises where the licensed activities were carried out. The licensee must either submit a report of the results of this survey or demonstrate that the premises are suitable for release in some other manner. This information must be submitted within the 24-month period after notification or approval of the DP, if required, unless an alternative schedule has been approved. Licenses, including expired licenses, will be terminated by written notice to the licensee when the Commission determines that (1) the radioactive material has been properly disposed of, (2) a reasonable effort has been made to eliminate residual radioactive contamination, and (3) either a radiation survey has been performed, or other information is submitted by the licensee which demonstrates that the premises are suitable for release in accordance with NRC requirements.

2.4 APPLICATION OF THE TIMELINESS RULE TO SPECIAL CASES

STORAGE-ONLY LICENSES

There are two different types of licenses where the authorized activity is "storage only":

(1) A storage-only license issued to address the inability to transfer or dispose of the material:

Storage under these circumstances is not a principal activity as defined in 10 CFR 30.4, "Definitions." Therefore, the requirements to notify the NRC and undertake decommissioning of the material kept in storage are not applicable. For these licensees, any decommissioning issues will be addressed by NRC when the license comes up for renewal. (Possible examples could include "greater than class C" and transuranic waste.)

(2) A license where storage of material is the principal activity (i.e., spent fuel storage under 10 CFR Part 72):

In such cases, storage will be treated as the principal activity under the license. Thus, the notification and decommissioning requirement would apply, but would be applicable only if the licensee ceases storage (i.e., transfers all material).

ONSITE DISPOSALS (BURIAL GROUNDS)

The Timeliness Rule includes requirements pertaining to buildings and outdoor areas that have been unused for a period of 24 months at facilities licensed under 10 CFR Parts 30, 40, and 70. Outdoor areas include those where disposals were made pursuant to former 10 CFR 20.304 and 20.302 and current 10 CFR 20.2002, "Method for Obtaining Approval of Proposed Disposal Procedures." Note that outdoor areas where radioactive materials were used that currently meet the NRC's criteria for unrestricted use are not subject to the notification requirements of the Timeliness Rule.

Outdoor areas include those where disposals were made pursuant to former 10 CFR 20.304 and 20.302 and current 10 CFR 20.2002. A licensee is required to assess the dose consequences of existing onsite buried material in order to determine whether the area is suitable for release in accordance with 10 CFR Part 20, Subpart E.

For proposed new onsite disposals, NRC guidance suggests constraining doses from onsite disposals to a few millirem per year, so that it is more likely that the entire site (including the contribution from onsite disposals) will meet the release criteria in 10 CFR Part 20, Subpart E, without remediation of the onsite disposal. Guidance for onsite disposal of radioactive material under 10 CFR 20.2002 is provided in Section 15.12 of Volume 1 of this NUREG report.

Burial of certain quantities of radioactive waste in soil by a licensee without prior approval of the U.S. Atomic Energy Commission (AEC) was authorized on January 29, 1957 (22 FR 548). Originally, this authorization was codified in former 10 CFR 20.304. On October 30, 1980, the Commission concluded that it was inappropriate to continue generic authorizations of burials

pursuant to 10 CFR 20.304 without regard to factors such as location of burial, concentrations of radioactive material, form of packaging, and notification of the NRC (45 FR 71761, 71762). Therefore, the NRC rescinded 10 CFR 20.304, and as of January 28, 1981, a licensee wishing to perform onsite disposals of the type previously authorized under 10 CFR 20.304 was required to obtain the NRC's prior approval in accordance with 10 CFR 20.302. The current requirements of 10 CFR 20.2002 (revised from 10 CFR 20.302) remain in force. For proposed new onsite disposals, refer to the guidance for onsite disposal of radioactive material under 10 CFR 20.2002, in Section 15.12 of Volume 1 of this NUREG report.

During decommissioning, the NRC will evaluate onsite disposals authorized under former 10 CFR Sections 20.304, 20.302, and current 20.2002 to determine their potential impact on the health and safety of the public. The acceptability of a disposal will depend on two factors: (1) the potential for the disposed material to migrate and significantly contaminate the ground water and (2) the potential for significant exposure to members of the public who may, at some time in the future, develop and use the disposal site for a private residence, farm, business, or other purpose.

BROAD-SCOPE LICENSES

The requirements of the Timeliness Rule apply to licensees regulated by 10 CFR Part 33, "Specific Licenses of Broad Scope for Byproduct Material." The permanent cessation of principal activities in an individual room or laboratory may require the licensee to notify the NRC if no other licensed activities are being performed in the building. Licensees should note, even if licensed activities are being performed in other parts of the building, they are required to keep lists of restricted (and formerly restricted) areas pursuant to 10 CFR 30.35(g)(3). Inspectors will review these lists to identify individual rooms that have been released, and verify that the rooms have been properly decommissioned.

URANIUM AND THORIUM MILLING

The Timeliness Rule, as described in this chapter, applies to the buildings and outdoor areas at all uranium and thorium recovery licensed sites, except the tailings impoundments and/or waste disposal areas. Per 10 CFR 40.42(l), specific licenses for uranium and thorium milling are exempt from selected provisions in the Timeliness Rule, with respect to the reclamation of tailings impoundments and/or waste disposal areas. The Statement of Considerations for the Timeliness Rule (59 FR 36026; July 15, 1994) provides clarification on disposal areas. Disposal areas (defined in 10 CFR Part 40) are areas containing Atomic Energy Act Section 11.e.(2) byproduct material that must be reclaimed under the design requirements of Criterion 6 of Appendix A. Based on 10 CFR Part 40, Appendix A, Criterion 2, in most cases, wastes from in situ uranium recovery (ISR) facilities must be disposed at existing large mill tailings disposal sites. In general, ISR facilities are cleaning up for unrestricted use all areas on the site, including evaporation ponds, deep well injection areas, and land application areas, among other areas on site. As a result, those areas are not being reclaimed under the design requirements of 10 CFR Part 40, Appendix A, Criterion 6, so these areas are not generally considered disposal areas for purposes of the exemption in 10 CFR 40.42(l). Thus, typically, all areas of ISR facilities, including evaporation ponds, deep well injection areas, land application areas, and

other similar areas, *will* be subject to the timeliness requirements. The exemptions are from 10 CFR 40.42(d)(4) for the 24-month period of inactivity; 10 CFR 40.42(g) for the content of the DP; and 10 CFR 40.42(h) for the timing of completion of the plan.

At ISRs, in addition to the applicability of the timeliness requirements for their overall decommissioning upon closure, the separate outdoor area provisions (see, e.g., 10 CFR 40.42(d)) mean that the timeliness requirements also apply to the ISRs on a wellfield-by-wellfield basis. This application reflects the common operational practice at ISRs, where groundwater restoration may be occurring in one wellfield while active uranium recovery is taking place in another wellfield. Once an ISR licensee decides to terminate the principal activity of uranium recovery in a particular wellfield, restoration of that wellfield must be initiated on a timely basis, even though licensed activities may continue to be conducted in other wellfields. Cessation of lixiviant injection would signify a licensee's intent to shift from the principal activity of uranium production to the initiation of groundwater restoration. While the NRC staff recognizes that residual uranium in the groundwater may still be recovered following the cessation of lixiviant injection and the initiation of groundwater restoration, the NRC staff's position is that the recovery of uranium then becomes incidental to groundwater restoration. The NRC staff recognizes that, in many cases, groundwater restoration may take several years or more to complete in a given wellfield. Nevertheless, extensions for restoration beyond the 24-month completion requirement (see Section 2.6) must provide that decommissioning/restoration will be completed as soon as practical, and that the health and safety of workers and the public will be protected.

TEMPORARY JOB SITES

The Timeliness Rule applies to licensees who conduct licensed activities at temporary job sites and are licensed pursuant to 10 CFR Parts 30, 40, and 70. Examples of these activities include, but are not limited to, reactor component repair service; well logging; radiography; portable gauge use; mobile nuclear medicine service; and field flood studies. The rule also applies to Agreement State licensees conducting licensed activities at temporary job sites within NRC jurisdiction pursuant to the provisions for reciprocity in 10 CFR Part 150, "Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters under Section 274." However, operations conducted at temporary job sites generally do not result in site contamination. Additionally, all radioactive materials used at temporary job sites are required to be removed at the completion of the licensed work. Hence, the Timeliness Rule will not apply to such operations that are conducted in compliance with NRC regulations and license conditions and do not result in site contamination that would involve site decommissioning.

Further, NRC or Agreement State licensees conducting licensed activities at temporary job sites are not expected to notify the NRC upon release of each job site under normal operations. These licensees are, however, expected to comply with applicable notification requirements, if significant contamination does occur (i.e., 10 CFR 30.50, "Reporting Requirements," and 10 CFR 39.77, "Licenses and Radiation Safety Requirements for Well Logging"). In case of site contamination, decommissioning may be required, and compliance with the Timeliness Rule may be applicable. Such occurrences will be reviewed on a case-by-case basis.

2.5 ENFORCEMENT

Failure to comply with the Timeliness Rule may be classified as a Severity Level III violation (as defined in NUREG-1600, "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), issued May 2000, and may result in consideration of monetary civil penalties or other enforcement action, as appropriate. Examples of noncompliance include the following:

- failure to notify the NRC as required by regulation or license condition;
- failure to meet decommissioning standards;
- failure to complete decommissioning activities in accordance with regulation or license condition; and
- failure to meet required schedules without adequate justification.

NUREG-1600 describes the NRC's enforcement policies. The current Enforcement Policy is included on the NRC's Web site at <http://www.nrc.gov>.

2.6 REVIEW OF EXTENSION OR ALTERNATIVE TIME SCHEDULE REQUESTS

The NRC staff will review a request to extend the time limits established for the initiation or completion of decommissioning activities in accordance with the requirements of the Timeliness Rule. *The Timeliness Rule requirements are presented in 10 CFR 30.36, 40.42, 70.38, and 72.54. Throughout the remainder of this section, reference will be made to various sections of 10 CFR 30.36, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas." Readers should substitute similar sections in 10 CFR 40.42, 70.38, and 72.54, as applicable, for other licensing situations.*

There are two relevant time schedules: one for initiating decommissioning (10 CFR 30.36(d)) and another for completion of decommissioning (10 CFR 30.36(h)).

The time schedules can be extended for initiation of decommissioning. Section 30.36(f) provides the requirements for extending the time periods established in Section 30.36(d); specifically, whether the relief is not detrimental to the public health and safety and is otherwise in the public interest. In addition to the criteria in 10 CFR 30.36(f), the criteria in 10 CFR 30.36(i) may also be helpful in evaluating an extension request.

The time schedules for the completion of decommissioning can also be extended. A request for an extension or alternative schedule for completing decommissioning may be approved, pursuant to 10 CFR 30.36(i), if warranted, after considering the following:

- whether it is technically feasible to complete the decommissioning within the 24-month period;

- whether sufficient waste disposal capacity is available to allow the completion of the decommissioning within the 24-month period;
- whether allowing short-lived radionuclides to decay will achieve a significant volume reduction in waste requiring disposal;
- whether allowing short-lived radionuclides to decay can achieve a significant reduction in radiation exposure to workers; and
- whether there are other site-specific factors, such as the regulatory requirements of other agencies, lawsuits, ground water treatment activities, monitored natural ground water restoration, actions that could result in more environmental harm than deferred cleanup, and other NRC-agreed upon factors beyond the control of the licensee.

The NRC's review should include the following:

- acceptance review;
- detailed review;
- request for additional information; and
- documentation of the safety and environmental review.

The NRC staff will review a request to extend the time period established in 10 CFR 30.36(d) (for initiating decommissioning) or 10 CFR 30.36(h) (for completing decommissioning) in accordance with the following sections.

ACCEPTANCE REVIEW

If the licensee's information is inadequate or incomplete, the staff will request that the licensee supply additional information. The NRC staff may elect to perform any of the following:

- reject a request because of inadequate information;
- place a request on hold pending submittal of requested information; or
- accept a request for a detailed review.

DETAILED REVIEW

The NRC staff will determine whether the licensee has met the extension request requirements of the Timeliness Rule. The NRC staff will verify the following:

- The licensee met the notification requirements of the Timeliness Rule.
- The licensee provided sufficient evidence to show that it met the regulatory evaluation criteria described below.

- Whether factors alleged to be beyond the control of the licensee are, in fact, beyond its control.

REQUESTS FOR ADDITIONAL INFORMATION

The NRC staff will document insufficient or inadequate information submitted by the licensee and communicate what additional information is needed to address the identified deficiencies.

SAFETY AND ENVIRONMENTAL REVIEW REPORTS

The NRC staff will document and communicate to the licensee the staff's position on the safety and environmental acceptability of the request, which forms the basis for the subsequent licensing action.

2.6.1 ACCEPTANCE CRITERIA

INFORMATION TO BE SUBMITTED

To support a request for an extension of the time period in 10 CFR 30.36(d), a licensee should provide the following:

- The date that principal activities ceased at the site, separate building, or outdoor area, as provided for in 10 CFR 30.36(d)(3) and 30.36(d)(4).
- The date a request for an extension of the time period is required, as provided for in 10 CFR 30.36(f).
- The length of postponement requested.
- Whether a DP will ultimately be required for the site.
- The reason the licensee is requesting an extension of the time period for initiation of the decommissioning schedule and an explanation of how the public's interest will be served by NRC approval of the extension. For example, licensees who request to go on standby rather than decommission could address whether decommissioning of the facility will require dismantlement, such that the facility will no longer be available for nuclear purposes. Operators of Federal facilities could explain how an extension of the time period for initiation of decommissioning would better take into account a broader Federal plan for decommissioning that establishes priority, funding, and schedules, thereby reducing the public funds needed for decommissioning the facility.
- A demonstration that the facilities will not significantly deteriorate during a standby period, if applicable. Facilities should be sufficiently maintained such that they may become operational without extensive repairs and decommissioning is not significantly more complex at a later date.
- A discussion of the current decommissioning cost estimate and the potential for increased decommissioning costs if an extension of the time period is approved.

- Evidence of adequate financial assurance for the ultimate decommissioning of the site. Financial assurance documentation will be reviewed in accordance with Chapter 4 and Appendix A to this volume.
- A discussion (1) of the extent and nature of contamination and the potential for migration by airborne or ground water pathways and (2) of the plan for monitoring and maintaining the site, separate building, or outdoor area during the extension period. The plan should be sufficiently detailed to demonstrate that public and worker health and safety and the environment will not be negatively affected during the extension period. The operating maintenance and radiation protection programs previously approved by the NRC may be continued during the extension period. The plan should also demonstrate that the applicant will conduct sufficient monitoring, during the extension period, to ensure that residual contamination does not become a public or a worker health and safety issue.

2.6.2 EVALUATION CRITERIA

Notification Requirements of the Timeliness Rule

A request to extend the time period established for initiation of decommissioning may be accepted if the request demonstrates that the extension is not detrimental to public health and safety and is otherwise in the public interest.

Evidence that an Extension of the Time Period will not be Detrimental to Public Health and Safety

To demonstrate that delaying the start of decommissioning will not be detrimental to public health and safety, a licensee should submit the following:

- a discussion of its record of regulatory compliance, particularly its compliance with NRC regulations
- the health and safety plan that will be in effect during the standby period

If the current health and safety plan will remain in effect during standby, the licensee should state when it was submitted and when the NRC-approved health and safety plan will be reviewed in accordance with Volume 1 of this NUREG series.

Demonstration that an Extension of the Time Period for Initiation of Decommissioning is Otherwise in the Public Interest

Factors that may form the basis for an argument that an extension of the time period for initiation of decommissioning is otherwise in the public interest include, but are not limited to, the following:

- future needs of the national defense industry
- a substantial increase in the efficiency of decommissioning and thus a reduction in anticipated dose to workers

- reduced decommissioning costs for Federal facilities
- postponing the initiation of decommissioning will not result in the spread of contamination, particularly ground water contamination, that may adversely affect the ultimate termination of the license

This list is not meant to be exhaustive. There are likely to be other valid licensee-specific arguments for extending the time period established for decommissioning. The NRC's determination of what is in the public interest will not be based solely on what is in the applicant's best economic interest; because the applicant's economic interest and the public's interest may not necessarily coincide.

2.6.3 SAMPLE EVALUATION FINDINGS

Documentation of the evaluation findings by the NRC staff should include the elements shown below:

- The NRC staff has reviewed the licensee's request to extend the time period established in 10 CFR 30.36(d), according to NUREG-1757, Volume 3, Revision 1, "Consolidated Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness."
- [*Insert name and license number of facility*] ceased principal activities at [*insert location of facility*] on [*insert date*]. The NRC received a request to extend the time period established for initiation of decommissioning by [*insert number*] years, on [*insert date*], in accordance with the requirements of 10 CFR 30.36(f). [*Insert name of licensee*] has acknowledged that a DP will be required to decommission the site before license termination.
- The Health and Safety Plan submitted [*or referenced*] by [*insert name of licensee*] is adequate to ensure that public health and safety will be protected during the extension period. In addition, results of past inspections indicate that [*insert name of licensee*] can successfully implement its operational health and safety plan.
- [*Insert name of licensee*] has secured financial surety equal in amount to the decommissioning cost estimate that the NRC previously approved. Provisions have been made to vary the amount of financial surety if necessary, to cover changing decommissioning costs with time.
- The monitoring and maintenance plan submitted by [*insert name of licensee*] is adequate to ensure that worker and public health and safety, and the environment, will not be negatively affected during the extension period.
- It is in the public's interest to allow [*insert name of licensee*] to extend the time period established for initiation of decommissioning for a period of time, not to exceed [*insert number*] years, for the following reason(s). [*Insert reason(s).*] [*Examples*: The standby period will allow economic conditions in the uranium market to improve. Existing statutes oblige the Secretary of Energy to gather information on the uranium mining industry and to have a continuing responsibility for the domestic industry, to encourage the use of domestic uranium. See 42 U.S.C. 2201b and 2296b-3. Although this responsibility is not the NRC's, we recognize that the viability of the industry is a Federal concern. **OR** An alternate

schedule involving some of the Federal licensee's other facilities would better take into account the Federal licensee's overall decommissioning needs, thereby reducing public funds needed for the ultimate decommissioning of the facility, etc.]

The NRC letter documenting its evaluation findings to the licensee will also state that within 60 days of the termination of the extension period, the licensee must notify the NRC in writing of such occurrence, and either begin decommissioning or submit within 12 months of notification a DP, if required by 10 CFR 30.36(g)(1), and begin decommissioning upon approval of that plan. An extension of a time schedule (for either initiation or completion of decommissioning) for greater than 6 months should be by license amendment, and the amendment should lay out the time schedule.

3. RECORDKEEPING OVERVIEW

NRC regulations prescribe recordkeeping responsibilities for NRC licensees. During licensed operations, the NRC requires licensees to maintain records important to safe and effective decommissioning. For licensees who must submit a DP, these records should subsequently be used to develop the site description portion of the DP. Following decommissioning and before license termination, additional NRC regulations prescribe the disposition of these records, in most cases to the NRC. Finally, the NRC staff is responsible for maintaining decommissioning records following license termination.

This chapter contains guidance for these recordkeeping requirements. The contents of this chapter are as follows:

3.1 RECORDKEEPING REQUIREMENTS DURING LICENSED OPERATIONS

INTRODUCTION

This section provides guidance on the NRC's recordkeeping requirements for licensees while they are conducting licensed operations. Section 3.2 of this chapter discusses how this information should be incorporated into a DP.

The purpose of the NRC's recordkeeping requirements is to provide an adequate knowledge base of the radiological conditions of a facility to enable decommissioning planning. This information will serve to facilitate decommissioning by minimizing occupational exposure and reducing the risk of any public exposure. The purpose of decommissioning records is to keep and maintain information concerning contamination remaining from spills or other occurrences and to maintain up-to-date drawings of both (1) restricted areas where radioactive materials are used or stored and (2) inaccessible areas, such as buried pipes that could have been contacted by radioactive materials, so that this information can be used when planning for decommissioning.

REGULATORY REQUIREMENTS

The applicable regulations are 10 CFR 20.1501, 20.2101, 20.2108, 20.2110, 30.35(g), 30.51(c)(1), 40.36(f), 40.61(c)(1), 70.25(g), 70.52(i)(1), and 72.30(f).

3.1.1 METHODS FOR IMPLEMENTING RECORDKEEPING REQUIREMENTS

GENERAL

1. The location of decommissioning records must be clearly identified and designated to contain records and information important to safe decommissioning.
2. Information related to decommissioning need not be submitted to the NRC as it is collected and filed, but the necessary documents must be maintained in appropriate files and be available for inspection upon request by the NRC.
3. Pertinent documents such as licensee operating procedures and incident reporting requirements should specify the type of information to be kept and the means for retention and updating of the records.
4. Records may be originals, copies, or clear and specific references to documents in other files. Computerized records systems may be used provided the other provisions of this guidance (e.g., provisions for retrievability and protection against damage) are followed.
5. The records must be protected against tampering and loss (e.g., fire, theft, or misplacement). The records should be updated as necessary, at least annually, to include pertinent new information such as recent unusual occurrences or facility modifications.
6. There should be provisions for efficient retrieval of the records at the time of decommissioning so that the records can be used as part of decommissioning planning.
7. Licensee operating procedures should contain a clear definition of responsibility for collection, retention, maintenance, updating, and recall of the decommissioning records.
8. Decommissioning records should be reviewed by licensee management, at least annually, to ensure their completeness and ability to serve their intended function.

REFERENCES TO OTHER RECORDS

The regulations in 10 CFR 30.35(g), 40.36(f), 70.25(g), and 72.30(f) indicate that, if records of information relevant to decommissioning are kept for other purposes, reference to those records and their locations may be substituted. If reference is made to other records, the following should be considered:

1. There must be an entry in the decommissioning records referring to the other record. The reference should be clear and specific, providing at least a one-sentence description of the subject and providing the referenced file location.
2. The licensee's procedures should contain provisions to avoid loss of the information in the original document in the referenced file in case that file is destroyed before the license is terminated, for example, by cross-referencing the original document or its file to the decommissioning records. Records that are referenced but not included in the decommissioning records themselves should be so labeled and marked not to be removed or destroyed without approval by the individual responsible for maintaining decommissioning records.

3. It is acceptable to reference reports made under other regulatory requirements concerning spills. However, the record for decommissioning purposes should specifically consider the contaminant levels remaining after any cleanup activities.

3.1.2 CONTENT OF DECOMMISSIONING RECORDS FILE

1. The regulation in 10 CFR 20.1501(a) requires each licensee to make or cause to be made, surveys of areas, including the subsurface, that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels, and concentrations or quantities of residual radioactivity, and the potential radiological hazards of the radiation levels and residual radioactivity detected. The regulation in 10 CFR 20.1501(b) requires records from surveys describing the location and amount of subsurface residual radioactivity identified at the site to be kept with records important for decommissioning.
2. The regulations in 10 CFR 30.35(g)(1), 40.36(f)(1), 70.25(g)(1), and 72.30(f)(1) state that records are to be kept of spills and other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site; that the records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants have spread to inaccessible areas, as in the case of possible seepage into porous material such as concrete; and that the records must include any known information on involved nuclides, quantities, forms, and concentrations.

– The records should contain a description of the spill or occurrence (including the date), cleanup activities taken, and the location of the remaining contamination. Inaccessible areas would be areas beyond those normally encountered in operations, such as cracks in concrete, seepage into porous material such as concrete, wood, or tile, seepage into equipment and components, or areas behind, below, or obstructed by equipment or structures. The records should contain sketches, diagrams, or drawings marked to show areas of contamination and points where radionuclide and radiation measurements were made.

– The records should contain information related to site characterization, including information on radiological spills on the site, residual soil contamination levels, principal contaminant radionuclides, onsite locations that may have been used for burial of radioactive materials, and any problems with the hydrology and geology if the site contained or still contains settling ponds, lagoons, or other potential sources of ground water contamination.

– As noted above, the records are to clearly indicate the specific radionuclides involved and the locations, quantity, form, and concentration of the radionuclide contamination, where known, and the basis for this information.

– Records on contamination that could contribute to exposure or impact decommissioning methods, costs, or radiation exposures should be included in the record file.

3. The regulations in 10 CFR 30.35(g)(2), 40.36(f)(2), 70.25(g)(2), and 72.30(f)(2) state that decommissioning records must include as-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used or stored and locations of possible inaccessible contamination. Normal facility as-built drawings are acceptable. If the

records reference other required drawings, each relevant document need not be indexed individually. If drawings are not available, appropriate records of available information concerning these areas and locations are to be substituted.

- Drawings of restricted areas where radioactive materials are used or stored should include drawings showing the location of structures, systems, equipment, and components in restricted areas as defined in 10 CFR 20.1003.
- Drawings of areas of possible inaccessible contamination should include buried pipes or other areas obstructed by equipment or structures.
- If other drawings are referenced, it is sufficient to reference the general category of drawings being referenced (for example, drawings of a particular laboratory location or facility structure or equipment) and the specific location where those drawings are kept (for example, the facility's specific file number).
- If drawings are unavailable, appropriate records of available information may be substituted, including written descriptions of particular areas, recent sketches, or photographs.
- Drawings should be maintained and should be updated as systems, components, and structures are modified or added. Old or superseded drawings must be retained if they contain information relevant to potential locations of contamination.
- To ensure that previously used work sites are not forgotten if they are inactive when final decommissioning occurs, the records should include information on all locations where radioactive operations were ever performed during the life of the facility, including a list of what licensed materials were handled, a general description of the operations performed, and typical contamination and radiation levels during operations.
- To provide a baseline history of background radiation levels prior to work with radioactive materials, the records should include surveys and isotopic analyses of building materials and soil samples made prior to initial use of new facilities or existing facilities not previously used for work with radioactive materials. This information can be used to verify the actual contribution of licensee operations to contamination and radiation levels at decommissioning.

4. Except for radionuclides and materials excluded by regulations 10 CFR 30.35(g)(3), 40.36(f)(3), and 70.25(g)(3), a list of the following must be maintained and updated every 2 years:

- all areas designated and formerly designated as restricted (under 10 CFR 20.1003);
- all areas outside of restricted areas that require documentation (under 10 CFR 30.35(g)(1), 40.36(f)(1), 70.25(g)(1), and 72.30(f)(1) respectively);
- all areas outside of restricted areas where wastes have been buried as documented under 10 CFR 20.2108, "Records of Waste Disposal"
- all areas outside of restricted areas that contain material, which if the license expired, would require remediation to meet the criteria in 10 CFR Part 20, Subpart E, or application for disposal under 10 CFR 20.2002

5. The regulations in 10 CFR 30.35(g)(4), 40.36(f)(4), 70.25(g)(4), and 72.30(f)(4) state that decommissioning records must include records of the cost of decommissioning. These records must include the prescribed amount of financial assurance provided (referred to in

the regulation as "the amount certified for decommissioning"), or the cost estimate performed for the decommissioning funding plan (DFP), as applicable. Additionally, records of the funding method used to provide financial assurance must be maintained.

3.1.3 SPECIFIC RECORDKEEPING REQUIREMENTS FOR DISPOSAL OF RADIOACTIVE WASTE BY LAND BURIAL UNDER FORMER 10 CFR 20.302, 20.304, AND CURRENT 20.2002

Onsite burials under 10 CFR 20.2002 (revision to the former 10 CFR 20.302) and under the former 10 CFR 20.304 have been problematic for licensees during their decommissioning of sites containing such burials. For some of these previous burials, it has been necessary to exhume material and dispose of it offsite, even though the material was originally disposed of in accordance with existing regulations. Based on this experience, NRC regulations require licensees to notify the NRC if they have burial sites that may require decommissioning (see Section 2.4) and also to maintain records of these burials.

At the time of decommissioning, completed records of 10 CFR 20.304, 20.302, and 20.2002 disposals are necessary for the NRC to evaluate the acceptability of the disposals. Each licensee is required per 10 CFR 20.2108 to maintain records of disposals made under 10 CFR 20.2002 and to preserve such records until the Commission terminates the license requiring these records. Former 10 CFR 20.401(c)(3) stated that records of disposals made pursuant to 10 CFR 20.302 and 10 CFR 20.304 must be maintained until the Commission authorizes their disposition. In addition, the final rule on "Decommissioning Recordkeeping and License Termination" (58 FR 39628; July 26, 1993) requires a single document listing (1) all areas outside restricted areas where current and previous wastes have been buried (as documented under 10 CFR 20.2108); and (2) other information necessary to ensure that decommissioning is carried out in accordance with the Commission's regulations.

At present, 10 CFR 20.2002 states that the licensee must apply to the Commission for approval of proposed procedures to dispose of licensed material in a manner not otherwise authorized in 10 CFR Part 20. The former NRC regulations also required this. After the NRC approves the application, records of actual disposals must be maintained under 10 CFR 20.2108. These records should be sufficient to demonstrate compliance with the approved procedures contained in the application.

Pursuant to the former 10 CFR 20.401 requirements, the records of disposals performed under former 10 CFR 20.304 were required. The following requirements were placed on burials made under 10 CFR 20.304:

1. The total quantity of licensed and other radioactive material buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in Appendix C, "Quantities of Licensed Material Requiring Labeling," to 10 CFR Part 20.
2. The burial is at a minimum depth of 1.2 meters (4 feet).
3. Successive burials are separated by distances of at least 1.8 meters (6 feet) and not more than 12 burials are made in any year.

The NRC expects that licensees who disposed of radioactive waste in accordance with 10 CFR 20.304, 20.302, and 20.2002 will comply with the applicable recordkeeping requirements. Further, if the NRC determines that the licensee has not kept the minimum records required for disposals that may pose a significant risk to the public after release, the licensee may then be expected to characterize the disposal sites by compiling the necessary information (e.g., sampling and survey data). The acceptability of the timing and extent of characterization will be determined by NRC on a case-by-case basis.

3.2 RECORDKEEPING INFORMATION FOR DECOMMISSIONING PLANS

Volume 1 of this NUREG series contains NRC guidance on developing and reviewing DPs. Specifically, Chapter 16 of Volume 1 details the site description portion of DPs. The records maintained in accordance with NRC Regulations discussed in this volume should be used in the licensee's development of the site description as well as the facility operating history, the facility description, and the radiological status of the facility. Refer to Volume 1 of this NUREG series for specific guidance in this regard.

3.3 RECORD DISPOSITION REQUIREMENTS AT LICENSE TERMINATION OR TRANSFER

This section provides guidance on the NRC's recordkeeping requirements for licensees at license termination or during license transfer. The purpose of these requirements is to ensure that records important to decommissioning remain available in the event that safety concerns arise after license termination or transfer. Since the NRC may not be able to determine what problems will arise in the future, the best course of action is to have the records available after license transfer or termination.

REGULATORY REQUIREMENTS

The applicable regulations are 10 CFR 30.35(g), 30.36, 30.51, 40.36(f), 40.42, 40.61, 70.25(g), 72.30(f), 70.38, 70.51, and 72.54.

RECORD DISPOSITION

In addition to maintaining records important to facility decommissioning, licensees are also required to ensure that such records are not lost at license transfer or termination.

When a license is transferred, the records kept in accordance with Section 3.1 of this volume must be transferred to the new licensee. Before the NRC consents to a license transfer, the licensee is responsible for ensuring that the appropriate records have been transferred in accordance with NRC regulations.

Before the NRC terminates a license, a licensee should transfer all records kept in accordance with Section 3.1 of this volume to the appropriate NRC Regional Office. The NRC staff is

responsible for verifying that all of these records were received, before termination of the NRC license.

3.4 RECORD RETENTION REQUIREMENTS FOR NRC STAFF

INTRODUCTION

The decommissioning process can generate a considerable amount of records, particularly in conducting a final status survey (FSS). This section provides general record retention guidance for the NRC staff responsible for project management of facilities undergoing decommissioning. The guidance is not meant to capture the totality of NRC staff requirements for record retention and document control. Refer to NUREG-0910, Revision 4, "NRC Comprehensive Records Disposition Schedule," issued March 2005, for detailed record retention guidelines. This section provides an overview of the records that, at a minimum, the NRC project manager should ensure are retained in the NRC's official records management system. Note that additional information in this regard can be obtained from the NRC's Office of Federal and State Materials and Environmental Management Programs (FSME), Records Management Liaison.

This volume does not contain staff requirements on electronic document maintenance. Because this is an evolving area, such guidance would become outdated with technological improvements and process changes and is therefore not appropriate for this consolidated guidance document. Additional information on electronic document submittal may be found at the NRC's Web site <http://www.nrc.gov>.

DOCUMENTS TO RETAIN

The NRC project manager should ensure, at a minimum, that the following records are retained for decommissioned facilities:

- all license applications, amendment requests, and renewal requests;
- complete license, including all amendments;
- any licensee request for license termination and all supporting documentation, including plans for completion of decommissioning;
- forms dealing with disposition of material (NRC/AEC Form 314, AEC Form HQ-277, and other forms) and/or letters from licensees dealing with disposition and status of material;
- any documents dealing with the disposition of waste or other material or residual contamination on the site, including records of onsite burials;
- all documents related to financial assurance for decommissioning, including DFPs, certifications of financial assurance for decommissioning, related cost estimates, and records of funding methods;
- records of spills and other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site;

- as-built drawings and modifications of structures and equipment in restricted areas where radioactive materials were used or stored and locations of possible inaccessible contamination;
- any additional documents that refer to decommissioning, decontamination, or termination of the license, including interim or partial decommissioning of specific facilities at any time during the history of licensed operations;
- any enforcement documents related to decommissioning and decontamination activities;
- a copy of the final status survey plan (FSSP) and DP, if required;
- FSSR from the licensee, which should include the following:
  - summary measurements for each survey unit in the FSS,
  - elevated area ("hot-spot") evaluations,
  - survey instrument description and calibration records,
  - records of data reductions and comparisons with guidelines, and
  - the results of any investigations to determine the cause of the failure to meet the decommissioning criteria;
- results of site inspections, meeting reports, and correspondence;
- results of closeout surveys and inspections, including split sample collection and evaluation and independent verification reports; and
- any other records provided by the licensee at termination in accordance with the preceding section of this volume.

PART II: FINANCIAL ASSURANCE

4. FINANCIAL ASSURANCE OVERVIEW

NRC regulations at 10 CFR 30.35, 40.36, 70.25, and 72.30 specify the requirements for certain licensees to provide financial assurance for decommissioning. The requirement to provide financial assurance is based on the authorized possession limits specified in the NRC license. In general, above a threshold quantity of radioactive material, the licensee must provide increasing amounts of financial assurance as its authorized possession limit increases. Financial assurance may be provided in certain prescribed amounts where the authorized possession limit falls within specified bounds and no significant subsurface contamination has occurred. The threshold quantities and specified bounds are listed in Appendix A.2. Such licensees must provide the NRC with a certification of financial assurance and the original financial instruments obtained to guarantee that funds will be available for decommissioning. A licensee with authorized possession limits within the specified bounds but with significant subsurface contamination or a licensee with authorized possession limits greater than the upper bound of the prescribed amounts must perform a site-specific cost estimate to determine the amount of financial assurance required. Such licensees must provide the NRC with a DFP, which includes the original financial instruments and a certification of financial assurance. Licensees under 10 CFR Part 72 must submit a DFP and are not required to submit the originals of the financial instruments but are required to submit a certification of financial assurance. If certain information in the financial instrument (licensee's name, license number, and docket number; and the name, address, and other contact information of the issuer, and, if a trust is used, the trustee) changes, licensees must, within 30 days, submit financial instruments reflecting such changes. This information is typically presented to the NRC for review and approval in the license application or renewal. The information in the DFP is updated periodically to reflect changes in the cost of decommissioning. Additionally, if a survey required under 10 CFR 20.1501(a) detects residual radioactivity at a site at levels that would, if left uncorrected, prevent the site from meeting 10 CFR 20.1402 "Radiological Criteria for Unrestricted Use," then the licensee must submit an updated DFP within one year of when the survey is complete. Later, the information is updated in the DP.

A certification of financial assurance is a statement by the licensee that a prescribed amount of funding has been obtained for decommissioning. The amount is established in NRC regulations and is summarized in the introduction to Appendix A to this volume.

A DFP outlines the work required to decommission a facility, provides a site-specific cost estimate for the decommissioning, and states that the funds necessary to complete the decommissioning have been obtained. During operations, residual radioactivity that would be significant for decommissioning planning would be a quantity of radioactive material that would later require remediation during decommissioning to meet the unrestricted use criteria of 10 CFR20.1402. The cost estimate must provide for decommissioning the facility to allow unrestricted release, unless the applicant or licensee can demonstrate its ability to meet the provisions of 10 CFR 20.1403, "Criteria for License Termination under Restricted Conditions," in which case the cost estimate may be based on meeting the criteria of that section. The estimate must assume that the work will be performed by an independent third-party contractor and should not take credit for salvage value or reduced taxes. However, for certain sites where the licensee provides a viable alternative approach, or alternative basis for the cost estimate, the

DFP may be approved if the approach provides sufficient assurance of funding for decommissioning.

The objective of the NRC's financial assurance requirements is to ensure that a suitable mechanism for financing the decommissioning of licensed facilities is in place in the event that a licensee is unable or unwilling to complete decommissioning. Financial assurance is achieved through the use of financial instruments. Some financial instruments provide a special account into which the licensee may essentially prepay the applicable costs. Other financial instruments guarantee funding by a suitably qualified third party, thereby providing "defense in depth" in the event the licensee is unable or unwilling to pay these costs when they arise. Financial assurance for decommissioning must be obtained prior to the commencement of licensed activities or receipt of licensed material, and it must be maintained until termination of the license. If the license is being terminated under restricted conditions, then financial assurance for site control and maintenance must be obtained prior to license termination. The amount of financial assurance obtained is often based on a site-specific cost estimate and must be increased if the cost estimate increases. Under NRC regulations, a number of different types of financial instruments may be used to demonstrate financial assurance, including trusts, letters of credit, surety bonds, and guarantees.

This chapter provides guidance to NRC licensees and license applicants on how to demonstrate financial assurance for decommissioning and, if applicable, for site control and maintenance following license termination. It also addresses the financial assurance requirements that apply when the license will be terminated for unrestricted release and when the license will be terminated under restricted conditions. Appendix A establishes a standard format for presenting the information to the NRC that will (1) aid the licensee or license applicant in ensuring that the information is complete, (2) help ensure that applicable requirements in 10 CFR Parts 30, 40, 70, and 72 have been met, and (3) help achieve the intent of the regulations, which is to ensure that the decommissioning of all licensed facilities will be accomplished in a safe and timely manner and that licensees will provide adequate funds to cover all costs associated with decommissioning and, if applicable, with site control and maintenance.

Unlike other materials licensees, 10 CFR Part 72 licensees are not required to submit originals of the financial instruments used to provide financial assurance. Part 72 licensees are encouraged to use the instrument templates described in this guidance. Financial assurance for Part 72 licenses is administered by the NRC's Office of Nuclear Reactor Regulation (NRR) in conjunction with financial assurance for the associated reactor. For Part 72 licenses that are not associated with a reactor, the Division of Spent Fuel Storage and Transportation in the Office of Nuclear Material Safety and Safeguards (NMSS) has the project lead and may request assistance from NRR or FSME staff for performing the financial assurance review.

This volume does not address the financial assurance requirements in 10 CFR Part 50.

This volume applies only to licensees and license applicants covered under the following parts of 10 CFR:

- Part 30—Byproduct Material. Financial assurance requirements are in 10 CFR 30.35, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 30.36.
- Part 40—Source Material (except uranium recovery facilities). Financial assurance requirements appear in 10 CFR 40.36, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 40.42, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- Part 70—Special Nuclear Material. Financial assurance requirements are in 10 CFR 70.25, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 70.38, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- Part 72—Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste. Financial assurance requirements are in 10 CFR 72.30, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 72.54, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- Part 20 (Subpart E)—License Termination. Financial assurance requirements appear in 10 CFR 20.1403.

Other documents also address the decommissioning financial assurance requirements. Guidance on uranium recovery facilities under 10 CFR Part 40 is provided in the Branch Technical Position titled "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities," (issued October 1988). Information on low-level waste disposal facilities under 10 CFR Part 61 is provided in Revision 1 of NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," (issued 1988), and Revision 3 of NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," (issued 1994).

The information in this volume is taken directly from the Standard Review Plan (SRP) (NUREG-1727). The SRP was developed specifically for reviewing DPs written to comply with the LTR. There has been some minor editing to remove redundancy and use consistent terminology in this document, but the essential information is the same. The difference in writing styles between the documents is because of different objectives and different authors for the documents. While there is some difference in writing style, this approach was the most efficient means to capture the contents of the SRP, which was finalized after significant public comment.

The financial assurance demonstrations discussed below are independent of the cost-benefit analysis required as part of the demonstration that residual radioactivity has been reduced to a level that is as low as reasonably achievable (ALARA). Appendix N of Volume 2 of this NUREG report includes guidance on preparing and reviewing the cost-benefit calculation for the ALARA analysis.

Note that throughout the remainder of this section, the term "licensee" is used generally to refer to licensees, applicants, and other responsible parties.

FINANCIAL ASSURANCE DEMONSTRATIONS REQUIRED AT LICENSE APPLICATION OR RENEWAL

At the time of license application or renewal, licensees who are authorized to possess nuclear material in excess of certain thresholds specified in 10 CFR Parts 30, 40, or 70 must submit a certification to demonstrate that sufficient assurance is in place to cover prescribed amounts (as specified in 10 CFR 30.35(b)(2), 30.35(c)(2), 40.36(b)(2), 40.36(c)(2), 70.25(b)(2), 70.25(c)(2), or 70.25(c)(3)).

Licensees having possession limits exceeding the upper bonds of the prescribed amounts must provide a certification of financial assurance to demonstrate that the dollar amount of the financial assurance provided is sufficient to cover the cost estimate for decommissioning (as specified in 10 CFR 30.35(c)(2), 30.35(e), 40.36(c)(2), 40.36(d), 70.25(c)(2), 70.25(c)(3), 72.25(e), or 72.30(b)(6)).

The amount of financial assurance certified must be either the prescribed amount specified in the NRC regulations or the amount of the cost estimate provided in the DFP. (Licensees under 10 CFR Part 72 cannot submit a prescribed amount of financial assurance; they must submit a DFP.)

- A DFP is based on a site-specific cost estimate for decommissioning.
- A certification of financial assurance relies on coverage levels specified in NRC regulations.

Licensees may choose among a number of different mechanisms to comply with the financial assurance requirements for decommissioning. The following financial assurance "methods" are specifically allowed under 10 CFR Parts 30, 40, 70, and 72:

- *Prepayment*. Under this method, the licensee provides advance decommissioning funding in full, using an account segregated from licensee assets and outside the licensee's administrative control. An acceptable prepayment mechanism is a trust fund.
- *Surety, insurance, or guarantee*. Under this method, an entity with adequate financial strength (e.g., bank, insurer, or other financial institution) guarantees that the required amount of funds will be available whenever needed. Acceptable surety, insurance, or guarantee mechanisms include surety bonds, letters of credit, insurance policies, parent company guarantees, and self-guarantees.
- *External sinking fund*. This method allows a licensee to gradually prepay for decommissioning by combining the use of a partially funded prepayment instrument (i.e., a trust fund) with a surety bond, a letter of credit, parent company guarantee or self-guarantee, or insurance covering the unfunded balance.

- *Statement of intent*. This method is a commitment by a Federal, State, or local government licensee to request and obtain decommissioning funds from its funding body, when necessary. A statement of intent needs to state the estimated cost of decommissioning, as required in NRC regulations, as well as a demonstration that the party signing the statement has the authority to make such a statement on behalf of the government. The signatory should be the head of the agency or the designee.

Licensees may also use combinations of the above instruments, except in the case of parent company guarantees and self-guarantees, which cannot be combined with other mechanisms except sinking funds. Note that a DFP must contain a certification of financial assurance. The licensee must include a signed original (or signed duplicate original) of the financial mechanism(s) obtained to satisfy the requirements for decommissioning, whether using a certification of financial assurance alone or a DFP. If certain information in the financial instrument (licensee's name, license number, and docket number, and the name, address, and other contact information of the issuer, and, if a trust is used, the trustee) changes, the licensee must, within 30 days, submit financial instruments reflecting such changes.

Note that 10 CFR Part 72 has different requirements. Part 72 licensees must submit a certification of financial assurance. Licensees providing financial assurance under Part 72 are not required to submit originals of the financial instruments obtained to satisfy financial assurance requirements.

FINANCIAL ASSURANCE DEMONSTRATIONS REQUIRED AT THE END OF LICENSED OPERATIONS

At the end of licensed operations, licensees must maintain all financial assurance established pursuant to 10 CFR Parts 30, 40, 70, or 72. In addition, licensees must submit a DP (1) if such a plan is required by a license condition, or (2) if the procedures and activities necessary to carry out decommissioning (and, if applicable, site control and maintenance) have not been approved by NRC and these procedures could increase the potential health and safety impacts to workers or the public.

A DP must include the following:

- an updated, detailed cost estimate for decommissioning;
- a comparison of that estimate with present funds set aside for decommissioning; and
- a plan for assuring the availability of adequate funds for completion of decommissioning.

If the license is being terminated under unrestricted conditions, the licensees may choose among the mechanisms listed above to comply with the financial assurance requirements for decommissioning.

If the license is being terminated under restricted conditions, the DP also must include estimated costs for control and maintenance of the site, along with financial assurance coverage for these costs. In addition to the cost estimate and financial assurance mechanism(s), the financial

assurance demonstration in a DP should contain a description of the means the licensee will employ for adjusting the cost estimate and associated funding level over any storage or surveillance period. Acceptable financial assurance for a restricted release site may be demonstrated either by a trust fund segregated from the licensee's assets and outside the licensee's administrative control or through special arrangements with a government entity that assumes custody and ownership of the site.

NRC staff will evaluate the decommissioning financial assurance demonstrations submitted by licensees pursuant to the requirements in 10 CFR Parts 30, 40, 70, and 72. NRC staff will evaluate the licensee's financial assurance demonstration to ensure that sufficient funds will be available to carry out decommissioning activities and site control and maintenance (if applicable) in a safe and timely manner. The demonstrations must include the following information:

- for a DFP, (1) a site-specific cost estimate for decommissioning, (2) a description of the means for adjusting the cost estimate and associated funding level periodically over the life of the facility, (3) a certification of financial assurance by the licensee that financial assurance has been provided in the amount of the cost estimate, and (4) one or more financial assurance mechanisms (including supporting documentation) (note that 10 CFR Part 72 licensees are not required to submit the certification of financial assurance of the third item or the mechanisms of the fourth item with the DFP);
- for a certification of financial assurance, (1) a "certification of financial assurance" (which certifies that the licensee has provided financial assurance in the appropriate amount specified in 10 CFR Parts 30, 40, 70, or 72), and (2) one or more financial assurance mechanisms (including supporting documentation); and
- for a DP, (1) an updated, detailed cost estimate for decommissioning and, if the license is being terminated under restricted conditions, for control and maintenance of the site following license termination, (2) one or more financial assurance mechanisms (including supporting documentation), (3) a comparison of the cost estimate with the present funds set aside for decommissioning and, if the license is being terminated under restricted conditions, for control and maintenance of the site following license termination, and (4) a plan for assuring the availability of adequate funds for completion of decommissioning.

NRC staff will review the financial assurance demonstration submitted by the licensee in accordance with the procedures outlined in this volume. NRC staff will ensure that, at a minimum, the financial assurance submission includes the information summarized above in addition to the following:

- For a licensee submitting a DFP at the time of license application or renewal, the NRC staff will review the following:
  - the accuracy and appropriateness of the methods used by the licensee to estimate the costs of decommissioning;
  - the acceptability of the licensee's submitted financial assurance mechanism(s) for decommissioning; and

  - the means identified in the DFP for adjusting the cost estimate and associated funding level over the life of the facility.

- For a licensee submitting a certification of financial assurance at the time of license application or renewal, the NRC staff will review the following:
  - the certification of financial assurance, to ensure that it certifies compliance with the appropriate requirements and that it specifies the correct amount of financial assurance; and
  - the acceptability of the licensee's submitted financial assurance mechanism(s).
- For a licensee submitting a DP at the end of licensed operations, the NRC staff will review the following:
  - the accuracy and appropriateness of the methods used by the licensee to estimate the costs of decommissioning and, if the license is being terminated under restricted conditions, the costs of site control and maintenance;
  - the acceptability of the licensee's submitted financial assurance mechanism(s) for decommissioning and, if the license is being terminated under restricted conditions, for site control and maintenance; and
  - the means identified in the DP for adjusting the cost estimate and associated funding level over any storage or surveillance period.

The material to be reviewed by the NRC staff is technical in nature. NRC staff will make a quantitative evaluation of the licensee's or responsible party's cost estimate or prescribed amount and financial assurance mechanism(s).

If the licensee has provided adequate financial assurance for decommissioning, the NRC staff will prepare a letter for the signature of the license reviewer, informing the licensee that the financial assurance for decommissioning is adequate. A sample post-review letter from the NRC to licensees for cases where no deficiencies are found in the submittal is provided at the end of this section. If the NRC staff determines that the licensee has not complied with the NRC's requirements for financial assurance for decommissioning, the staff will prepare a deficiency letter for signature at the Branch Chief level or higher outlining these deficiencies and requiring the licensee to respond within a brief period (e.g., 30 to 60 days) to provide financial assurance. No existing financial assurance will be canceled and returned to the licensee until the NRC has received adequate assurance. It is important to maintain control and security of the financial instruments once received by the NRC.

The staff will follow NRC Management Directive 8.12, "Decommissioning Financial Assurance Instrument Security Program," to ensure security and control of the instrument. In the event a licensee defaults before completing the decommissioning, the management directive specifies procedures for acting on the instrument. Additional guidance is found in Chapters 5 and 6 of this volume.

HOW TO USE CHAPTER 4

Chapter 4 is organized around the various components of a financial assurance demonstration (e.g., the cost estimate, the financial instrument). Each component of a financial assurance demonstration is addressed briefly in this introduction and then is addressed again in greater detail in its own section. Each subsequent section provides narrative guidance on a particular component and contains one or more checklists to guide the reader. By completing the tasks on the checklists, a licensee can be sure that its financial assurance demonstration is complete and likely to be acceptable to the NRC.

Licensees should read this chapter in its entirety. This chapter directs licensees to Checklist 1 in Section A.1, which directs the reader to other relevant sections and checklists in Appendix A of this volume. To prepare a financial assurance demonstration that is likely to be acceptable to the NRC, a licensee should simply complete the following steps:

1. Complete Checklist 1 in Appendix A.
2. Complete applicable checklists called for by Checklist 1 in Appendix A.
3. Prepare any documentation called for in the completed checklists.
4. Submit the completed checklists and accompanying documentation to NRC for review and approval.

SAMPLE POST-REVIEW LETTER FROM NRC TO LICENSEES

(No Deficiencies in Submittal)

(**NOTE:** *Letters will be printed on NRC letterhead paper.*)

[*Date*]
[*Names of licensee representative*]
[*Title*]
[*Names of a licensee*]
[*Address*]

SUBJECT: DECOMMISSIONING FINANCIAL ASSURANCE

Dear [*insert "Dr.," "Mr.," or "Ms."*] [*insert last name of licensee representative*]:

We have reviewed your [*insert description of information submitted by the licensee (e.g., decommissioning funding plan, certification of financial assurance, cost estimate, financial assurance mechanism)*] dated [*insert date*]. Based on our review, we have no further comments at this time.

If you have any questions, you may contact us at [*insert telephone number*].

Sincerely,

[*Name of NRC representative*]
[*Branch*]

License No. [*insert all applicable NRC license numbers*]
Docket No. [*insert all applicable NRC docket numbers*]

4.1 COST ESTIMATE (AS CONTAINED IN A DECOMMISSIONING FUNDING PLAN OR DECOMMISSIONING PLAN)

The purpose of the review of the cost estimate is to ensure that the licensee or responsible party has developed a cost estimate for decommissioning the facility based on documented and reasonable assumptions and that the estimated cost is sufficient to allow an independent third party to assume responsibility for decommissioning the facility if the licensee or responsible party is unable to complete the decommissioning. In addition, if the licensee or responsible party intends to request license termination under restricted conditions, the cost estimate must be sufficient to allow an independent third party to assume responsibility for all necessary control and maintenance activities at the site.

INFORMATION TO BE SUBMITTED

The information supplied by the licensee or responsible party should be sufficient to allow the NRC staff to determine if the cost estimates for decommissioning and site control and maintenance (if applicable) are reasonable and were developed in accordance with NRC regulations and guidance. NRC staff's review should verify that the cost estimates for decommissioning and site control and maintenance incorporate all of the information summarized under "Evaluation Criteria," below.

Section A.3 of Appendix A to this volume contains guidance—including cost estimating tables—to assist licensees in preparing cost estimates that will be acceptable to the NRC. The NRC staff should use this guidance to the extent necessary in reviewing cost estimates submitted by licensees.

EVALUATION CRITERIA

The information supplied by the licensee or responsible party should be sufficient to allow the NRC staff to determine if the licensee's cost estimate(s) is adequate by comparing the information presented in the decommissioning financial plan or decommissioning plan with applicable NRC regulations and guidance. A cost estimate for decommissioning and site control and maintenance (if applicable) is acceptable if it meets *all* of the conditions in this section.

Evaluation Criteria Applicable to All Cost Estimates for Unrestricted or Restricted Release

At minimum, all cost estimates for unrestricted or restricted release must meet all 10 of the following conditions:

(1) The cost estimate meets the applicable regulatory requirements in 10 CFR 20.1403(c), 20.1403(e)(2)(iii), 30.35(b), 30.35(c), 30.35(e), 30.36(e), 30.36(g)(4)(v), 40.36(b), 40.36(c), 40.36(d), 40.42(e), 40.42(g)(4)(v), 70.25(b), 70.25(c)(5), 70.25(e), 70.38(e), 70.38(g)(4)(v), 72.30(b), and 72.54(g)(5).

(2) The cost estimate is based on documented and reasonable assumptions. The key assumptions are identified and justified.

(3) The unit cost factors used in the cost estimate are reasonable and consistent with NRC cost estimation reference documents.

(4) The cost estimate is based on the cost of an independent contractor to perform all decommissioning activities.

(5) The cost estimate includes costs for labor, equipment and supplies, overhead and contractor profit, sampling and laboratory analysis, and miscellaneous expenses (e.g., license fees, insurance, and taxes).

(6) The cost estimate is based on the volume of *all* contaminated material, including, but not limited to, surface and subsurface soil material, buildings and building materials, and equipment containing residual radioactivity that will require remediation to meet the criteria for license termination.

(7) The cost estimate applies a contingency factor of at least 25 percent to the sum of all estimated costs.

(8) The means identified in the DFP or DP for adjusting the cost estimate and associated funding level over the life of the facility and any storage or surveillance period is adequate.

(9) The cost estimate reflects decommissioning under appropriate facility conditions (for a DFP, routine facility conditions should be assumed; for a DP, facility conditions at the end of licensed operations should be assumed).

(10) The cost estimate includes costs for all major decommissioning and site control and maintenance activities specified in Section A.3 of Appendix A to this volume, including (a) planning and preparation, (b) decontamination and/or dismantling of facility components, (c) packaging, shipment, and disposal of radioactive wastes, (d) a final radiation survey, (e) restoration of contaminated areas on facility grounds, if necessary, and (f) site stabilization and long-term surveillance, if necessary.

In addition to these criteria, the cost estimate should not take credit for (a) any salvage value that might be realized from the sale of potential assets during or after decommissioning or (b) reduced taxes that might result from payment of decommissioning costs or site control and maintenance costs.

Additional Evaluation Criteria Applicable to Cost Estimates for Restricted Release

In addition, cost estimates for restricted release must meet all six of the following conditions:

(1) The cost estimate for site control and maintenance is consistent with the amount of radioactivity remaining at the site, the radionuclides involved, the characteristics of the residual radioactivity at the site, and site-specific exposure scenarios, pathways, and parameters.

(2) The cost estimate for site control and maintenance includes all costs for enforcement of institutional controls, if needed, including activities related to physical barriers at the site (e.g., periodic inspection, surveys, control, maintenance) and maintenance/monitoring of deed restrictions or other institutional controls.

(3) The cost estimate for site control and maintenance accounts for the costs of establishing and implementing institutional controls, recordkeeping related to the controls, and corrective actions.

(4) The cost estimate for site maintenance includes adequate periods of site control and accounts for all associated costs during this period.

(5) The cost estimate for site control and maintenance assumes that all activities will be carried out to a level sufficient to prevent the annual dose to the average member of the critical group from exceeding 0.25 millisievert (mSv) (25 millirem (mrem)).

(6) The cost estimate required under 10 CFR 20.1403(e)(2) (if applicable) for site control and maintenance accounts for periodic checks and inspections of the site no less frequently than every 5 years by the party responsible for site control and maintenance.

SPECIFIC REVIEW PROCESS GUIDELINES

Before the site-specific cost estimate can be reviewed, the license reviewer or licensing project manager will review the cost estimate to verify that the contamination sources assumed in the cost estimate are reasonable, based on the license reviewer's or licensing project manager's knowledge of the site and site operations:

- If the contamination sources are reasonable, the license reviewer or licensing project manager may either conduct a technical review of the cost estimate or prepare a Technical Assistance Request (TAR) to the Deputy Director of the Decommissioning and Uranium Recovery Licensing Directorate (DURLD), for the review of the site-specific cost estimate by DURLD staff.
- If there are deficiencies in the assumed contamination sources, the license reviewer or licensing project manager will make a decision on whether there is sufficient information in the submittal to warrant a review of the cost estimate. For DURLD TARs, if there is sufficient information, the license reviewer or licensing project manager will prepare a note describing the source deficiencies so that DURLD staff comments appropriately consider this information.

The reviewer will provide a memorandum documenting the review of the cost estimate. If there are any deficiencies, the reviewer will provide specific comments for inclusion in a deficiency letter, which will be prepared by the licensing project manager.

SAMPLE EVALUATION FINDINGS

Documentation of the evaluation findings by the NRC staff should include the following:

> "NRC staff has reviewed the cost estimate[s] for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the cost estimate[s] submitted by the licensee [*adequately* **OR** *does not adequately*] reflect[s] the costs to carry out all required decommissioning activities prior to license termination [and, if the license is being

terminated under restricted conditions, to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site]."

4.2 PRESCRIBED AMOUNT

This section applies only to reviews of submissions that demonstrate financial assurance using one or more of the three prescribed amounts established in 10 CFR Parts 30, 40, and 70.

When a licensee proposes to use a prescribed amount of financial assurance, the purpose of the review of the certification of financial assurance is to ensure that, based on the licensed possession limits and the applicable quantities specified in 10 CFR 30.35(d), 40.36(b), or 70.25(d), the licensee is eligible to use a prescribed amount and, if eligible, that the prescribed amount is appropriate.

INFORMATION TO BE SUBMITTED

The information supplied by the licensee or responsible party should be sufficient to allow the NRC staff to determine if the certification of financial assurance was developed in accordance with NRC regulations and guidance. The NRC staff's review should verify that the certification of financial assurance satisfies all of the information summarized under "Evaluation Criteria," below.

In determining whether use of a prescribed amount is allowable and whether the prescribed amount is appropriate, the NRC staff will use the method outlined in 10 CFR 30.35, 40.36, and 70.25. Additional guidance on this method is contained in Appendix A to this volume. Appendix A also contains a table showing (for each isotope with a half-life greater than 120 days) the activity levels for which prescribed amounts of financial assurance are allowed under NRC regulations. The table also shows the prescribed amounts that are applicable to specific activity levels for each isotope.

Note that the prescribed amounts of financial assurance listed are current at the time of publication. Check the applicable parts of 10 CFR Parts 30, 40, and 70 for the most recent prescribed amounts.

The worksheet below can be used to help determine the total prescribed amount required for one or more licenses. In completing the worksheet, the preparer should enter the required prescribed amounts under all applicable parts of 10 CFR (i.e., Parts 30, 40, and 70) on the appropriate lines and add them to yield the total required prescribed amount.

Appendix A to this volume contains guidance—including recommended wording and checklists—to assist licensees in preparing certifications of financial assurance that will be acceptable to the NRC. The NRC staff should use this guidance to the extent necessary in reviewing certifications of financial assurance submitted by licensees.

EVALUATION CRITERIA

The information supplied by the licensee should be sufficient to allow the NRC staff to determine if the licensee's certification of financial assurance is adequate by comparing it with applicable NRC regulations and guidance. A certification of financial assurance is acceptable if it meets all four of the following conditions:

(1) Use of a prescribed amount of financial assurance is allowed, based on the licensed possession limits and the applicable quantities specified in 10 CFR 30.35(d), 40.36(b), or 70.25(d), and on the absence of subsurface contamination, as specified in 10 CFR 30.35(b), 40.36(b), or 70.25(b).

(2) Where the licensee is authorized to possess more than one radionuclide, the unity rule (as defined in Appendix B to Part 30) is applied to all radionuclides with half-life greater than 120 days.

(3) The prescribed amount is correct, based on the licensed possession limits and the applicable quantities specified in 10 CFR 30.35(d), 40.36(b), or 70.25(d). Figure 4.1 provides a worksheet for determining the required prescribed amount.

(4) The certification of financial assurance includes all necessary information, including the name of the licensee, the locations of the facilities for which financial assurance is provided, the amount and types of materials authorized for possession under the license, and the prescribed amount(s).

WORKSHEET FOR DETERMINING THE REQUIRED PRESCRIBED AMOUNT

Applicable Part of 10 CFR (Check all that apply):	☐ Part 30 ☐ Part 70	☐ Part 40
		Required Prescribed Amount ($)
Part 30 (Sealed Sources):		_____
Part 40:		_____
Part 70:		_____
Total of all prescribed amounts for all licenses:		_____

Figure 4.1 Worksheet for Determining the Required Prescribed Amount

SPECIFIC REVIEW PROCESS GUIDELINES

The license reviewer or licensing project manager will compare the wording of the certification of financial assurance to the recommended wording contained in Section A.2.4 of Appendix A to this volume. If the wording is identical, the certification of financial assurance is acceptable. If the wording is not identical, the license reviewer or licensing project manager will verify that the certification of financial assurance includes all necessary information, including the name of the licensee, the locations of the facilities for which financial assurance is provided, the amount and types of materials authorized for possession under the license, and the prescribed amount(s).

The reviewer will provide a memorandum documenting the review of the certification of financial assurance. If there are any deficiencies, the reviewer will provide specific comments for inclusion in a deficiency letter.

SAMPLE EVALUATION FINDINGS

Documentation of the evaluation findings by the NRC staff should include the following:

> "NRC staff has reviewed the certification of financial assurance for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the certification of financial assurance submitted by the licensee [*specifies or does not specify*] the appropriate information and level of financial assurance coverage."

Note that the introduction to Chapter 4 of this volume contains a sample post-review letter from NRC to licensees for cases where no deficiencies are found in the submittal.

4.3 FINANCIAL ASSURANCE MECHANISMS

The purpose of the review of the licensee's financial assurance mechanism is to ensure that sufficient funds will be available to carry out all required decommissioning activities prior to license termination and, if the license is being terminated under restricted conditions, to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.

INFORMATION REQUIREMENTS

The financial assurance mechanism supplied by the licensee or responsible party shall consist of one or more of the following instruments:

- trust fund,
- surety bond,
- letter of credit,
- insurance policy,
- parent company guarantee,
- self-guarantee,
- external sinking fund,
- statement of intent, or
- special arrangements with a government entity that assumes custody and ownership of the site.

Note that for DPs, external sinking funds may not be used to cover costs for site control and maintenance. Special arrangements with a government entity that assumes custody and ownership of the site may be used only if the license is being terminated under restricted conditions. Acceptable financial assurance for a restricted release site may be demonstrated either by a trust fund segregated from the licensee's assets and outside the licensee's administrative control or through special arrangements with a government entity that assumes custody and ownership of the site.

The NRC staff will verify that the financial assurance mechanism for decommissioning and site maintenance and control (if applicable) meets the criteria summarized under "Evaluation Criteria" below. Appendix A of this volume contains guidance—including recommended wording and checklists—to assist licensees in preparing financial mechanisms that will be acceptable to the NRC. The NRC staff should use this guidance to the extent necessary in reviewing financial mechanisms submitted by licensees.

EVALUATION CRITERIA

The NRC staff will verify that the financial assurance mechanism supplied by the licensee or responsible party meets the general requirements for all financial assurance mechanisms listed below *and* the applicable specific requirements listed in the following sections.

4.3.1 GENERAL CRITERIA APPLICABLE TO ALL FINANCIAL ASSURANCE MECHANISMS

- The financial assurance mechanism is an originally signed duplicate; and
- The wording of the financial assurance mechanism and supporting documents conforms to the model documents provided in Appendix A of this volume (e.g., for a trust fund, refer to the section on trust funds).
- If the wording and supporting documents do not conform exactly to the model documents in Appendix A, the NRC staff will follow the procedures outlined in Section 4.3.3.

4.3.2 SPECIFIC CRITERIA FOR FINANCIAL ASSURANCE MECHANISMS

4.3.2.1 TRUST FUNDS

In addition to the general criteria outlined in Section 4.3.1, a trust fund submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - trust agreement;
  - Schedule A;
  - Schedule B;
  - Schedule C;
  - specimen certificate of events;

- specimen certificate of resolution;
- letter of acknowledgment; and
- receipt or statement from the trustee showing the trust's current market value.

- The trustee is an appropriate Federal or State government agency or a financial institution that has the authority to act as trustee and whose trust operations are regulated and examined by a Federal or State agency. If the submission does not present evidence of the trustee's qualifications, the reviewer will evaluate the trustee's qualifications as follows:

  - The word "National" in the title of a financial institution signals that the institution is *Federally regulated*, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable trustee, the reviewer will access the Federal Financial Institutions Examination Council's (FFIEC's) Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

    Alternatively, the reviewer may contact the appropriate district office of the Office of the Comptroller of the Currency (OCC) and confirm that the institution (1) is Federally regulated *and* (2) has Federally regulated trust operations. The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>. As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:

    - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.
    - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.
    - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.
    - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

  - The word "State" in the title of a financial institution signals that the institution is State regulated. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable trustee, the reviewer will access the FFIEC's Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

    Alternatively, the reviewer may contact the applicable State banking authority and confirm that the institution (1) is State regulated *and* (2) has State-regulated trust operations.

  - The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated. This is also often true in the case of domestic branches of foreign banks.

- The licensee has not assumed any real rate of return on funds in the trust that apply to decommissioning.
- The licensee has not assumed a real (i.e., inflation-adjusted), after-tax rate of return greater than one percent per year on funds in the trust that apply to site control and maintenance.
- Under the appropriate assumptions regarding earnings on the trust, the current market value of the trust is sufficient to pay for all required activities. **Exception:** If the trust is being used in combination with another financial assurance mechanism(s), the value of the trust (accounting for earnings on prepaid funds for site control and maintenance activities, if applicable) must at least equal the difference between the cost estimate or prescribed amount and the sum of the coverages being provided by the other mechanism(s).
- The maximum withdrawal of funds at one time for a particular activity (i.e., decommissioning or site control/maintenance) is limited to 10 percent of the remaining funds available for that activity unless approval from the appropriate party (i.e., the NRC, or the party responsible for site control and maintenance) is attached.
- Schedule A to the trust agreement allows the trustee to access the full amount of coverage (using multiple withdrawals as necessary) to conduct all decommissioning and/or site control and maintenance activities. The amount shown in Schedule A must be at least as great as the licensee's cost estimate or prescribed amount.

4.3.2.2 SURETY BONDS

In addition to the general criteria outlined in Section 4.3.1, a surety bond submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - surety bond;
  - standby trust agreement and all supporting documentation (see Section 4.3.2.10); and
  - copy of broker/agent's power of attorney authorizing the broker/agent to issue bonds.
- The company issuing the surety bond is listed in the most recent edition of the U.S. Department of the Treasury's Circular 570, "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies," for the State where the surety bond was signed and has an underwriting limitation greater than or equal to the level of coverage specified in the bond. If evidence of the issuing company's qualifications is not provided in the submission, the reviewer will consult the most recent edition of Circular 570, which is published annually on approximately July 1 and is updated periodically in the *Federal Register*. (Circular 570 can also be found on the World Wide Web at <http://www.fms.treas.gov/c570/index.html>.)
- The surety bond is payable to a standby trust fund that meets all applicable NRC requirements, as discussed in the section on standby trust funds (Section 4.3.2.10).

- The broker/agent's power of attorney authorizes the broker or agent to issue bonds on behalf of the issuing company.
- The surety bond is in an amount that is at least as great as the licensee's cost estimate or prescribed amount—unless the surety bond is being used in combination with another financial assurance mechanism(s), in which case the amount of the surety bond must at least equal the difference between the cost estimate or prescribed amount and the sum of the coverages being provided by the other mechanism(s).
- No credit is taken for earnings on any financial assurance mechanism (e.g., a surety bond) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.3 LETTERS OF CREDIT

In addition to the general criteria outlined in Section 4.3.1, a letter of credit submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - letter of credit; and
  - standby trust agreement and all supporting documentation (see Section 4.3.2.10).
- The bank issuing the letter of credit is a financial institution whose operations are regulated and examined by a Federal or State agency. If the submission does not include evidence of the issuer's qualifications, the reviewer will verify the qualifications of the issuer as follows:
  - The word "National" in the title of a financial institution signals that the institution is *Federally regulated*, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable issuer of a letter of credit, the reviewer will access the Federal Deposit Insurance Corporation's (FDIC's) Institution Directory on the World Wide Web at <http://www2.fdic.gov/idasp/>.

    Alternatively, the reviewer may contact the appropriate district office of the Office of the Comptroller of the Currency OCC) and confirm that the institution is Federally regulated. The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>. As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:
    - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.
    - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.
    - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.
    - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

  - The word "State" in the title of a financial institution signals that the institution is State regulated. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable issuer of a letter of credit, the reviewer will access the FDIC's Institution Directory on the World Wide Web at < http://www2.fdic.gov/idasp/>.

    Alternatively, the reviewer may contact the applicable State banking authority and confirm that the institution is State regulated.
  - The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated. This is also often true in the case of domestic branches of foreign banks.

- The letter of credit is payable to a standby trust fund that meets all applicable NRC requirements, as discussed in the section on standby trust funds (Section 4.3.2.10).
- The letter of credit is in an amount that is at least as great as the licensee's cost estimate or prescribed amount—unless the letter of credit is being used in combination with another financial assurance mechanism(s), in which case the amount of the letter of credit must at least equal the difference between the cost estimate or prescribed amount and the sum of the coverages being provided by the other mechanism(s).
- No credit is taken for earnings on any financial assurance mechanism (e.g., a letter of credit) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.4 INSURANCE POLICIES

In addition to the general criteria outlined in Section 4.3.1, an insurance policy submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - insurance policy; and
  - standby trust agreement and all supporting documentation.
- The insurer is licensed by a State regulatory authority to transact business as an insurer in one or more U.S. States. If evidence of the insurer's qualifications is not provided in the submission, the NRC staff will contact the State insurance commission for the State in which the insurer is located, or the National Association of Insurance Commissioners (NAIC) at (816) 842-3600 or at <http://www.naic.org/cis/>, and confirm that the insurer is licensed by a State regulatory authority to transact business as an insurer in one or more U.S. States.
- The insurance policy is payable to a standby trust fund that meets all applicable NRC requirements, as discussed in the section on standby trust funds (Section 4.3.2.10).
- The insurance policy provides coverage in an amount that is at least as great as the licensee's cost estimate or prescribed amount—unless the insurance policy is being used in combination with another financial assurance mechanism(s), in which case the amount of the insurance must at least equal the difference between the cost estimate or prescribed amount and the sum of the coverages being provided by the other mechanism(s).

- No credit is taken for earnings on any financial assurance mechanism (e.g., an insurance policy) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.5 PARENT COMPANY GUARANTEES

In addition to the general criteria outlined in Section 4.3.1, a parent company guarantee submission that meets the following *additional* criteria will be acceptable to NRC:

- The following items have been included in the submission:
  - parent company guarantee agreement;
  - letter from chief executive officer (CEO) of licensee*;*
  - letter from chief financial officer (CFO) of parent company, including parent company guarantee financial test (Financial Test I or II);
  - auditor's special report confirming CFO letter and reconciling amounts in the CFO letter with parent company's financial statements;
  - parent company's audited financial statements for the most recent fiscal year, including the auditor's opinion on the financial statements; and
  - standby trust agreement and all supporting documentation.
- The parent company guarantor has majority control of the licensee's voting stock (greater than 50 percent), although the NRC may consider exceptions to this rule on a case-by-case basis. Evidence might include the guarantor's most recent Securities and Exchange Commission (SEC) Form SEC 10K or a certified corporate resolution certifying the direct parent relationship.
- The parent company guarantor meets one of the two financial tests specified in Appendix A, "Criteria Relating to Use of Financial Tests and Parent Company Guarantees for Providing Reasonable Assurance of Funds for Decommissioning," to 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material." Furthermore, the guarantor passes the financial test for *all* costs covered by a financial test, including (1) the parent company guarantee, (2) other NRC or Agreement State parent company guarantees or self-guarantees, and (3) parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., the U.S. Environmental Protection Agency (EPA)).
- The parent company guarantor's annual financial statements have received a "clean" opinion from an independent certified public accountant. The accountant's opinion must state that the financial statements fairly and unconditionally present the firm's financial condition in accordance with generally accepted accounting principles. If an accountant's opinion is an adverse opinion, a disclaimer of opinion, or an opinion that raises "going concern" issues, the NRC staff will not allow the use of a parent company guarantee. NRC staff will evaluate other types of accountant's opinions on a case-by-case basis in the context of the guarantor's financial statements so that the reviewer can determine the implications for the accuracy of the financial test. If the NRC staff cannot make a decision because the information in the opinion or the financial statements is insufficient, it will require that the guarantor submit

additional information. If the matter is still unresolved, NRC staff will request assistance from its legal counsel. If there is any doubt about the qualifications of the guarantor's independent certified public accountant, the NRC staff will verify the accountant's credentials by contacting the State Board of Accountancy in the accountant's State.

- A parent company guarantee may not be used in combination with any other financial assurance methods, except an external sinking fund. However, an external sinking fund cannot be used as financial assurance for site control and maintenance.
- The standby trust fund submitted with the parent company guarantee must meet all applicable NRC requirements, as discussed in the section on standby trust funds (Section 4.3.2.10).
- The parent company guarantee is in an amount that is at least as great as the amount of decommissioning funds being assured by a parent company guarantee for the total of all nuclear facilities or parts thereof (or prescribed amount if a certification is used).
- No credit is taken for earnings on any financial assurance mechanism (e.g., a parent company guarantee) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.6 SELF-GUARANTEES

In addition to the general criteria outlined in Section 4.3.1, a self-guarantee submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - self-guarantee agreement;
  - letter from CEO or CFO of licensee, including applicable self-guarantee financial test;
  - auditor's special report confirming CEO or CFO letter and reconciling amounts in the CEO or CFO letter with licensee's financial statements; and
  - licensee's audited financial statements for the most recent fiscal year, including the auditor's opinion on the financial statements.
- The licensee does *not* have a parent company holding majority control of its voting stock (greater than 50 percent).
- The licensee meets the applicable financial test specified in Appendix C, D, or E to 10 CFR Part 30. Furthermore, the licensee passes the financial test for *all* costs covered by a financial test, including (1) the self-guarantee, (2) other NRC or Agreement State parent company guarantees or self-guarantees, and (3) parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., EPA).
- The licensee's annual financial statements have received a "clean" opinion from an independent certified public accountant. The accountant's opinion must state that the financial statements fairly and unconditionally present the firm's financial condition in accordance with generally accepted accounting principles. If an accountant's opinion is an adverse opinion, a disclaimer of opinion, or an opinion that raises "going concern" issues, the

NRC staff will not allow the use of a self-guarantee. NRC staff will evaluate other types of accountant's opinions on a case-by-case basis in the context of the licensee's financial statements so that the reviewer can determine the implications for the accuracy of the financial test. If the NRC staff cannot make a decision because the information in the opinion or the financial statements is insufficient, it will require that the licensee submit additional information. If the matter is still unresolved, NRC staff will request assistance from its legal counsel. If there is any doubt about the qualifications of the licensee's independent certified public accountant, the NRC staff will verify the accountant's credentials by contacting the State Board of Accountancy in the accountant's State.

- A self-guarantee may not be used in combination with any other financial assurance methods, except an external sinking fund. However, an external sinking fund cannot be used as financial assurance for site control and maintenance.
- The standby trust fund meets all applicable NRC requirements, as discussed in the section on standby trust funds (Section 4.3.2.10).
- The self-guarantee is in an amount that is at least as great as the amount of decommissioning funds being assured by a self-guarantee for the total of all nuclear facilities or parts thereof (or prescribed amount if a certification is used).
- No credit is taken for earnings on any financial assurance mechanism (e.g., a self-guarantee) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.7 EXTERNAL SINKING FUNDS

In addition to the general criteria outlined in Section 4.3.1, an external sinking fund submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - prepayment mechanism (trust fund is the only allowable form of prepayment) and all supporting documentation; and
  - surety method (i.e., surety bond or letter of credit) or insurance and all supporting documentation.
- The external sinking fund is *not* being used to provide financial assurance for site control and maintenance following license termination under restricted conditions.
- The prepayment mechanism (trust fund is the only allowable form of prepayment) and the surety/insurance mechanism (i.e., surety bond, letter of credit, insurance) that comprise the external sinking fund meet all applicable NRC requirements, as discussed earlier in this section.
- The assurance provided by the prepayment mechanism, in combination with the assurance provided by the surety method or insurance, totals an amount that is at least as great as the licensee's decommissioning cost estimate or prescribed amount. **Exception:** 10 CFR Part 72 licensees that qualify to use the assurance method of 10 CFR 72.30(e)(5) and either (1) recover, either directly or indirectly, the estimated total cost of decommissioning through rates established by "cost of service" or similar ratemaking regulation, or (2) have a

source of revenues for its external sinking fund that is a "non-bypassable charge," the total amount of which will provide funds estimated to be needed for decommissioning, may use an external sinking fund without having to couple it with a surety method or insurance. For qualified licensees, a sinking fund that is not coupled with another financial assurance mechanism is acceptable if the amount accumulated in the fund, plus the amount authorized for recovery through rates or as a "non-bypassable charge," plus earnings consistent with 10 CFR 50.75(e)(1)(ii), covers the total estimated cost of decommissioning.

4.3.2.8 STATEMENTS OF INTENT

In addition to the general criteria outlined in Section 4.3.1, a statement of intent submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - statement of intent; and
  - documentation verifying that the signatory is authorized to represent the licensee in providing the statement of intent.
- The licensee is a Federal, State, or local government entity.
- The individuals signing the statement of intent on behalf of the licensee have the authority to request funds from the appropriate funding body.
- The statement of intent is in an amount that is at least as great as the licensee's cost estimate or prescribed amount—unless the statement of intent is being used in combination with another financial assurance mechanism(s), in which case the amount of the statement of intent must at least equal the difference between the cost estimate or prescribed amount and the sum of the coverages being provided by the other mechanism(s).
- No credit is taken for earnings on any financial assurance mechanism (e.g., a statement of intent) that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.9 SPECIAL ARRANGEMENTS WITH A GOVERNMENT ENTITY THAT ASSUMES CUSTODY AND OWNERSHIP OF THE SITE

In addition to the general criteria outlined in Section 4.3.1, a special arrangement submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following item has been included in the submission:
  - documentation of the special arrangement.
- The government entity has the authority to receive and hold funds for specified purposes (e.g., site control and maintenance).
- The arrangement provides financial assurance in an amount at least as great as the licensee's cost estimate.

- No credit is taken for earnings on any special arrangement that does not set aside actual funds as prepayment for site control and maintenance activities.

4.3.2.10 STANDBY TRUST FUNDS

In addition to the general criteria outlined in Section 4.3.1, a standby trust fund submission that meets the following *additional* criteria will be acceptable to the NRC:

- The following items have been included in the submission:
  - standby trust agreement;
  - Schedule A;
  - Schedule B;
  - Schedule C;
  - specimen certificate of events;
  - specimen certificate of resolution; and
  - letter of acknowledgment.
- The trustee is an appropriate Federal or State government agency or a financial institution that has the authority to act as trustee and whose trust operations are regulated and examined by a Federal or State agency. If evidence of the trustee's qualifications is not provided in the submission, the reviewer will evaluate the trustee's qualifications as follows:
  - The word "National" in the title of a financial institution signals that the institution is *Federally regulated*, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable trustee, the reviewer will access the Federal Financial Institutions Examination Council's (FFIEC) Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

    Alternatively, the reviewer may contact the appropriate district office of the Office of the Comptroller of the Currency (OCC) and confirm that the institution (1) is Federally regulated *and* (2) has Federally regulated trust operations. The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>. As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:
    - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.
    - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.
    - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.

  - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

- The word "State" in the title of a financial institution signals that the institution is State regulated. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable trustee, the reviewer will access the FFIEC's Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

  Alternatively, the reviewer may contact the applicable State banking authority and confirm that the institution (1) is State regulated, *and* (2) has State-regulated trust operations.

- The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated. This is also often true in the case of domestic branches of foreign banks.

- The licensee has not assumed any real rate of return on funds in the standby trust that apply to decommissioning.
- The licensee has not assumed a real (i.e., inflation adjusted), after-tax rate of return greater than one percent per year on funds in the standby trust that apply to site control and maintenance.
- In the event that funds from the licensee's primary financial assurance mechanism(s) have been deposited into the standby trust fund, and under the appropriate assumptions regarding earnings on the trust, the current market value of the standby trust is sufficient to pay for all required activities.
- The maximum withdrawal of funds at one time for a particular activity (i.e., decommissioning or site control/maintenance) is limited to 10 percent of the remaining funds available for that activity unless approval from the appropriate party (i.e., the NRC or the party responsible for site control and maintenance) is attached.
- Schedule A to the standby trust agreement allows the trustee to access the full amount of coverage (using multiple withdrawals as necessary) to conduct all decommissioning and/or site control and maintenance activities. The amount shown in Schedule A must be at least as great as the licensee's cost estimate or prescribed amount.

4.3.3 SPECIFIC REVIEW PROCESS GUIDELINES

GENERAL GUIDELINES

- On receipt of a licensee's financial assurance instrument, the license reviewer or licensing project manager will enter the financial assurance information (including type of mechanism, amount of mechanism, expiration date, and name and address of issuer) into the License Tracking System or other applicable license tracking database, and will update existing information as necessary. The license reviewer or licensing project manager will use standard Regional or division procedures for entering information into the License Tracking System.
- The license reviewer or licensing project manager will secure all financial assurance instruments in a safe in accordance with Management Directive 8.12, "Decommissioning Financial Assurance Instrument Security Program."
- The license reviewer or licensing project manager, in coordination with DURLD, will use the specific guidelines below to perform an initial review of all parent company guarantees, self-guarantees, insurance policies, and special arrangements with a government entity. When the initial review determines that an in-depth review is needed, copies of the instruments should be sent to DURLD for review via a TAR. DURLD and, if necessary, both the Office of the General Counsel (OGC) and contractor staff will review these submittals to ensure (1) that the supporting financial information provided with the instrument is correct and complete and (2) that the instruments provide an adequate level of financial assurance. (See additional specific guidance below.)
- In all other cases, the license reviewer or licensing project manager will review the financial assurance instrument(s) submitted by the licensee to ensure that the instrument(s) meets all applicable regulatory requirements. If the mechanism is identical to the recommended wording in Appendix A to this volume, the mechanism is acceptable. If there are only *minor* differences in the wording, the Region may forward the mechanism to its Regional Counsel for review. In all other cases, a TAR should be prepared for DURLD review. If there are questions about the wording of financial instruments or about documentation, the reviewing staff will consult the appropriate NRC office for assistance.
- If requested, via a TAR, to review a submission, the DURLD staff will provide a memorandum documenting the review of the financial assurance instrument(s) to the license reviewer or licensing project manager. The memorandum will identify any nonconforming language or documentation found in the licensee's submittal that does not provide a level of financial assurance equivalent to that provided by the model documentation illustrated in Appendix A to this volume. The license reviewer or licensing project manager will incorporate the comments into a letter directing the licensee to correct the nonconforming language or documentation and resubmit their financial assurance package.

SPECIFIC GUIDELINES FOR PARENT COMPANY GUARANTEES AND SELF-GUARANTEES

NOTE: As stated above, all parent company guarantees and self-guarantees should be reviewed against the specific guidelines below to determine if they should be forwarded to DURLD for review via a TAR (although regions may also conduct their own separate reviews).

- The NRC staff will verify that the submission includes all of the necessary items (as identified in Section 4.3.2). If any necessary items are not included, NRC staff will obtain the missing items from the licensee. (Note that, at NRC staff's discretion, the request for the missing items may be postponed until other deficiencies, if any, have been identified.)
- The NRC staff will compare the wording of the mechanism (including all attachments) to the recommended wording contained in Appendix A to this volume. The submitted wording is acceptable if it is identical to the recommended wording. If the submitted wording is not identical, NRC staff will determine (with assistance from DURLD as necessary) whether any deviations potentially reduce the likelihood that the NRC will have ready access to adequate funding for decommissioning and/or site control and maintenance. Where such potential exists, the NRC staff should forward the instruments to DURLD for review. NRC staff will complete the applicable "terms and conditions checklist" in Appendix A as an aid in determining whether appropriate provisions are included in the text of the mechanism.

SPECIFIC GUIDELINES FOR INSURANCE POLICIES AND SPECIAL ARRANGEMENTS WITH A GOVERNMENT ENTITY

NOTE: As stated above, all insurance policies and special arrangements with a government entity should be reviewed against the specific guidelines below to determine if they should be forwarded to DURLD for review via a TAR (although regions may also conduct their own separate reviews). This section outlines the procedures for review of the submittal by DURLD staff.

- The NRC staff will verify that all of the necessary items (as identified in Section 4.3.2) have been included in the submission. If any necessary items are not included, NRC staff will obtain the missing items from the licensee. (Note: At NRC staff's discretion, the request for the missing items may be postponed until other deficiencies, if any, have been identified.)
- The NRC staff will complete the applicable "terms and conditions checklist" in Appendix A to this volume to determine whether the submitted mechanism includes the appropriate provisions. The submitted mechanism is acceptable if it includes all of the necessary provisions. For all deviations from the checklist or additional provisions contained in the mechanism, the NRC staff will determine (with assistance from DURLD as necessary) whether the deviations potentially reduce the mechanism's protections in ensuring that the NRC will have ready access to adequate funding for decommissioning and/or site control and maintenance. Where such potential exists, NRC staff should forward the instruments to DURLD for review.

SPECIFIC GUIDELINES FOR ALL OTHER FINANCIAL ASSURANCE MECHANISMS

- The license reviewer or licensing project manager will compare the wording of the mechanism (including all attachments) to the recommended wording contained in Appendix A to this volume. The submitted wording is acceptable if it is identical to the recommended wording. If there are only minor differences in the wording, the Region may forward the mechanism to its Regional Counsel for review. In all other cases, the license reviewer or licensing project manager will forward the submittal to DURLD for review as a "nonstandard" submittal via a TAR.
- For all deviations from the recommended wording, the reviewer will determine (with assistance from contractor staff, OGC staff, and/or Regional Counsel staff as necessary) whether any deviations significantly reduce the mechanism's protections in ensuring that the NRC will have ready access to adequate funding for decommissioning and/or site control and maintenance. The reviewer will complete the applicable "terms and conditions checklist" in Appendix A as an aid in determining whether appropriate provisions are included in the text of the mechanism.
- The reviewer will verify that all of the necessary items (as identified in Section 4.3.2) have been included in the submission. If any necessary items are not included with a standard submittal, or if any necessary items are not included with a nonstandard submittal, the reviewer will obtain the missing items from the licensee. (Note: At the reviewer's discretion, the request for the missing items may be postponed until other deficiencies, if any, have been identified.) However, if the submission contains additional items that are not listed above but that might affect the workings of the mechanism, the license reviewer or licensing project manager will forward the submittal to DURLD for review as a nonstandard submittal via a TAR.

SAMPLE EVALUATION FINDINGS

Documentation of the evaluation findings by the NRC staff (internal memorandum to the license reviewer or licensing project manager) should include one of the following:

- Documentation conforms to NRC guidance and the amount of assurance covers the decommissioning costs:

> NRC staff has reviewed the financial assurance mechanism(s) for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the financial assurance mechanism(s) and supporting documentation submitted by the licensee conform to NRC guidance. The amount of financial assurance covers the [*required prescribed amount or decommissioning cost estimate*].

- Documentation conforms to NRC guidance, but the amount of assurance does not cover the decommissioning costs:

  > NRC staff has reviewed the financial assurance mechanism(s) for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the financial assurance mechanism(s) and supporting documentation submitted by the licensee conform to NRC guidance. However, the amount of financial assurance does not cover the [*required prescribed amount* or *decommissioning cost estimate*].

- Documentation does not conform to NRC guidance, but the amount of assurance covers the decommissioning costs:

  > NRC staff has reviewed the financial assurance mechanism(s) for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the financial assurance mechanism(s) and supporting documentation submitted by the licensee do not conform to NRC guidance. However, the amount of financial assurance covers the [*required prescribed amount* or *decommissioning cost estimate*].

- Documentation does not conform to NRC guidance and the amount of assurance does not cover the decommissioning costs:

  > NRC staff has reviewed the financial assurance mechanism(s) for the [*insert name and license number of facility*] located at [*insert location of facility*] according to NUREG-1757, Volume 3, "Financial Assurance, Recordkeeping, and Timeliness." Based on this review, NRC staff has determined that the financial assurance mechanism(s) and supporting documentation submitted by the licensee do not conform to NRC guidance. In addition, the amount of financial assurance does not cover the [*required prescribed amount* or *decommissioning cost estimate*].

NOTIFICATION TO LICENSEE OF NONCONFORMANCES

If the NRC staff identifies nonconformances in the licensee's submittal that reduce the level of financial assurance below the level provided by the models in Appendix A of this volume, NRC staff will send a letter to the licensee identifying the nonconforming language or documentation. Where appropriate, NRC staff will identify the reasons that the nonconforming language or documentation needs to be changed. In addition, the letter will instruct the licensee how to change its documents to conform to Appendix A and to resubmit its financial assurance package.

Nonconformances may include, but are not limited to, the following:

- inadequate amount of financial assurance,
- missing documents,

- lack of original signature,
- language that differs from Appendix A, or
- typographical errors.

Note that the introduction to Chapter 4 of this volume contains a sample post-review letter from the NRC to licensees for cases where no deficiencies are found in the submittal.

4.4 WEB SITES FOR FINANCIAL REVIEW

The NRC's policy is to reference Web sites by the highest possible level (i.e., closer to the home page). In the sections on financial review, specific Web addresses for non-NRC entities have been provided to make it easy for stakeholders to find information. As of June 2011, these Web site addresses are valid; over time, these addresses may no longer be accurate due to the fluid nature of the Internet. Table 4.1 lists alternative Web site addresses and methods to obtain the same information.

Table 4.1 Alternative Addresses for Web Sites Referenced in this NUREG

Entity	Specific Web Site Address	Top-Level Web Site Address	Comments
National Association of Insurance Commissioners (NAIC)	<http://www.naic.org/cis/>	<http://www.naic.org>	From the NAIC Web site > Consumer Information Source (CIS) > Company Information
Federal Deposit Insurance Corporation (FDIC) Institution Directory	<http://www2.fdic.gov/idasp/>	<http://www.fdic.gov>	From the FDIC Web site > Analysts > Institution Directory
U.S. Department of the Treasury's Financial Management Service (FMS)	<http://www.fms.treas.gov/c570/index.html>	<http://www.fms.treas.gov>	From the FMS Web site > Surety Bonds
Federal Financial Institutions Examination Council (FFIEC) Trust Institutions Search	<http://www.fdic.gov/bank/individual/trust/>	<http://www.fdic.gov>	From the FDIC Web site > Analysts > Trust Institutions Data

PART III: BANKRUPTCY, BANKRUPTCY REVIEW TEAM, AND DRAWING ON FINANCIAL ASSURANCE INSTRUMENTS

5. BANKRUPTCY OVERVIEW

OVERVIEW

NRC regulations at 10 CFR 30.34, 40.41, and 70.32 require a licensee to notify the NRC of the filing of a petition for bankruptcy. Chapters 5 and 6 of this volume contain guidance for licensees, and in some cases, license applicants, to use in preparing this notification to the NRC. Chapters 5 and 6 do not supersede NUREG-1556, "Consolidated Guidance About Materials Licenses," Volume 15, "Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Material Licenses," issued November 2000, which contains detailed information about the specific requirements for bankruptcy notifications.

Persons who are in the process of applying for an NRC license and who do not already hold another NRC license are not subject to NRC regulations with regard to bankruptcy. However, applicants must advise the NRC of any change of control or bankruptcy that results in changes to the information being reviewed by the NRC in the application review process that would impact the basis on which the NRC would eventually issue the license.

SCOPE

The scope of Chapters 5 and 6 of this volume is limited to an introduction of bankruptcy requirements as they pertain to financial assurance, the function of the Bankruptcy Review Team (BRT), and the basic procedures for drawing on financial assurance mechanisms.

5.1 BANKRUPTCY

Licensees must notify the appropriate NRC Regional Administrator, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy by or against the following:

- a licensee,
- an entity controlling the licensee,
- an entity listing the license or licensee as property of the estate, or
- an affiliate of the licensee.

This notification must identify the bankruptcy court in which the petition was filed and the date of filing.

In addition, a parent company providing financial assurance for decommissioning to a licensee through a parent company guarantee and a licensee providing financial assurance for decommissioning through a self-guarantee must provide in their guarantee that, in case of financial distress (i.e., bankruptcy or insolvency), the guarantor will notify the Commission and agree that the Commission may declare the financial assurance immediately due.

A licensee's financial condition could affect its ability to control licensed material. Therefore, the NRC must be notified so that it can ensure that appropriate measures to protect the public health and safety have been or will be taken.

Special Note: **Licensees who have filed for bankruptcy remain responsible for all regulatory requirements until such time as the license is terminated or transferred to another entity by NRC.**

The NRC may share pertinent information with other involved entities (e.g., trustees, Agreement States) so that health and safety issues can be resolved before bankruptcy actions are completed.

BANKRUPTCY TYPES

There are different types of bankruptcies described in title 11 of the United States Code (U.S.C.). The following discussion outlines the bankruptcy types that may involve NRC:

- Chapter 7 is used primarily by individuals and by businesses who wish to free themselves from debt simply and inexpensively. The debtor may enter Chapter 7 bankruptcy voluntarily or be forced to enter it involuntarily by creditors. The creditors of a debtor, as well as the debtor, have the right under Chapter 11 to convert to Chapter 7.
- Chapter 11 is generally used to reorganize a business and allows the debtor to continue its business operations by a plan of reorganization in the hopes that it can be returned to a viable state. As with Chapter 7, the debtor may enter Chapter 11 bankruptcy either voluntarily or involuntarily.

In addition to the notification described above, licensees are also requested to provide the information described in Appendix G of NUREG-1556, Volume 15.

All licensee submittals will be available for review by the general public in the NRC's Public Document Room. If it is necessary to submit proprietary information, licensees should follow the procedure in 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Failure to follow this procedure could result in disclosure of the proprietary information to the public or substantial delays in processing the application. Employee personal information (i.e., home address, home telephone number, Social Security number, date of birth, and radiation dose information) should not be submitted unless specifically requested by the NRC.

Notes:

- The requirements in these regulations apply to a bankruptcy proceeding for or against the licensee itself, an entity controlling the licensee, an entity listing the licensee as a property of the estate, or an affiliate of the licensee. For example, Company A owns Company B, and Company B is an NRC licensee. Company A files to reorganize under Chapter 11 of the bankruptcy law. Company B must notify the NRC immediately after such a filing.
- Licensees (or entities controlling a licensee, or affiliates of the licensee) may contact the appropriate Regional or Headquarters office for further information or guidance.

5.2 BANKRUPTCY REVIEW TEAM

The NRC will establish a BRT to review and act on bankruptcy notifications. The BRT brings together the various NRC offices and is typically composed of members of the relevant licensing office staff, OGC, the Office of the Controller, the Office of Enforcement, the Division of Materials Safety and State Agreements, and the Division of Waste Management and Environmental Protection (DWMEP). Where one of the licensee's locations affected by the bankruptcy is located within an Agreement State, the BRT shall establish a dialogue for providing the Agreement State with information concerning the NRC's response to the bankruptcy filing.

The NRC procedures for BRT review of bankruptcy actions are described in detail in Appendix H of NUREG-1556, Volume 15. These procedures ensure that bankruptcy cases are managed in a fully coordinated manner with all involved NRC staff.

6. PROCEDURES FOR DRAWING ON FINANCIAL ASSURANCE INSTRUMENTS

The following discussion outlines the procedures used to draw money from financial instruments. Detailed information concerning procedures for drawing funds from financial instruments can be found in Appendix I of NUREG-1556, Volume 15, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Material Licenses."

Drawing on funds means transferring funds from a surety method, insurance, or other guarantee method into a trust fund for later use in decommissioning. These funding methods promise to provide funds when demanded. Financial instruments that may be used for these methods include letters of credit, surety or bonds, parent company guarantees, or self-guarantees. Each of these funding methods requires a standby trust to directly receive the funds drawn from the instrument.

Certain types of financial instruments that are deposits of funds rather than the promise to pay funds are not drawn upon.

Drawing funds from a financial instrument may occur as a consequence of bankruptcy. If a BRT has been established, it should discuss the need for, and timing of, drawing funds.

However, bankruptcy is not required to enable the NRC to draw funds. For example, if a licensee does not fulfill its obligation to decommission a site or facility, the NRC could draw funds for placement in a trust. A BRT is not necessary for such cases, although coordination among NRC staff (including a dialogue with an Agreement State(s), if applicable) is needed to evaluate and approve drawing funds from financial instruments.

6.1 LETTER OF CREDIT

The licensing office will, in consultation with OGC, the Office of the Chief Financial Officer (OCFO), and DWMEP, contact the bank which issued the letter of credit to determine the specific bank procedures for drawing on the instrument. In these discussions, the following details should be resolved:

- where the transaction is to take place,
- whether the transaction needs to take place in person,
- what documents need to be presented (e.g., if the originals are needed),
- if there are deadlines on when the instrument can be drawn,
- if there are deadlines before which the instrument cannot be drawn, and
- the form of the sight draft (a bill of exchange or draft payable when presented).

Arrangements for direct transfer of the funds to the standby trust must be made so that the NRC does not directly acquire funds. The NRC staff must not accept funds (even if instruments are made out to the trustee), and NRC staff must never allow the bank to make any instrument payable directly to the NRC or the licensee.

6.2 SURETY BOND

Licensing office staff, in consultation with OGC, OCFO, and DWMEP, will contact the company issuing the surety bond to determine the specific procedures that need to be followed to draw on the instrument. In these discussions, the following details should be resolved:

- where the transaction is to take place;
- whether the transaction needs to take place in person;
- what documents need to be presented; and
- what form of the notification by the NRC is desired.

Arrangements for direct transfer of the funds to the standby trust must be made so that the NRC does not directly acquire funds. The NRC staff must not accept funds (even if instruments are made out to the trustee), and NRC staff must never allow the bank to make any instrument payable directly to the NRC or the licensee.

6.3 PARENT COMPANY GUARANTEE

Licensing office staff, in consultation with OGC, OCFO, and DWMEP, will examine the provisions of the parent company guarantee and prepare a notification directing the parent company to deposit funds into a standby trust. Arrangements for direct transfer of the funds to the standby trust must be made so that the NRC does not directly acquire funds. The NRC staff must not accept funds, even if instruments are made out to the trustee. The NRC staff must never allow the parent company to make any instrument payable directly to the NRC. Payments by the guarantor must be made to a standby trust fund established at the same time that the guarantee is created.

6.4 SELF-GUARANTEE

Licensing office staff, in consultation with OGC, OCFO, and DWMEP, will examine the provisions of the self-guarantee and prepare a notification directing the licensee to deposit funds into the standby trust. Arrangements for direct transfer of the funds to the standby trust must be made so that the NRC does not directly acquire funds. The NRC staff must not accept funds, even if instruments are made out to the trustee. NRC staff must never allow the licensee to make any instrument payable directly to the NRC. Payments by the guarantor must be made to a standby trust fund established at the same time that the guarantee is created.

7. PROCEDURE FOR APPROVING DISBURSEMENTS FROM DECOMMISSIONING FUNDS

The standard contract language for decommissioning funds includes a provision for the NRC's approval of disbursements greater than 10 percent of the amount held in trust or in escrow. When a licensee submits a request for withdrawal of greater than 10 percent of the funds, the NRC staff will verify the following items:

- The facility is identified by the licensee and is in decommissioning status.
- If a DP is required, the licensee has an approved DP.
- If a DP is not required, the licensee has a schedule for decommissioning activities.
- The licensee identifies the activities for which the funds will be used.
- The funds withdrawn will be used for decommissioning activities of the facility for which the instrument was established.
- The licensee has provided a revised estimate of costs for the decommissioning activities that will remain after the withdrawn funds are spent; and
- The balance of the funds remaining in the trust or in escrow will be sufficient to cover the estimated costs for the remaining decommissioning activities.

Disbursements of less than 10 percent of the amount held in trust require a 30-day notice to the NRC but do not require the NRC's approval. However, all withdrawals require the licensee to certify to the trustee that it is in decommissioning status.

8. RETURNING, CANCELING, OR REDUCING FINANCIAL ASSURANCE INSTRUMENTS

When licensees replace financial instruments, the superseded instruments should be canceled and returned to the licensee. Likewise, when licenses are terminated, or licenses fall below the possession limit thresholds requiring financial assurance, the instruments should be canceled and returned to the licensee. As an alternative, at the request of the licensee, the superseded or canceled financial instrument may be sent directly to the issuer.

Note that financial instruments are amended or revised from time to time. An amendment or revision to an existing instrument generally does not require cancellation and return of the earlier versions to the licensee.

The regulations in 10 CFR Parts 30, 40, 70, and 72 provide no method to credit work completed during decommissioning against the amount of financial assurance provided. Therefore, to reduce the amount of financial assurance, the licensee must either amend its license to reduce its possession limits, amend its decommissioning cost estimate to reflect the actual cost remaining to complete decommissioning, or terminate its license.

Where the licensee provides financial assurance for a prescribed amount, based on its license possession limits, the financial assurance must be maintained in accordance with the license possession limits until the license is terminated. In this case, the financial assurance instrument may not be returned until after the license is terminated. The amount of financial assurance may not be reduced unless the license is amended to reduce the possession limits to permit either (1) use of a lower prescribed amount of financial assurance or (2) elimination of the financial assurance requirement. However, the licensee has the option to provide financial assurance using a DFP, with the amount based on a site-specific cost estimate. If the licensee exercises that option, it may reduce or cancel its financial assurance as described below.

Where the licensee provides financial assurance using a DFP based on a site-specific decommissioning cost estimate, the amount of financial assurance must cover the amount of the last approved cost estimate. Therefore, the licensee can reduce its financial assurance by submitting a revised DFP and receiving NRC approval. The licensee may not reduce its decommissioning cost estimate simply by subtracting the cost of work completed from the last approved cost estimate. In order to reduce the amount of financial assurance provided, the licensee must submit a new cost estimate, acceptable to the NRC, which justifies a lower amount based on the cost of work remaining to be done. If the licensee has completed all decommissioning activities and surveys, it may submit a cost estimate of zero, which will permit cancellation of its financial assurance instruments when the cost estimate is accepted by the NRC.

Appendix A

Standard Format and Content of Financial Assurance Mechanisms for Decommissioning

A.1 Introduction

Overview

Financial assurance requirements help ensure that adequate funds will be available to pay for certain costs (e.g., decommissioning) in a timely manner. Financial assurance is achieved through the use of financial instruments. Some financial instruments provide a special account into which the licensee may essentially prepay the applicable costs. Other financial instruments guarantee funding by a suitably qualified third party, thereby providing "defense in depth" in the event the licensee is unable or unwilling to pay these costs when they arise. Financial assurance for decommissioning must be obtained prior to the commencement of licensed activities or receipt of licensed material, and it must be maintained until termination of the license. If the license is being terminated under restricted conditions, then financial assurance for site control and maintenance must be obtained prior to license termination. The amount of financial assurance obtained is often based on a site-specific cost estimate and must be increased if the cost estimate increases. Under U.S. Nuclear Regulatory Commission (NRC) regulations, a number of different types of financial instruments may be used to demonstrate financial assurance, including trusts, letters of credit, surety bonds, and guarantees.

Scope

The purpose of this appendix is to provide guidance to NRC licensees and license applicants on how to demonstrate financial assurance for decommissioning and, if applicable, for site control and maintenance following license termination. The appendix also establishes a standard format for presenting the information to the NRC that will (1) aid the licensee or license applicant in ensuring that the information is complete, (2) help ensure that applicable requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 20, 30, 40, 70, and 72 have been met, and (3) help achieve the intent of the regulations, which is to ensure that the decommissioning of all licensed facilities will be accomplished in a safe and timely manner and that licensees will provide adequate funds to cover all costs associated with decommissioning and, if applicable, with site control and maintenance.

This appendix applies only to licensees and license applicants covered under the following parts of Title 10 of the *Code of Federal Regulations*:

- 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material"—Financial assurance requirements can be found in 10 CFR 30.35, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 30.36, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- 10 CFR Part 40, "Domestic Licensing of Source Material" (except uranium recovery facilities)—Financial assurance requirements can be found in 10 CFR 40.36, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 40.42, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."

- 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material"—Financial assurance requirements can be found in 10 CFR 70.25, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 70.38, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste"—Financial assurance requirements can be found in 10 CFR 72.30, "Financial Assurance and Recordkeeping for Decommissioning," and 10 CFR 72.54, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas."
- Subpart E, "Radiological Criteria for License Termination," of 10 CFR Part 20, "Standards for Protection against Radiation"—Financial assurance requirements can be found in 10 CFR 20.1403, "Criteria for License Termination under Restricted Conditions."

Decommissioning financial assurance requirements for licensees not within the scope of this document are covered by other guidance documents. Guidance on uranium recovery facilities under Criteria 9 and 10 of Appendix A to 10 CFR Part 40 is also provided in the Branch Technical Position (BTP), "Technical Position on Financial Assurances for Reclamation, Decommissioning, and Long-Term Surveillance and Control of Uranium Recovery Facilities" (October 1988). Information on low-level waste disposal facilities under 10 CFR Part 61 is provided in Revision 1 of NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility" (January 1988), and Revision 3 of NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility" (March 1994).

The information collections contained in this appendix are covered by the requirements of 10 CFR Part 30, 10 CFR Part 40, 10 CFR Part 70, and 10 CFR Part 72, which were approved by the Office of Management and Budget (OMB), approval numbers 3150-0017, 3150-0020, 3150-0009, and 3150-0132, respectively. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

A.1.1 How to Use this Appendix

This appendix is organized around the various components of a financial assurance demonstration (e.g., the cost estimate, the financial instrument). Each component of a financial assurance demonstration is addressed briefly in this introduction and then is addressed again in greater detail in its own section. Each subsequent section provides narrative guidance on a particular component and contains one or more checklists to help guide the reader. By completing the tasks on the checklists, a licensee or applicant can be sure that its financial assurance demonstration is complete and likely to be acceptable to the NRC.

Licensees and applicants should read Section A.1 in its entirety. The section includes a "master" checklist that directs the reader to other relevant sections and checklists in this appendix. To prepare a financial assurance demonstration that the NRC is likely to accept, a licensee or applicant simply should complete the following four steps:

1. Complete Checklist 1 (the master checklist).
2. Complete applicable checklists called for by Checklist 1.
3. Prepare any documentation called for in the completed checklists.
4. Submit the completed checklists and accompanying documentation to the NRC for review and approval.

Checklist 1 Master Checklist for Decommissioning Financial Assurance

Name of Licensee/Applicant_____

Mailing Address_____

Facility Address_____

License Number(s)_____

Date of Submission_____

Applicable Parts of 10 CFR (check all that apply): ☐ Part 30 ☐ Part 40 ☐ Part 70 ☐ Part 72

Type of Submission:
☐ Certification of Financial Assurance → attach Checklist 2
☐ Decommissioning Funding Plan → attach Checklist 3
☐ Decommissioning Plan → attach Checklist 13-A

Type of Mechanism:

☐ Prepayment
  ☐ Trust → attach Checklist 4-A

☐ Surety, Insurance, or Other Guarantee Method
  ☐ Surety Bond → attach Checklist 5-A
  ☐ Letter of Credit → attach Checklist 6-A
  ☐ Insurance → attach Checklist 7-A
  ☐ Parent Company Guarantee → attach Checklist 8-A
  ☐ Self-Guarantee → attach Checklist 9-A

☐ External Sinking Fund → attach Checklist 10

☐ Statement of Intent → attach Checklist 11-A

☐ Special Arrangement with a Government Entity → attach Checklist 13-B

To help licensees and applicants make the initial decisions called for in Checklist 1, this section discusses each of the three major decision points:

- Confirmation that financial assurance is required (see Section A.1.2)
- Use of a Certification of Financial Assurance or a Decommissioning Funding Plan (see Section A.1.3)

- Selection of a financial instrument (see Section A.1.4)

Finally, the section also explains applicable recordkeeping requirements (see Section A.1.5) and provides guidance for licensees who wish to cancel, replace, or transfer their financial assurance mechanisms (see Section A.1.6).

Note: Throughout the remainder of this appendix, the term "licensee" refers to both licensees and license applicants. This appendix also uses the terms "financial instrument," "financial mechanism," and "financial assurance mechanism" interchangeably.

A.1.2 When Financial Assurance is Required

This section provides guidance on when a licensee must demonstrate financial assurance for a particular license. Section A.1.2.1 discusses financial assurance requirements for decommissioning, which apply at the time of license application or renewal and at the end of licensed operations. Section A.1.2.2 discusses financial assurance requirements for site control and maintenance, which are triggered if the license is being terminated under restricted conditions.

A.1.2.1 Financial Assurance for Decommissioning

The NRC's financial assurance requirements for decommissioning apply only to licensees authorized to possess or use certain quantities and types of licensed materials. The minimum possession or use thresholds that trigger the requirements vary, depending on the type of license and the types and quantities of materials authorized under the particular license. Licensees authorized to possess only a single isotope may use the table in Attachment 1 to this appendix to determine whether financial assurance is required for a given activity level. Any license that authorizes the possession or use of types or quantities of materials exceeding these thresholds is subject to the NRC's decommissioning financial assurance requirements. Note that the relevant quantities and types of materials are those authorized under a particular license, even if a licensee does not currently or usually possess or use these same quantities and types of materials.

Type of License	Minimum License Threshold Requiring Financial Assurance
10 CFR PART 30	*Unsealed byproduct material with a half-life greater than 120 days* in amounts greater than 10^3 times the applicable quantities of Appendix B, "Quantities of Licensed Material Requiring Labeling," to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^4 is greater than 1, when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30 ***Or***

Type of License	Minimum License Threshold Requiring Financial Assurance
	Sealed sources or plated foils with a half-life greater than 120 days in amounts greater than 10^{10} times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^{10} is greater than 1, when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30
10 CFR PART 40	*Source material in a readily dispersible form* exceeding 10 millicuries (mCi)
10 CFR PART 70	*Unsealed special nuclear material* in amounts greater than 10^3 times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^3 is greater than 1, where R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30
10 CFR PART 72	*Any amount of spent fuel or high-level radioactive waste*

Licensees who exceed the minimum thresholds outlined above are required to demonstrate financial assurance for decommissioning that is acceptable to the NRC until decommissioning has been completed and the license has been terminated. License applicants must have financial assurance in place prior to the receipt of licensed materials.

A.1.2.2 Financial Assurance for Site Control and Maintenance (License Termination under Restricted Conditions)

If the license is being terminated under restricted conditions pursuant to 10 CFR 20.1403, a licensee must provide financial assurance for site control and maintenance following license termination. This requirement applies to all licensees who request license termination under restricted conditions, regardless of whether decommissioning financial assurance is required. This assurance must be in place before the license is terminated and must be sufficient to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.

A.1.3 Prescribed Amount or Decommissioning Funding Plan

This section applies only to financial assurance demonstrations for decommissioning prepared as part of a license application or renewal. This section does not apply to licensees preparing or updating financial assurance demonstrations as part of a decommissioning plan (DP). These licensees should skip this section and should review Section A.13.

If financial assurance is required for a particular license, a licensee must decide whether to provide a prescribed amount of financial assurance or a decommissioning funding plan (DFP), which are the only two options for demonstrating financial assurance.

PRESCRIBED AMOUNT	Where the licensee has authorized possession limits within certain bounds established by the regulations, and the licensee's facility does not have significant subsurface residual radioactivity, it may provide financial assurance based on one or more of the prescribed amounts specified by 10 CFR 30.35(d), 10 CFR 40.36(b), or 10 CFR 70.25(d). (As of December 2, 2003, the regulations provide for three prescribed amounts of financial assurance—$113,000, $225,000, and $1,125,000—however, the amounts may be revised from time to time and the regulations must be consulted to determine the currently applicable prescribed amounts when the licensee's financial assurance is reviewed.)
DFP	A DFP is a financial assurance demonstration that is based on a site-specific cost estimate for decommissioning the licensed facility. Any licensee may use a DFP, but certain licensees *must* use a DFP, as discussed below. The DFP must include a certification of financial assurance to be acceptable. The amount of the facility-specific cost estimate is the required level of financial assurance coverage for a licensee who uses a DFP.

Licensees may be *required* to prepare a DFP rather than a certification depending on the type of license, the types and quantities of materials authorized under the particular license, and the presence of significant residual radioactivity on their facility. Specifically, if a survey required under 10 CFR 20.1501(a) detects residual radioactivity at a site at levels that would, if left uncorrected, prevent the site from meeting the unrestricted use criteria of 10 CFR 20.1402 "Radiological Criteria for Unrestricted Use," then the licensee must submit an updated DFP within one year of when the survey is complete. Alternatively, a licensee authorized possession limits within the bounds established by the regulations for use of a prescribed amount must use a DFP if there is a reasonable basis to believe that the licensee has significant residual radioactivity in the facility and the environment, including the subsurface, on site. Any license authorizing the possession or use of types or quantities of materials exceeding the thresholds identified below must use a DFP. Licensees who are authorized to possess only a single isotope may use the table in Attachment 1 to this appendix to determine whether a DFP is required for a given activity level. Note that the relevant quantities and types of materials are those authorized under a particular license, even if a licensee does not currently or usually possess or use these same quantities and types of materials. Licensees whose possession limits are stated in general terms (e.g., up to 1 curie (Ci) of any nuclide having an atomic number from 1 to 83) should submit a DFP or commit to limiting material quantities below the applicable financial assurance thresholds. In addition, licensees authorized to possess an unlimited quantity of material must submit a DFP. During operations, residual radioactivity that would be significant for decommissioning planning would be a quantity of radioactive material that would later require remediation during decommissioning to meet the unrestricted use criteria of 10 CFR 20.1402.

Type of License	**Minimum License Threshold Requiring Financial Assurance**
10 CFR PART 30	*Unsealed byproduct material with a half-life greater than 120 days* in amounts greater than 10^5 times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^5 is greater than 1, when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30
10 CFR PART 40	*Source material in a readily dispersible form* exceeding 100 mCi

Type of License	Minimum License Threshold Requiring Financial Assurance
10 CFR PART 70	*Unsealed special nuclear material* in amounts greater than 10^5 times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^5 is greater than 1, where R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30
10 CFR PART 72	*Any amount of spent fuel or high-level radioactive waste*

Where the licensee is authorized to possess more than one radionuclide, the unity rule is applied to all radionuclides with a half life of greater than 120 days to determine if financial assurance is required.

Licensees who do *not* exceed the thresholds outlined above may use *either* a prescribed amount or a DFP. Such licensees may wish to elect use of a DFP if, for example, they wish to obtain the optimal amount of financial assurance, or because use of a site-specific cost estimate may result in a lower financial assurance coverage requirement than would use of a prescribed amount (as could happen if a single facility holds multiple licenses, each of which triggers its own prescribed amount).

- Licensees who elect to use a prescribed amount of financial assurance should refer to Section A.2 of this appendix for applicable guidance. Complete Checklist 2 (in Section A.2) if using a certification.
- Licensees who use DFPs should refer to Section A.3 of this appendix for applicable guidance. Complete Checklist 3 (in Section A.3) if using a DFP.

A.1.4 Selection of Financial Instrument

Another major decision that a licensee must make is to identify the type of financial instrument it will use to demonstrate financial assurance. The choice of financial instrument typically depends on a number of factors, including the availability of the instrument to the licensee (i.e., whether or not the licensee is capable of obtaining it), the time and difficulty associated with establishing the instrument, the cost of the instrument, and the expected amount of time remaining before decommissioning. Because these factors can differ for different licensees, each licensee will have to identify the financial instrument that best meets its particular needs.

The NRC regulations specify 8 allowable types of financial instruments that fall into 1 of 4 "methods."

A.1.4.1 Method 1: Prepayment

Under prepayment, the licensee provides advance decommissioning funding in full (i.e., in the applicable prescribed amount or in the amount of the facility-specific cost estimate) using an account segregated from licensee assets and outside the licensee's administrative control. Licensees who use prepayment mechanisms generally will not need to provide additional funds

at the time of decommissioning unless decommissioning costs exceed the amount of financial assurance provided. Prior to decommissioning, the funds placed in prepayment instruments can be expected to generate earnings. These earnings are payable to the licensee as long as adequate funds remain in the financial mechanism. Upon completion of decommissioning, any funds remaining in the prepayment mechanism are returned to the licensee. Prepayment instruments include the following:

TRUST

A trust is analogous to a special bank account that is administered by a "trustee." Trusts can be readily established using an appropriately qualified financial institution as the trustee. Trustee fees are typically taken from the earnings on the trust.

- Licensees who elect to use a trust fund should refer to Section A.4 for applicable guidance.
- Licensees who use a trust fund should complete Checklist 4-A (in Section A.4).

A.1.4.2 Method 2: Surety, Insurance, or Guarantee

Under the surety, insurance, or guarantee method, an entity with adequate financial strength (e.g., bank, insurer, or other financial institution) guarantees that the required amount of funds will be available whenever needed. Unlike prepayment, this method does *not* require the full amount of decommissioning funds to be set aside by the licensee in advance. Instead, the licensee typically pays an annual fee to the provider of the surety, insurance, or guarantee. Specific surety, insurance, or guarantee instruments include the following:

SURETY BOND

A surety bond is a guarantee by a company that it will fund decommissioning if the licensee fails to do so. Licensees must pay an annual fee to the issuing company to provide the bond and may have to provide substantial collateral, depending on the licensee's financial condition. Surety bonds must be accompanied by a standby trust.

- Licensees who elect to use a surety bond should refer to Section A.5 for applicable guidance.
- Licensees who use a surety bond should complete Checklist 5-A (in Section A.5).

LETTER OF CREDIT

A letter of credit is extended by a bank on behalf of a licensee and essentially acts as an irrevocable guarantee of payment to the NRC. The credit may be used only to fund decommissioning. As with a surety bond, licensees who use a letter of credit must pay an annual fee to the bank and may have to provide substantial collateral depending on the licensee's financial condition. Letters of credit must be accompanied by a standby trust.

- Licensees who elect to use a letter of credit should refer to

Section A.6 for applicable guidance.

– Licensees who use a letter of credit should complete Checklist 6-A (in Section A.6).

INSURANCE

An insurance policy is a guarantee by an insurance company that it will fund decommissioning activities, whenever needed, if a licensee does not do so. Insurance must be accompanied by a standby trust.

– Licensees who elect to use insurance should refer to Section A.7 for applicable guidance.

– Licensees who use insurance should complete Checklist 7-A (in Section A.7).

PARENT COMPANY GUARANTEE

A parent company guarantee is a guarantee from a licensee's corporate parent that it will fund or carry out decommissioning activities if the licensee fails to do so. The corporate parent must pass a financial test to demonstrate that it has adequate financial strength to provide the guarantee. Because of its very low cost, the parent company guarantee is usually the financial instrument of choice for licensees with corporate parents willing and able to provide such a guarantee for decommissioning.

– Licensees who elect to use a parent company guarantee should refer to Section A.8 for applicable guidance.

– Licensees who use a parent company guarantee should complete Checklist 8-A (in Section A.8).

SELF-GUARANTEE

A self-guarantee is a guarantee by the licensee itself that it will fund and carry out decommissioning activities. The licensee must pass a financial test to demonstrate that it has adequate financial strength to provide the guarantee. Self-guarantees may not be used by licensees who have a corporate parent. Because of its very low cost, the self-guarantee is usually the financial instrument of choice to ensure decommissioning for licensees who are able to provide such a guarantee.

– Licensees who elect to use a self-guarantee should refer to Section A.9 for applicable guidance.

– Licensees who use a self-guarantee should complete Checklist 9-A (in Section A.9).

A.1.4.3 Method 3: External Sinking Fund

An **external sinking fund** allows a licensee to *gradually* prepay for decommissioning by combining the use of a partially funded prepayment instrument (i.e., a trust fund) with a surety bond, letter of credit, or insurance covering the unfunded balance. As the licensee gradually funds the prepayment instrument over time, the licensee is allowed to reduce by a corresponding amount the coverage provided by the surety bond, letter of credit, or insurance.

- Licensees who elect to use an external sinking fund should refer to Section A.10 for applicable guidance.
- Licensees who use an external sinking fund should complete Checklist 10 (in Section A.10).

A.1.4.4 Method 4: Statement of Intent

A **statement of intent** is a commitment by a Federal, State, or local government licensee to request and obtain decommissioning funds from its funding body when necessary. Because of its very low cost, the statement of intent is usually the financial instrument of choice to ensure decommissioning for government licensees. This method (and instrument) is available only to licensees who are government entities.

- Licensees who elect to use a statement of intent should refer to Section A.11 for applicable guidance.
- Licensees who use a statement of intent should complete Checklist 11-A (in Section A.11).

A.1.4.5 Standby Trust Funds

As noted earlier, funds drawn from a surety bond, letter of credit, parent company guarantee, self-guarantee, or insurance policy must be placed directly into a standby trust fund if the licensee fails to conduct decommissioning as required. A standby trust fund is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source. Funds in the standby trust would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. Standby trusts are necessary because, if the funds from surety or insurance mechanisms were paid directly to the NRC rather than to a standby trust fund, the NRC would be required to deposit the funds in the U.S. Treasury as general revenue. Consequently, the funds would not be available to pay for decommissioning costs.

- Licensees who elect to use a standby trust fund should refer to Section A.12 for applicable guidance.
- Licensees who use a standby trust fund should complete Checklist 12-A (in Section A.12).

A.1.4.6 Special Arrangements with a Government Entity

In cases where the license is being terminated under restricted conditions, licensees may provide financial assurance through a special arrangement deemed acceptable by a governmental entity when the governmental entity assumes custody and ownership of a site. This mechanism may only be used in a financial assurance demonstration that is submitted at the end of licensed operations.

- Licensees who elect to use a special arrangement with a government entity should refer to Section A.13.2.2 for applicable guidance.
- Licensees who use a special arrangement with a government entity should complete Checklist 13-B (in Section A.13).

A.1.5 Recordkeeping

The recordkeeping requirements for licensees are in 10 CFR 30.35(g), 10 CFR 40.36(f), 10 CFR 70.25(g), and 10 CFR 72.30(f). At a minimum, licensees must keep records of the following:

- Spills or other unusual occurrences if contamination remains after any cleanup procedure or if contaminants may have spread to inaccessible areas. These records must include information on nuclides, quantities, forms, and concentrations.
- As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used or stored.
- Records of the cost estimate performed for the DFP or of the amount certified for decommissioning, as well as records of the funding methods used for assuring funds.
- A copy of the financial assurance mechanism and other supporting documentation.

Timely notification should be given to NRC in the following situations:

- Any proposed changes, revisions, and adjustments to the underlying cost estimates and to the financial mechanisms, including a change from one mechanism to another.
- Commencement of bankruptcy action involving the licensee. Written notification of commencement of bankruptcy proceedings is to be submitted, as required by 10 CFR 30.34(h), 10 CFR 40.41(f), 10 CFR 70.32(a)(9), and 10 CFR 72.44(b)(6). For additional information concerning bankruptcy, licensees may refer to Chapters 5 and 6 of NUREG-1556, Volume 15, "Consolidated Guidance About Materials Licenses: Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Material Licenses," issued November 2000.
- Reports that certify completion of the activities for which financial assurance is provided must be submitted to the agency before the financial assurance mechanism may be canceled.

A.1.6 Canceling, Replacing, or Transferring Financial Instruments

The financial assurance mechanisms outlined in this appendix are designed so that licensees may not cancel them without the NRC's approval, even if a replacement instrument is being established. Licensees who wish to cancel their existing financial mechanisms must first submit a replacement to the NRC for review and approval or notify the NRC that decommissioning has been completed. If the licensee provides a replacement mechanism to the NRC for review, the current mechanism will *not* be canceled or released before the NRC's review and approval of the replacement mechanism. Licensees should provide the NRC with adequate time to review proposed replacement mechanisms. Upon the NRC's approval of the replacement mechanism (or termination of the license if decommissioning has been completed), the applicable NRC Deputy Division Director will stamp the current mechanism as "canceled," sign it, and release it to the licensee. Chapter 8 of this volume provides additional detail about returning, canceling, or reducing financial assurance instruments.

If the license holder is expected to change as a result of a corporate acquisition or divestiture, the licensee must obtain the NRC's approval before an existing financial instrument may be transferred or released. If the new license holder intends to establish a new financial instrument to replace the existing one, the NRC must approve the replacement before NRC will release the existing mechanism. The NRC recommends that the licensee communicate with NRC staff concerning any replacement instrument well in advance (at least 60 days) of the scheduled change in licensee or in corporate ownership.

A.2 Certification of Financial Assurance

All licensees required to provide financial assurance under 10 CFR Part 30, 10 CFR Part 40, 10 CFR Part 70, and 10 CFR Part 72 must submit a Certification of Financial Assurance. The following sections describe the use of the Certification of Financial Assurance when using a prescribed amount of financial assurance or when using a DFP. Section A.2.4 provides a Model Certification of Financial Assurance to illustrate a format acceptable to the NRC.

A.2.1 Certification of Financial Assurance Using a Prescribed Amount

For licensees that are not required to submit a DFP, the regulations prescribe three levels of financial assurance—$113,000, $225,000, and $1,125,000. However, the amounts may be revised from time to time, and the regulations must be consulted to determine the currently applicable prescribed amounts when the licensee's financial assurance is reviewed. The dollar amounts shown in this guidance document are for illustrative purposes and must be revised as necessary to meet regulatory requirements. A combination of these amounts is required for licensees authorized to possess more than one type of radioactive material. For example, a licensee authorized to possess sealed sources containing byproduct material ($113,000) and 20 mCi of source material in readily dispersible form ($225,000) would be required to submit financial assurance for the sum of the prescribed amounts, or $338,000. The prescribed amount specified in the regulations becomes the required level of financial assurance coverage. Licensees who use a prescribed amount must undertake the following actions, as summarized in Checklist 2:

- Determine the appropriate prescribed amount (see Section A.2.1).
- Prepare a certification of financial assurance (see Section A.2.2).
- Submit the required documentation (see Section A.2.3).

Licensees using prescribed amounts eventually may have to adjust their financial assurance coverage levels (and update their financial instruments) for one of three reasons:

- The NRC adjusts the prescribed amount specified in the regulations.
- The licensee submits a DFP containing a site-specific cost estimate instead of using a prescribed amount.
- The licensee prepares a DP with a site-specific cost estimate. Certain licensees who notify the NRC that they will terminate activities under their licenses and decommission their facilities must submit DPs (not the same as DFPs). The DP must contain "an updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and a plan for assuring the availability of adequate funds for completion of decommissioning," as required in 10 CFR 30.36(g)(4)(v), 10 CFR 40.42(g)(4)(v), 10 CFR 70.38(g)(4)(v), and 10 CFR 72.54(g)(5).

Checklist 2 Certifications of Financial Assurance Using a Prescribed Amount

License Number(s):_____

Applicable Parts of 10 CFR (check all that apply): ☐ Part 30 ☐ Part 40 ☐ Part 70

☐ Determine the appropriate prescribed amount(s) (see Section A.2.1)

- Amount required under Part 30 for sealed sources:_____
- Amount required under Part 30 for unsealed sources:_____
- Amount required under Part 40:_____
- Amount required under Part 70:_____
- *Total of all prescribed amounts for all licenses*:_____

☐ Prepare certification statement (see Section A.2.2)

☐ Include the necessary documentation (see Section A.2.3):

- ☐ Certification statement (see Section A.2.4)
- ☐ Financial instrument and supporting documentation

In addition, regardless of a particular licensee's eligibility to use a prescribed amount, any licensee may elect instead to use a DFP based on a site-specific cost estimate to determine the required level of financial assurance coverage. Licensees may wish to use a DFP if, for example, they wish to obtain the optimal amount of financial assurance, or because use of prescribed amounts may overstate a facility's decommissioning costs. In addition, a materials licensee may not base its financial assurance for decommissioning on a certification amount when the licensee's site surveys indicate the presence of residual radioactivity in amounts that would prevent the site from meeting the unrestricted use criteria in 10 CFR 20.1402. Guidance on preparing DFPs is presented in Section A.3 of this appendix.

Licensees may be eligible to use a particular prescribed amount depending on the type of license and the types and quantities of materials authorized under the particular license, as summarized below. Licensees authorized to possess only a single isotope may use the table in Attachment 1 to this appendix to determine the appropriate certification amount for a given activity level. Note that the relevant quantities and types of materials are those *authorized* under a particular license, even if a licensee does not currently or usually possess or use these same quantities and types of materials. The following discussion of applicable prescribed amounts is organized into three parts corresponding to the three general license types:

- 10 CFR Part 30—Byproduct Material
- 10 CFR Part 40—Source Material
- 10 CFR Part 70—Special Nuclear Material

Only radionuclides with a half-life of greater than 120 days are included in the determination of financial assurance requirements.

A.2.1.1 10 CFR Part 30 Prescribed Amounts

Title 10 of the *Code of Federal Regulations* Part 30 prescribes three levels of financial assurance. *Check 10 CFR 30.35(d) to determine current specifications for prescribed amount.* The following apply to the use of prescribed amounts by 10 CFR Part 30 licensees.

- **The lowest level prescribed amount of $113,000 applies** to 10 CFR Part 30 licensees who are authorized to possess or use sealed sources or plated foils with a half-life greater than 120 days:
  - in amounts greater than 10^{10} times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment A.2 to this appendix); or
  - for a *combination* of isotopes, if R divided by 10^{10} is greater than 1 (when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30).
- **The middle level prescribed amount of $225,000 applies** to 10 CFR Part 30 licensees who are authorized to possess or use unsealed byproduct material with a half-life greater than 120 days:
  - in amounts greater than 10^3 but less than or equal to 10^4 times the applicable quantities of Appendix B to 10 CFR Part 30; or
  - for a *combination* of isotopes, if R divided by 10^3 is greater than 1 but if R divided by 10^4 is less than or equal to 1 (when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30).
- **The highest level prescribed amount of $1,125,000 applies** to 10 CFR Part 30 licensees who are authorized to possess or use unsealed byproduct material with a half-life greater than 120 days in amounts exceeding the limit applicable to the $225,000 prescribed amount, as stated above, but—
  - in amounts greater than 10^4 but less than or equal to 10^5 times the applicable quantities of Appendix B to 10 CFR Part 30; or
  - for a *combination* of isotopes, if R divided by 10^4 is greater than 1 but if R divided by 10^5 is less than or equal to 1 (when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30).

- ***A prescribed amount may not be used*** for a 10 CFR Part 30 license authorizing the possession or use of byproduct material in amounts exceeding the limit applicable to the highest level prescribed amount ($1,125,000), as stated above. These licensees must prepare DFPs, as discussed in Section A.3.
- ***No financial assurance is required*** for a 10 CFR Part 30 licensee who is authorized to possess or use (1) unsealed byproduct material with a half-life greater than 120 days in amounts less than or equal to 10^3 times the applicable quantities of Appendix B to 10 CFR Part 30 (reproduced as Attachment 2 to this appendix) or, for a combination of isotopes, if R divided by 10^3 is less than or equal to 1, when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30, *or* (2) sealed sources or plated foils in amounts less than or equal to 10^{10} times the applicable quantities of Appendix B to 10 CFR Part 30 or, for a combination of isotopes, if R divided by 10^{10} is less than or equal to 1, when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30. No financial assurance is required for licensees possessing only byproduct material with a half-life of 120 days or less.

A.2.1.2 10 CFR Part 40 Prescribed Amounts

Title 10 of the *Code of Federal Regulations* Part 40 prescribes one level of financial assurance. *Check 10 CFR 40.36(d) to determine current specifications for prescribed amount.* The following apply to the use of prescribed amounts by 10 CFR Part 40 licensees:

- ***A prescribed amount of $225,000 applies*** to a 10 CFR Part 40 licensee who is authorized to possess or use source material in a readily dispersible form in amounts greater than 10 mCi but less than or equal to 100 mCi.
- ***A prescribed amount may not be used*** for 10 CFR Part 40 licensees authorized to possess or use source material in a readily dispersible form in amounts greater than 100 mCi. These licensees must prepare DFPs, as discussed in Section A.3.
- ***No financial assurance is required*** for 10 CFR Part 40 licensees who are authorized to possess or use source material in a readily dispersible form in amounts less than or equal to 10 mCi. No financial assurance is required for licensees possessing only source material that is not in a readily dispersible form.

A.2.1.3 10 CFR Part 70 Prescribed Amounts

Title 10 of the *Code of Federal Regulations* Part 70 prescribes two levels of financial assurance. The following apply to the use of prescribed amounts by 10 CFR Part 70 licensees. *Check 10 CFR 70.25(d) to determine current specifications for prescribed amount.*

- **The middle level prescribed amount of $225,000** applies to a 10 CFR Part 70 licensee who is authorized to possess or use unsealed special nuclear material as follows:
  - in amounts greater than 10^3 but less than or equal to 10^4 times the applicable quantities of Appendix B to 10 CFR Part 30; or

  - for a *combination* of isotopes, if R divided by 10^3 is greater than 1 but if R divided by 10^4 is less than or equal to 1 (when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30).

- **The highest level prescribed amount of $1,125,000** applies to a 10 CFR Part 70 licensee who is authorized to possess or use unsealed special nuclear material in amounts exceeding the limit applicable to the $225,000 prescribed amount, as stated above, but—
  - in amounts greater than 10^4 but less than or equal to 10^5 times the applicable quantities of Appendix B to 10 CFR Part 30; or
  - for a *combination* of isotopes, if R divided by 10^4 is greater than 1 but if R divided by 10^5 is less than or equal to 1 (when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30).
- ***A prescribed amount may not be used*** for a 10 CFR Part 70 license authorizing the possession or use of unsealed special nuclear material in amounts exceeding the limit applicable to the highest level prescribed amount ($1,125,000), as stated above. These licensees must prepare DFPs, as discussed in Section A.3.
- ***No financial assurance is required*** for a 10 CFR Part 70 license authorizing the possession or use of unsealed special nuclear material in amounts less than or equal to 10^3 times the applicable quantities of Appendix B to 10 CFR Part 30 or, for a combination of isotopes, if R divided by 10^3 is less than or equal to 1 when R is defined as the sum of the ratios of the quantity of each isotope to the applicable value in Appendix B to 10 CFR Part 30. No financial assurance is required for licensees possessing only special nuclear material in sealed form.

A.2.2 Preparing the Certification of Financial Assurance

All licensees who are required to provide financial assurance must prepare a certification of financial assurance. In the certification of financial assurance, the licensee certifies that it has obtained financial assurance in the appropriate amount and provides the details needed to verify that the amount is accurate under NRC regulations. As discussed above, these details include the license type and the types and amounts of materials authorized by the license.

The NRC staff considers the model wording for certifications of financial assurance presented in Section A.2.4 to be acceptable. Although other wording may also be satisfactory, all certifications of financial assurance should clearly identify the licensee, the license number, the type of license (e.g., 10 CFR Part 30), the types and amounts of materials authorized by the license (including specific isotopes where applicable), the appropriate amount of financial assurance, and a certification that the information presented in the statement is accurate.

A.2.3 Submitting the Required Documentation

Under NRC's financial assurance regulations 10 CFR 30.35(b)(2), 10 CFR 40.36(b)(2), and 10 CFR 70.25(b)(2), licensees who use prescribed amounts of financial assurance must submit the following to the NRC:

- The certification of financial assurance (regulatory guidance is provided in Section A.2.2); and
- An *originally signed duplicate* of the financial instruments obtained to provide financial assurance for decommissioning. This appendix describes the allowable financial instruments first in general terms, in Section A.1, and then in detail beginning in Section A.4. Licensees should refer to these other sections to ensure that their financial assurance instruments and supporting documentation will be acceptable to the NRC. Licensees under 10 CFR Part 72 are not required to submit originals of the financial assurance documents. If certain information in the financial instrument (licensee's name, license number, and docket number and the name, address, and other contact information of the issuer, and, if a trust is used, the trustee) changes, the licensee must, within 30 days, submit financial instruments reflecting such changes.

In addition to submitting these materials, licensees must maintain records of the amount of financial assurance certified for decommissioning and the funding methods used for assuring funds (e.g., a copy of the financial instruments and all supporting documentation).

A.2.4 Model Certification of Financial Assurance

CERTIFICATION OF FINANCIAL ASSURANCE

Principal: [*Legal names and business address of licensee*]
NRC license number, name, and address of the facility

Issued to: U.S. Nuclear Regulatory Commission

I certify that [*insert name of licensee*] is licensed to possess the following types of [*insert all that apply: "sealed sources or plated foils with a half-life greater than 120 days licensed under 10 CFR Part 30," "unsealed byproduct material with a half-life greater than 120 days licensed under 10 CFR Part 30," "source material in a readily dispersible form licensed under 10 CFR Part 40," "unsealed special nuclear material licensed under 10 CFR Part 70" and "spent nuclear fuel, high-level radioactive waste, and reactor-related greater than Class C waste licensed under 10 CFR Part 72"*] in the following amounts:

Type of Material	Amount of Material
[*List materials and quantities of materials noted above. For* ***byproduct materials*** *and* ***special nuclear materials****, list separately the type and amount of* ***each isotope*** *authorized by the license.*]	

I also certify that financial assurance in the amount of [*insert the total of all prescribed amounts calculated from Checklist 2 or the amount of the site-specific cost estimate, in U.S. dollars*] has been obtained for the purpose of decommissioning as prescribed by 10 CFR Part [*insert 30, 40, 70, or 72*].

[*This paragraph is needed* ***for a 10 CFR Part 72 licensee (10 CFR 72.30(e)(5)) only*** *that qualifies to use an external sinking fund that is not coupled with another form of financial assurance.*] I also certify that [*insert name of licensee*] is qualified to use the assurance method of 10 CFR 72.30(e)(5) or 10 CFR 50.75(e)(1)(ii), and [*insert name of licensee*] either (1) recovers the total cost of decommissioning through rates established by "cost of service" or similar ratemaking regulation or (2) has a source of revenues for its external sinking fund that is a "non-bypassable charge," the total amount of which will provide funds needed for decommissioning. As of [*insert date*], $[*insert dollar amount*] has been collected for decommissioning. Therefore, $[*insert dollar amount*] remains to be collected for decommissioning. The remaining funds needed for decommissioning will be collected [*insert frequency (i.e., monthly, semi-annually, annually*])] over the next [*insert time period*] in the amount of $[*insert dollar amount*].

[*This paragraph is needed* ***for 10 CFR Part 72 licensees (10 CFR 72.30(e)) only.***] Contact information for this certification of financial assurance by [*insert name of licensee*] is the following: [*insert the licensee's name, license number, and docket number and the name, address, contact person, and phone number of the issuer or guarantor and of the trustee*].

[*Signatures and titles of officials of institution*]
[*Corporate seal*]
[*Date*]

A.2.5 Certification of Financial Assurance Using a Decommissioning Funding Plan

The DFPA Certification of Financial Assurance must be included with the DFP. The format illustrated in Section A.2.4 should be used. The amount certified must cover the full amount of the cost estimate submitted in the DFP.

A.3 Decommissioning Funding Plans

A DFP is a financial assurance demonstration that is based on a site-specific cost estimate for decommissioning the facility. The amount of the facility-specific cost estimate becomes the minimum required level of financial assurance coverage. Any licensee may use a DFP, but certain licensees *must* use a DFP, as discussed in Section A.1. Licensees who use DFPs must undertake the following actions, as summarized in Checklist 3:

- Prepare a site-specific decommissioning cost estimate (see Section A.3.1).
- Determine the means that will be used to adjust the cost estimate and associated funding levels periodically over the life of the facility (see Section A.3.2).
- Submit the required documentation (see Section A.3.3).

Checklist 3 Decommissioning Funding Plans

License Number(s):_____

Applicable Parts of 10 CFR (check all that apply): ☐ Part 30 ☐ Part 40 ☐ Part 70 ☐ Part 72

☐ Prepare a detailed, site-specific cost estimate (see Section A.3.1).

☐ Determine the means that will be used to adjust the site-specific cost estimate and associated funding levels periodically over the life of the facility (see Section A.3.2).

☐ Include the necessary documentation (see Section A.3.3).

☐ Include a detailed, site-specific cost estimate that includes the following (see Section A.3.4):

- ☐ Detailed facility description
- ☐ Description of the means that will be used to adjust the site-specific cost estimate and associated funding level
- ☐ A certification statement that financial assurance for decommissioning has been provided in the amount of the decommissioning cost estimate (see Section A.2.4)

☐ Include a financial instrument and supporting documentation.

A.3.1 Preparing the Site-Specific Cost Estimate

In evaluating decommissioning cost estimates, the NRC considers the following factors:

- the completeness of the estimate (i.e., scope);
- the level of detail presented; and
- the reasonableness of the estimate (i.e., the accuracy and magnitude of estimated costs).

For updates or revisions to a cost estimate, the NRC will also evaluate the following:

- the adequacy of the historical site assessment (HSA); and
- the adequacy of the characterization survey.

These factors are discussed briefly below. Sections A.3.1.1 through A.3.1.3 outline or describe the three basic parts of a cost estimate: the facility description, the estimated decommissioning costs, and key assumptions. Section A.3 concludes with a series of cost estimating tables that can assist licensees in preparing decommissioning cost estimates that are likely to be acceptable to NRC.

The site-specific cost estimate required for a DFP must assume that the work will be performed by an independent third party and should represent the licensee's best approximation of all direct and indirect costs of decommissioning its facilities under routine facility conditions. The assumption that routine facility conditions will prevail at the time of decommissioning implies that the cost estimate need not consider a worst-case decommissioning scenario. Similarly, however, the estimate should not be based on a scenario that is more optimistic than would be consistent with routine facility conditions. By way of example, the NRC believes it reasonable for decommissioning cost estimates to assume the following:

- Inventories of materials and wastes at the time of decommissioning will be in amounts that are consistent with routine facility conditions over time. For example, if radioactive waste is continually generated but is not disposed until after a certain period of time (e.g., 3 months) has elapsed, then it is reasonable for the cost estimate to assume that, at the time of decommissioning, the facility will have an inventory of waste equal to that typically on site just prior to routine disposal (i.e., a 3-month inventory).
- Decommissioning activities take place immediately on cessation of operations without multiyear storage-for-decay periods.
- Decommissioning will meet the criteria for unrestricted release, unless a successful demonstration has been made that the provisions of 10 CFR 20.1403, "Criteria for license termination under restricted conditions," can be met.

Decommissioning activities do not need to include removal or disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license.

A decommissioning cost estimate should contain a substantial level of detail, consistent with the guidance presented in this section, to allow the NRC to fully evaluate the adequacy of the estimate. A series of cost estimating tables are provided at the end of this section to assist licensees in preparing decommissioning cost estimates that contain sufficient detail and are likely to be acceptable to NRC. *The NRC staff recommends that licensees pattern their cost estimates after the cost estimating tables presented at the end of this section.*

The labor estimates, material costs, and other factors of the cost estimate should have a clear and reasonable basis. Licensees may wish to consider the use of NRC-provided cost information such as that found in NUREG/CR-6477, "Revised Analyses of Decommissioning Reference Non-Fuel-Cycle Facilities," issued July 1998, and other NRC cost estimating references. The bibliography of this appendix cites other documents that may help in calculating estimates for decommissioning costs.

Complete decommissioning cost estimates contain three basic parts:

- a facility description, including subsurface;
- the estimated decommissioning costs (including labor costs, nonlabor costs, and a contingency factor); and
- identification and justification of the key assumptions used in the decommissioning cost estimate.

These parts of cost estimates are discussed separately below and have been incorporated into the cost estimating tables at the end of Section A.3.

A.3.1.1 Facility Description

The facility description provides the basic context of the estimate. It should include both general and specific information, including the following:

- license number and type;
- specific quantities and types of materials authorized by the license (e.g., by specific isotope);
- general discussion of how licensed materials are used in the licensee's operations;
- description of facility buildings, rooms, and grounds, including the number and dimensions of areas (e.g., laboratories) that require decontamination;
- number and dimensions of facility components (e.g., fume hoods, glove boxes, laboratory benches, ductwork) that require decontamination;
- an estimate of the volume of contaminated material, including that in the subsurface, containing residual radioactivity that will require remediation to meet the criteria for license termination; and
- quantities of materials or waste accumulated prior to shipping or disposal (if applicable).

The facility description should also address any other characteristics of the facility that need to be understood to evaluate the estimated decommissioning costs.

A.3.1.2 Estimated Decommissioning Costs

The cost estimate must account for the costs of all phases of the decommissioning process. The estimate should itemize each of the major decommissioning tasks or activities and should distinguish between labor costs and nonlabor costs, as described in Sections A.3.1.2.1 and A.3.1.2.2. The estimate should also explicitly incorporate a contingency factor, as discussed in Section A.3.1.2.3. Estimated costs must be based on reasonable and documented assumptions and provide sufficient funds to allow an independent third party to assume responsibility for and carry out the decommissioning of the facility if the licensee is unable to do so.

A.3.1.2.1 Labor Costs

Labor costs associated with all decommissioning tasks and activities must include basic wages and benefits for staff of a third-party contractor performing decommissioning-related tasks, overhead costs, and contractor profit (sufficient to allow an independent third party to carry out the decommissioning project). The source for the labor costs (e.g., Bureau of Labor Statistics' schedules of labor rates for specified areas of the country; current commonly used standard cost estimating manuals; or labor costs in current or projected third-party contracts with the licensee) should be described in sufficient detail to allow the NRC staff to confirm them. Licensees also should consider including other supporting material, such as electronic versions of spreadsheets used to build the cost estimate and web addresses for Internet-accessible data. The term "overhead" typically includes costs that are not directly traceable to any particular product produced or project conducted by the firm. Thus, overhead typically includes "period" costs, such as insurance, utilities, rent, supplies, property taxes, depreciation, and the costs of any wages, salaries, and benefits incurred as a result of the corporation's officers and support staff (e.g., accounting staff, legal staff, janitorial staff, security staff). To spread such costs across multiple products or projects fairly, firms usually calculate an "indirect" overhead rate that is applied to all direct labor hours (i.e., on those labor hours that are directly associated with particular products or projects). Licensees should provide justification for the overhead rates assumed in the cost estimate. Labor costs should be broken out by major task or activity; example categories include the following:

- planning and preparation of the facility and site for decommissioning, including activities such as preparing a detailed DP, preparing other State or local documentation, developing work plans, performing staff training, procuring special equipment, and characterizing the radiological condition of the facility;
- decontamination or dismantling of radioactive facility components;
- restoration of contaminated areas on facility grounds, if necessary;
- a final radiation survey (including sampling); and
- site stabilization and long-term surveillance, if necessary.

The cost estimate should also describe the techniques and methods that will be used to decontaminate facility components because these decontamination methods will impact the amount of labor required. If any of the decommissioning tasks or activities listed above do not apply to a particular facility, the estimate should explain why this is the case.

A.3.1.2.2 Nonlabor Costs

Nonlabor costs also are likely to arise during decommissioning; these costs may include the following:

- packing materials;
- shipping costs (these could be classified as labor costs for some facilities);
- disposal costs;
- other equipment and supplies (e.g., personal protective equipment, brushes);
- laboratory costs (including transport of samples to a third-party laboratory, testing and analysis, etc.); and
- miscellaneous expenses (e.g., license fees, insurance, taxes, security).

A.3.1.2.3 Contingency Factor

Because of the uncertainty in contamination levels, waste disposal costs, and other costs associated with decommissioning, the cost estimate is required to apply an "adequate" contingency factor. In general, a contingency of 25 percent applied to the sum of all estimated decommissioning costs should be adequate, but in some cases a higher contingency may be appropriate. The 25 percent contingency factor provides reasonable assurance for *unforeseen* circumstances that could increase decommissioning costs and should not be reduced or eliminated simply because foreseeable costs are low. Proposals to apply the contingency only to selected components of the cost estimate, or to apply a contingency lower than 25 percent, should be approved only in circumstances when a case-specific review has determined that there is an extremely low likelihood of unforeseen increases in the decommissioning costs (e.g., if the decommissioning costs are highly predictable and are established by binding contracts.)

The NRC's recommendation for the use of a 25-percent contingency factor is consistent with the analysis and guidance contained in NUREG/CR-6477, which applies a 25 percent contingency factor to all estimated costs associated with decommissioning various reference facilities.

A.3.1.3 Key Assumptions

The licensee must identify and adequately justify the key assumptions used in the decommissioning cost estimate. For example, claims of low levels of contamination should be supported by test results or by adequate discussion of how the licensed materials are used throughout the facility. Unusual items, such as disposal of radioactive materials at zero costs,

should be supported by relevant information (e.g., disposal agreements, contracts, or other information). In general, justifications based on "past experience" are likely to be adequate only if the past experience is relevant; therefore, the cost estimate should compare comparable decommissionings with respect to facilities, materials, processes, management, regulatory requirements, and price levels. If cost models are used, the models should be described in enough detail to determine whether they are adequate and appropriate given the characteristics of the facility.

The cost estimate should clearly state that it does not take credit for any *salvage value* that might be realized from the sale of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning. If estimated credits are taken for salvage value but are not fully realized at the time of decommissioning, the cost estimate (as well as the financial assurance) may be significantly low. In some instances, the NRC may approve credit for salvage value based on its review of explicit documentation provided by the licensee to justify the credit.

A.3.2 Adjusting the Cost Estimate

Licensees who use DFPs must specify the means (i.e., the method and frequency) by which they will periodically adjust their cost estimates and associated funding levels over the life of their facilities. In general, cost estimates should be updated with the current prices of goods and services at least every 3 years or when the amounts or types of material at the facility change. Triennial adjustments should be made to account for inflation, for other changes in the prices of goods and services (e.g., disposal cost increases), for changes in facility conditions or operations, and for changes in expected decommissioning procedures.

Experience with decommissioning sites indicates that certain operational events can affect the decommissioning cost estimate. The following types of events must be evaluated in the triennial adjustment for their effect on the decommissioning cost estimate:

- Leaks and spills—Facilities with fluid processes may have unplanned and uncontrolled leaks or spills. Occasionally leaks or spills will exceed the confinement capability of the facility or occur in an unconfined area and migrate into the environment. Once in the environment, the contaminants may spread through the subsurface, resulting in a potentially large volume of residual radioactivity in the subsurface that will require remediation before license termination. When such residual radioactivity is identified, the cost of remediating it must be included in the decommissioning cost estimate.
- Licensees should be alert for opportunities to reduce their decommissioning costs through voluntary activities to address leaks and spills. Two activities can be undertaken by licensees to limit the amount of financial assurance that will be required. First, by evaluating their processes that handle large volumes of fluids, installing process instrumentation sufficiently sensitive to detect small system losses, placing moisture monitors in areas not readily available for visual inspection, utilizing other leak detection systems, reengineering systems to eliminate hard-to-monitor features or components, and installing sumps and berms, licensees can reduce the possibility of experiencing subsurface residual radioactivity and minimize remediation costs (see Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," issued June 2008). Second, by

remediating spills and leaks promptly after their detection and quickly removing any residual radioactivity before it spreads, the amount of remediation will be decreased. Licensees will be able to avoid increasing their cost estimates to cover the costs that they would incur if they waited until the time of decommissioning to remediate the residual radioactivity. Prompt cleanup of spills and leaks during operations must meet occupational and public dose limits, but does not necessarily have to reduce residual radioactivity to meet the radiological criteria for license termination. The amount of prompt material cleanup may be selected by an analysis of present versus future remediation costs, in order to reduce decommissioning costs. However, the amount of radioactive material, if any, remaining after cleanup efforts have been completed must be evaluated to determine whether the amount of financial assurance for decommissioning needs to be increased.

- Newly detected soil or groundwater contamination—If new locations of soil or groundwater contamination are identified during site characterization prior to decommissioning or during decommissioning, the materials present must be identified and the cost of cleanup must be included in the cost estimate.
- Increased waste inventory—The decommissioning cost estimate should include an estimate of waste remaining on site that will need dispositioning when the site is decommissioned. When the cost exceeds the amount provided in the previous estimate, the licensee must make an adjustment to account for the costs.
- Increased disposal costs—The cost estimate must include up-to-date disposal costs.
- Facility modifications—Modifications to the facility must be evaluated for their effects on decommissioning costs and the estimate adjusted appropriately.
- Changes in authorized possession limits—Changes in authorized possession limits may result in increasing the cost of decommissioning due to larger expected inventories of waste material, extensions to the area of contaminated surfaces, or additional volume of contaminated material that must be disposed of during decommissioning.
- Actual remediation costs that exceed the decommissioning cost estimate—During decommissioning, the actual expenditures should be tracked and compared in detail with the decommissioning cost estimate. The reasons why actual costs may be exceeding the estimated costs should be identified and evaluated. Both the cost estimate and the level of available funding should be increased in a timely manner.
- Onsite disposal—Onsite disposals must be evaluated to determine if they must be remediated to meet decommissioning criteria. If remediation will be required, then the cost must be included in the decommissioning cost estimate.
- Use of a settling pond—Settling pond remediation must be included in the decommissioning cost estimate and include reasonable estimates of pond leakage.

A.3.3 Submitting the Required Documentation

Under NRC's financial assurance regulations (10 CFR 30.35(e), 10 CFR 40.36(d), 10 CFR 70.25(e), and 10 CFR 72.30(b)), licensees who use DFPs must submit the following to the NRC:

- a detailed site-specific cost estimate for decommissioning (regulatory guidance is provided in Section A.3.1);
- a description of the means that will be used to adjust the site-specific cost estimate and associated funding levels periodically over the life of the facility (regulatory guidance is provided in Section A.3.2);
- a certification of financial assurance by the licensee that financial assurance for decommissioning has been provided in the amount of the decommissioning cost estimate; and
- an originally signed duplicate of the financial instruments that provide financial assurance for decommissioning.

10 CFR Part 72 licensees are not required to submit originals of the financial assurance documents. If certain information in the financial instrument (licensee's name, license number, and docket number and the name, address, and other contact information of the issuer, and, if a trust is used, the trustee) changes, the licensee must, within 30 days, submit financial instruments reflecting such changes.

This appendix describes the allowable financial instruments in general terms in Section A.1 and in detail beginning in Section A.4. Licensees should refer to these sections to ensure that their financial assurance instruments and supporting documentation will be acceptable to the NRC.

In addition to submitting these materials to the NRC, licensees must maintain records of these materials in their files. Licensees must adjust the cost estimate and submit the adjusted DFP to the NRC every three years.

A.3.4 Facility Description Summary

NRC license numbers and types (i.e., Parts 30, 40, 70, and 72).
Types and quantities of materials authorized under the licenses listed above.
Description of how licensed materials are used. (Use additional sheets as necessary.)
Description of facility, including buildings, rooms, grounds, and description of where particular types of materials are used. (Use additional sheets as necessary)
Quantities of materials or waste accumulated before shipping or disposal. (Use additional sheets as necessary)
Volume of contaminated material, including that in the subsurface, containing residual radioactivity that will require remediation.

A.3.5 Number and Dimensions of Facility Components

Use this table to summarize relevant features of the facility. Copy and complete the table as necessary for each room, laboratory, or area. Rooms, laboratories, or areas with similar levels of contamination may be consolidated in one table.

Name of room, laboratory, or area: _____

Level of contamination: _____

Component	Number of Components	Dimensions of Component (specify units)	Total Dimensions (specify units)
Glove Boxes			
Fume Hoods			
Lab Benches			
Sinks			
Drains			
Floors			
Walls			
Ceilings			
Ventilation/Ductwork			
Hot Cells			
Equipment/Materials			
Soil Plots			
Storage Tanks			
Storage Areas			
Radwaste Areas			
Scrap Recovery Areas			
Maintenance Shop			
Equipment Decontamination Areas			
Utilities/Piping			
Other (specify)			

A.3.6 Planning and Preparation (Workdays)

Estimate the number of workdays, by specific labor category, that will be required to complete planning and preparation activities. Include all appropriate labor categories, including Supervisor, Foreman, Craftsman, Technician, Health Physicist, Laborer, Clerical, and others as needed.

Activity	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
Preparation of Documentation for Regulatory Agencies						
Submittal of Decommissioning Plan to NRC when required by 10 CFR 30.36(g)(1), 10 CFR 40.42(g)(1), 10 CFR 70.38(g)(1), or 10 CFR 72.54(g).						
Development of Work Plans						
Procurement of Special Equipment						
Staff Training						
Characterization of Radiological Condition of the Facility (including sampling, soil and tailings analysis, or groundwater analysis, if applicable)						
Administrative Fees (such as procurement fees for third-party contractor, legal fees, local permits, utilities, financial assurance fees, and NRC staff review of these items)						
Other (specify)						
TOTALS						

A.3.7 Decontamination or Dismantling of Radioactive Facility Components (Workdays)

Estimate the number of workdays, by specific labor category, which will be required to complete decontamination and/or dismantling activities for each facility component. Copy and complete this table as necessary for each room, laboratory, or area. Rooms, laboratories, or areas with similar levels of contamination may be consolidated in one table.

Name of room, laboratory, or area: _____

Level of contamination: _____

Component	Decon. Method	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
Glove Boxes							
Fume Hoods							
Lab Benches							
Sinks							
Drains							
Floors							
Walls							
Ceilings							
Ventilation/ Ductwork							
Hot Cells							
Equipment/ Materials							
Soil Plots							
Storage Tanks							
Storage Areas							
Radwaste Areas							
Scrap Recovery Areas							
Maintenance Shop							
Equipment Decontamination Areas							
Other (specify)							
TOTALS							

A.3.8 Restoration of Contaminated Areas on Facility Grounds (Workdays)

Estimate the number of workdays, by specific labor category, required to restore contaminated areas on facility grounds.

Activity	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
Backfill and Restore Site						
TOTALS						

A.3.9 Final Radiation Survey (Workdays)

Estimate the number of workdays, by specific labor category, required to conduct a final radiation survey.

Activity	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
TOTALS						

A.3.10 Site Stabilization and Long-Term Surveillance (Workdays)

Estimate the number of workdays, by specific labor category, required to complete site stabilization and long-term surveillance activities.

Activity	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
TOTALS						

A.3.11 Total Workdays by Labor Category

Enter the total workdays estimated for each specific labor category from the applicable table above (i.e., from the bottom rows of Tables A.3.6 through A.3.10).

Task	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category	Labor Category
Planning and Preparation (TOTALS from Table A.3.6)						
Decontamination or Dismantling of Radioactive Facility Components (Sum of TOTALS from all copies of Table A.3.7)						
Packaging, Shipping, and Disposal of Radioactive Wastes						
Restoration of Contaminated Areas on Facility Grounds (TOTALS from Table A.3.8)						
Final Radiation Survey (TOTALS from Table A.3.9)						
Site Stabilization and Long-Term Surveillance (TOTALS from Table A.3.10)						

A.3.12 Worker Unit Cost Schedule

Estimate labor costs (including salary, fringe benefits, and corporate overhead). Include all appropriate labor categories, including Supervisor, Foreman, Craftsman, Technician, Health Physicist, Laborer, Clerical, and others as needed.

Labor Cost Component	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**
Salary & Fringe ($/year)*						
Overhead Rate (%)						
Total Cost Per Year						
Total Cost Per Workday**						
Note: * Source: ** Based on _____ workdays per year (e.g., 260 days).						

A.3.13 Total Labor Costs by Major Decommissioning Task

Multiply the estimated workdays for each specific labor category (from Table A.3.11) by the total cost per workday for the corresponding labor category (from Table A.3.12), and enter the results in the table below. Then, add across all labor categories to determine the total labor costs for each major decommissioning task.

Task	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**	**Labor Category**	**Total Labor Cost**
Planning and Preparation							
Decontamination or Dismantling of Radioactive Facility Components							
Packaging, Shipping, and Disposal of Radioactive Wastes*							
Restoration of Contaminated Areas on Facility Grounds							
Final Radiation Survey							
Site Stabilization and Long-Term Surveillance							

* If labor costs are included in the packaging, shipping, and disposal costs listed in Tables A.3.14(a)–(c), add a note to the decommissioning cost estimate that labor was included in those costs.

A.3.14 Packaging, Shipping, and Disposal of Radioactive Wastes (Excluding Labor Costs)

If labor is included in these costs, add a note to the cost estimate that these costs include labor.

(a) Packing Material Costs

Estimate the types and volumes of waste expected to be generated, along with the number and types of containers required for packaging the waste. Multiply the number of containers required by the unit cost per container.

Waste Type	Volume (m^3)	Number of Containers	Type of Container	Unit Cost of Container	Total Packaging Costs
TOTAL			-	-	

(b) Shipping Costs

Estimate the number of truckloads of waste to be shipped. Multiply shipping costs per mile (including truckload costs, surcharges, and overweight charges) by the total distance shipped.

Waste Type	Number of Truckloads	Unit Cost ($/mile/ truckload)	Surcharges ($/mile)	Overweight Charges ($/mile)	Distance Shipped (miles)	Total Shipping Costs
TOTAL		-	-	-	-	

(c) Waste Disposal Costs

Estimate the volume of waste to be disposed. Multiply the volume of waste disposed by the unit disposal cost (including any volume-based surcharges). Add any surcharges that are based on the number of containers of waste.

Waste Type	Disposal Volume (m^3)	Unit Cost ($/$m^3$)	Surcharges ($/$m^3$ or $/container)	Total Disposal Costs
TOTAL			-	

A.3.15 Equipment/Supply Costs (Excluding Containers)

Estimate the quantity of equipment and supplies required for decommissioning and multiply that quantity by the appropriate unit costs.

Equipment/Supplies	Quantity	Unit Cost	Total Equipment/ Supply Cost
TOTAL	-	-	

A.3.16 Laboratory Costs

If applicable, estimate costs for analyses to be performed by an independent third-party laboratory.

Activity	Total Cost
Sampling	
Transport of samples	
Testing and analysis	
Other (specify)	
TOTAL	

A.3.17 Miscellaneous Costs

Estimate any other applicable costs.

Cost Item	Total Cost
License Fees	
Insurance	
Taxes	
Other (specify)	
TOTAL	

A.3.18 Total Decommissioning Costs

Enter the total costs reported in Table A.3.13, Table A.3.14(a)–(c), Table A.3.15, Table A.3.16, and Table A.3.17 into the appropriate cells below, and add them to obtain a subtotal. Add to the subtotal a contingency allowance in the amount of 25 percent of the subtotal to obtain the total decommissioning cost estimate. Also, calculate for each task/component the percentage it represents of the subtotal.

Task/Component	Cost	Percentage
Planning and Preparation (From Table A.3.13)		
Decontamination and/or Dismantling of Radioactive Facility Components (From Table A.3.13)		
Restoration of Contaminated Areas on Facility Grounds (From Table A.3.13)		
Final Radiation Survey (From Table A.3.13)		
Site Stabilization and Long-Term Surveillance (From Table A.3.13)		
Packing Material Costs (TOTAL from Table A.3.14(a))		
Shipping Costs (TOTAL from Table A.3.14(b))		
Waste Disposal Costs (TOTAL from Table A.3.14(c))		
Equipment/Supply Costs (TOTAL from Table A.3.15)		
Laboratory Costs (TOTAL from Table A.3.16)		
Miscellaneous Costs (TOTAL from Table A.3.17)		
Contractor Overhead and Profit		
SUBTOTAL		100%
25% Contingency		
TOTAL DECOMMISSIONING COST ESTIMATE		

A.4 Trust Funds

A *trust fund* functions much like a savings account except that (1) monies are legally segregated for a specific purpose and (2) the funds are administered by someone with a fiduciary responsibility to keep or use the property in the fund for the benefit of the beneficiary. A decommissioning trust is governed by an irrevocable, three-party written agreement in which the licensee (called the *grantor* or, less frequently, the trustor or settlor) transfers an amount of cash, securities, or other liquid assets at least equal to the cost of decommissioning to a *trustee*, such as a bank. The trustee manages the fund according to the terms of the written agreement for the benefit of the *beneficiary*. Although the NRC is indicated as the beneficiary, the agency does not receive funds from the trust. The NRC can direct the trustee to pay funds to the licensee, who in turn carries out decommissioning. If the licensee is unable or unwilling to perform decommissioning, the NRC can direct the trustee to pay funds to a third-party contractor, who will perform the work. The NRC cannot under 31 U.S.C. 3302(b) receive funds directly.

The following sections discuss the primary criteria the NRC will use to determine the acceptability of particular trust fund submissions:

- Section A.4.1 describes qualifications required of the trustee.
- Section A.4.2 addresses funding and the adequacy of coverage.
- Section A.4.3 discusses the documentation that supports a trust fund.
- Section A.4.4 presents a model trust fund submission acceptable to the NRC.

This section also contains two checklists designed to assist licensees in preparing acceptable decommissioning trusts. Checklist 4-A summarizes the primary criteria used by the NRC to evaluate trust funds. Checklist 4-B (which should be used only by licensees who revise or do not use the model wording for trust agreements) presents terms and conditions that are recommended for trust agreements.

Checklist 4-A Trust Funds

☐ Documentation is complete when the following are included:

- ☐ 1. trust agreement (originally signed duplicate);
- ☐ 2. Schedule A;
- ☐ 3. Schedule B;
- ☐ 4. Schedule C;
- ☐ 5. specimen certificate of events;
- ☐ 6. specimen certificate of resolution;
- ☐ 7. letter of acknowledgment;
- ☐ 8. receipt or statement from the trustee showing the trust's current market value; and
- ☐ 9. Checklist 4-B (if model trust wording is modified or not used).

☐ The trustee is qualified when the following conditions are met:

- ☐ The financial institution is regulated by a Federal or State agency.
- ☐ The financial institution has authority to act as a trustee and has trust operations that are regulated and examined by a Federal or State agency.

☐ The trust's current market value equals or exceeds the required coverage level.

Checklist 4-B Terms and Conditions Needed in Decommissioning Trust Agreements

Use this checklist only if deviating from the wording recommended in Section A.4.4. The referenced sections are to the model trust fund agreement.

☐ Execution date of trust includes the following:

- ☐ Purpose of trust ("whereas" clauses).
- ☐ Statement of licensee's regulatory obligations as reason for the trust fund.
- ☐ Grantor or grantors (introductory paragraph).
- ☐ Trustee or trustees (introductory paragraph) includes the following:
  - ☐ 1. names and addresses; and
  - ☐ 2. bank or corporate trustee.

☐ Identification of facilities (name, address, and license number) and cost estimates or prescribed amounts (Section 2 and Schedule A).

- ☐ Words of transfer, conveyance, and delivery in trust (Section 3).
- ☐ Description of trust property (Section 4 and Schedule B) includes the following:
  - ☐ 1. cash;
  - ☐ 2. securities; and
  - ☐ 3. other liquid assets.
- ☐ Additions to trust (Section 4).
- ☐ Distribution of trust principal (Section 5) includes the following:
  - ☐ 1. disbursement to licensee upon proper certification;
  - ☐ 2. payment for activities at NRC's direction in writing;
  - ☐ 3. refund to grantor at NRC's written specification upon completion of decommissioning; and
  - ☐ 4. maximum withdrawal of funds at one time for a particular license is limited to 10 percent of the remaining funds available for that license unless NRC written approval is attached.
- ☐ Trust management (Sections 6–8) includes the following:
  - ☐ 1. discretionary powers;
  - ☐ 2. fiduciary duty;
  - ☐ 3. commingling and investment;

Checklist 4-B Terms and Conditions Needed in Decommissioning Trust Agreements (continued)

- ☐ 4. sale or exchange of trust property;
- ☐ 5. scope of investments;
- ☐ 6. express powers of trustee;
- ☐ 7. borrowing money and encumbering trust assets;
- ☐ 8. insurance (optional);
- ☐ 9. operation of business (optional); and
- ☐ 10. compromise of claims (optional).

☐ Taxes and expenses (Section 9).

☐ Annual valuation (Section10).

☐ Advice of counsel (Section 11).

☐ Authority, compensation, and tenure of trustees (Sections 12–14) includes the following:

- ☐ 1. trustee compensation (Schedule C);
- ☐ 2. successor trustee; and
- ☐ 3. instructions to trustee.

☐ Amendment of agreement (Section 15).

☐ Irrevocability and termination (Section 16).

☐ Immunity and indemnification (Section17).

☐ Law to govern construction and operation of trust (Section 18).

☐ Interpretation and severability (Section 19).

☐ Signatures and titles.

☐ Acknowledgments, seals, or attestations, if necessary or desired (witness by notary public).

☐ Acceptance of trust by trustee or trustees (acknowledgment).

A.4.1 Qualifications of the Trustee

The regulations on financial assurance for decommissioning (10 CFR 30.35(f)(2)(ii), 10 CFR 40.36(e)(2)(ii), and 10 CFR 70.25(f)(2)(ii)) require that the trustee be acceptable to the NRC. Acceptable trustees include appropriate Federal or State government agencies and financial institutions that have the authority to act as trustees and whose trust operations are regulated and examined by a Federal or State agency. Trust operations are regulated separately from other banking operations, and it is very common for a regulated bank not to have the authority to act as a trustee. In addition, the NRC's requirement for trustees is not usually met by individuals who are not acting as a representative of a financial institution.

- The word "National" in the title of a financial institution signals that the institution is *Federally regulated*, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable trustee, licensees should access the Federal Financial Institutions Examination Council's (FFIEC) Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see whether the bank branch has full trust powers.

  Alternatively, licensees may contact the appropriate district office of the Office of the Comptroller of the Currency (OCC) and confirm that the institution (1) is Federally regulated *and* (2) has Federally regulated trust operations. (The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>.) As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:

  - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.

  - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.

  - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.

  - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

- The word "State" in the title of a financial institution signals that the institution is State regulated. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable trustee, licensees should access the FFIEC's Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see whether the bank branch has full trust powers.

  Alternatively, licensees may contact the applicable State banking authority and confirm that the institution (1) is State regulated *and* (2) has State-regulated trust operations.

- The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated, as are many domestic branches of foreign banks.

The licensee may need or choose to replace the current trustee with a new trustee. To be acceptable to the NRC, any successor trustee must meet the same standard as the original trustee (i.e., the new trustee must be an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency). To ensure that the change in trustee does not negatively impact the trust, the licensee should replace the trustee only after sufficient notification (i.e., 90 days or more) has been provided to both the NRC and the current trustee.

A.4.2 Level of Coverage

A trust must at all times contain sufficient assets, valued at their *current market value*, to complete decommissioning activities. Therefore, at the time the trust is established, the trust must be fully funded, with a market value at least as great as the licensee's current decommissioning cost estimate or prescribed amount. The only exception to this rule is a trust fund that is being combined with another financial mechanism. For a combination of mechanisms, the *sum* of the coverage provided by the mechanisms must be at least equal to the required coverage level. When submitting a trust to the NRC, a licensee should also submit documentation verifying the amount in the trust (e.g., a receipt from the trustee or a fund balance statement). If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the trust fund, the licensee must either (1) revise the trust to assure the higher amount or (2) obtain another financial assurance mechanism to make up the difference between the new coverage level and the amount of the trust.

In addition to being adequately funded, a trust agreement should allow the trustee access to the full level of coverage as appropriate to complete decommissioning activities. For example, in the model wording for a trust agreement, the trustee is authorized to make decommissioning payments only up to the amount listed in Schedule A to the trust agreement. If the amount listed in Schedule A is not at least as great as the NRC-approved cost estimate or prescribed amount, the trustee may not be able to make sufficient payments to complete decommissioning, even if there are sufficient monies in the trust.

A.4.3 Recommended Documentation

The terms and conditions of a trust are governed by a written trust agreement. The wording of a trust agreement may vary, but Section A.4.4 of this appendix is a recommended model trust agreement that would meet the NRC's requirements. Other documentation must also be submitted with a trust agreement. Supporting documentation may differ for licensees who submit trusts that deviate from the recommended model. As summarized in Checklist 4-A, the following documentation is to be submitted with the trust agreement:

- The *trust agreement* (along with any amendments) is the written document that specifies the terms and conditions of the trust. The wording contained in the model trust presented in Section A.4.4 is acceptable to NRC. Licensees who use other wording should refer to Checklist 4-B to ensure that the alternative wording contains all the necessary terms and conditions.
- *Schedule A* (Section A.4.5) identifies the name and address of the licensee, the NRC license numbers covered by the trust, the addresses of the licensed activity, the amount of regulatory assurances demonstrated by the trust agreement, and the date on which these amounts were last adjusted and approved by NRC.
- *Schedule B* (Section A.4.5) lists the property (i.e., cash, securities, or other liquid assets) used to establish the initial trust fund.
- *Schedule C* (Section A.4.5) specifies the compensation to be paid by the licensee to the trustee for its services.
- The *specimen certificate of events* (Section A.4.6) and the *specimen certificate of resolution* (Section A.4.7) provide the format for instructing the trustee to release monies from the trust in order to fund decommissioning activities at the licensee's facility. When submitted as part of a financial assurance package, the specimen certificates should be unexecuted drafts. (Actual authorization to release funds from the trust is accomplished when completed and notarized versions of these certificates are signed by the secretary of the licensee and presented to the trustee.)
- The notarized *letter of acknowledgment* (Section A.4.8) verifies the execution of the trust agreement and certifies the trustee's signature and authority to enter into the agreement.

A.4.4 Model Trust Fund Agreement

TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [*insert date*] by and between [*insert name of licensee*], [*insert license number, docket number, and address*], a [*insert name of State*] [*insert "corporation," "partnership," "proprietorship," or "limited liability company (LLC)"*], herein referred to as the "Grantor," and [*insert name and address of a trustee acceptable to NRC*], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I, of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, or 72*]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a trust fund to provide [*insert "all" or "part"*] of such financial assurance for the facilities identified herein;

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee;

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the trustee who enters into this Agreement and any successor trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [*insert license number*] issued pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*], as shown in Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund (the Fund) for the benefit of NRC. The Grantor and the Trustee intend that no third party shall have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any

payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

(a) A certificate duly executed by the Secretary of the Grantor attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate of Events; and

(b) A certificate attesting to the following conditions:

  (1) that decommissioning is proceeding pursuant to an NRC-approved plan;

  (2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan; and

  (3) that NRC has been given 30 days prior notice of [*insert name of licensee*]'s intent to withdraw funds from the trust fund.

No withdrawal from the Fund for a particular license can exceed 10 percent of the remaining funds available for that license unless NRC written approval is attached.

In addition, the Trustee shall make payments from the Fund as NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by NRC from the Fund for expenditures for required activities in such amounts as NRC shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims, except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal government, and in obligations of the Federal

government such as GNMA, FNMA, and FHLM bonds and certificates or State and Municipal bonds rated BBB or higher by Standard & Poor's or Baa or higher by Moody's Investment Services; and

(c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and NRC or to reinvest in securities at the direction of the Grantor;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve Bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the trust fund, furnish to the Grantor and to NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and NRC shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantor. (See Schedule C.)

Section 13. Successor Trustee. Upon 90 days notice to NRC and the Grantor, the Trustee may resign; upon 90 days notice to NRC and the Trustee, the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee, the successor accepts the appointment, the successor is ready to assume its duties as trustee, and NRC has agreed, in writing, that the successor is an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. When the resignation or replacement is effective, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust, in a writing sent to the Grantor, NRC, and the present Trustee, by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this Agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully

protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. If NRC issues orders, requests, or instructions to the Trustee these shall be in writing, signed by NRC or its designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or NRC hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or NRC, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. All amendments shall meet the relevant regulatory requirements of NRC.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust or in carrying out any directions by the Grantor or NRC issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [*insert name of State*].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this Agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

[*Insert name of licensee (Grantor)*]
[*Signature of representative of Grantor*]
[*Title*]

ATTEST:
[*Title*] [*Seal*]

[*Insert name and address of Trustee*]
[*Signature of representative of Trustee*]
[*Title*]

ATTEST:
[*Title*] [*Seal*]

A.4.5 Model Trust Agreement Schedules

Schedule A

This Agreement demonstrates financial assurance for the following cost estimates or prescribed amounts for the following licensed activities:

U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER(S)	NAME AND ADDRESS OF LICENSEE	ADDRESS OF LICENSED ACTIVITY	COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT

The cost estimates listed here were last adjusted and approved by NRC on [*insert date*].

Schedule B

AMOUNT _____
AS EVIDENCED BY _____

Schedule C

[*Insert name, address, and phone number of Trustee.*]
Trustee's fees shall be $_____ per year.

A.4.6 Model Specimen Certificate of Events

[*Insert name and address of trustee*]

Attention: Trust Division

To Whom It May Concern *[May be personalized]*:

In accordance with the terms of the Agreement with you dated ____, I, _____, Secretary of [*insert name of licensee*], hereby certify that the following events have occurred:

1. [*Insert name of licensee*] is required to commence the decommissioning of its facility located at [*insert location of facility*] (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on _____ (copy of approval attached).

3. The Board of Directors of [*insert name of licensee*] has adopted the attached resolution authorizing the commencement of the decommissioning.

_____
Secretary of [*insert name of licensee*]

_____
Date

A.4.7 Model Specimen Certificate of Resolution

I, _____, do hereby certify that I am Secretary of [*insert name of licensee*], a [*insert organization type: corporation, partnership, proprietorship, or LLC*] organized under the laws of [*insert name of state*] and that the resolution listed below was duly adopted at a meeting of this company's Board of Directors on _____, 20___.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this _____day of _____, 20___.

_____
Secretary

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate, to commence decommissioning activities at [*insert name of facility*] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approve with and upon the advice of Counsel.

A.4.8 Model Letter of Acknowledgment

STATE OF _____

To Wit: _____

CITY OF _____

On this _____day of _____, before me, a notary public in and for the city and State aforesaid, personally appeared _____, and she/he did depose and say that she/he is the [*insert title*] of _____ [*if applicable, insert ", national banking association" or ", State banking association"*], Trustee, which executed the above instrument; that she/he knows the seal of said association; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the association; and that she/he signed her/his name thereto by like order.

_____
[*Signature of notary public*]

My Commission Expires: _____
[*Date*]

A.5 Surety Bonds

A *payment surety bond* (or *surety bond*) is a guarantee by a surety company (or surety) that it will fund decommissioning activities if the principal (i.e., the licensee) fails to do so. In issuing a surety bond, the surety company becomes "jointly and severally" liable for the guaranteed payment, meaning that the surety assumes the licensee's obligation to fund decommissioning as its own and can be sued jointly with the licensee for the obligation. Consequently, most surety bonds include an indemnification provision that requires the principal to reimburse the surety for costs incurred in satisfaction of the principal's obligations.

A surety bond used for decommissioning financial assurance must be open ended or, if written for a specified term (such as 5 years), must be renewed automatically unless, 90 days or more prior to the renewal date, the surety notifies both the NRC and the licensee of its intention not to renew. A surety bond must also provide that the full face amount of the bond be paid to the beneficiary automatically prior to expiration, without proof of forfeiture, if the licensee fails to provide a replacement mechanism acceptable to the NRC within 30 days after receipt of notification of cancellation.

Funds drawn from a surety bond must be placed directly into a "standby trust fund" if the licensee fails to conduct decommissioning as required. A standby trust fund is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source (such as a surety bond). Funds in the standby trust would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. (See Section A.12 for more information on standby trust funds.)

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular surety bond submissions acceptable.

- Section A.5.1 describes qualifications required of the issuer (the surety company).
- Section A.5.2 addresses the adequacy of coverage.
- Section A.5.3 discusses the documentation that supports a surety bond.
- Section A.5.4 presents a model surety bond that the NRC has found to be acceptable.

This section also contains two checklists that are designed to assist licensees who wish to use surety bonds. Checklist 5-A summarizes the primary criteria used by the NRC to evaluate surety bonds. Checklist 5-B (which should be used only by licensees who revise or do not use the model wording for surety bonds) presents terms and conditions that are recommended for surety bonds.

Checklist 5-A Surety Bonds

☐ Documentation is complete when the following are included:

☐ 1. surety bond (originally signed duplicate);

☐ 2. standby trust agreement and all supporting documentation (see Section A.12 and attach Checklist 12-A);

☐ 3. copy of broker/agent's power of attorney authorizing the broker/agent to issue bonds; and

☐ 4. Checklist 5-B (if model surety bond wording is modified or not used).

☐ The company issuing the surety bond is listed in the most recent edition of Circular 570 for the State in which the bond was signed and has an underwriting limitation greater than or equal to the amount of the bond being used for decommissioning.

☐ The amount of the surety bond equals or exceeds the required coverage level.

Checklist 5-B Terms and Conditions Needed in Decommissioning Surety Bonds

Use this checklist only if deviating from the wording recommended in Section A.5.4.

☐ Date of execution of bond and effective date.

☐ Name and address of licensee.

☐ Type of business organization and State of incorporation (if appropriate).

☐ NRC license number, identification of licensed facility(ies) (name and address), costs, or required decommissioning activities.

☐ Identification of company issuing the surety(ies) includes the following:

- ☐ 1. name;
- ☐ 2. state of incorporation; and
- ☐ 3. qualification in jurisdiction where facility covered by the surety bond is located.

☐ Designation of obligee (NRC).

☐ Recitation of consideration (fee paid for surety bond).

☐ Liability of company issuing the surety includes the following:

- ☐ 1. penal sum;
- ☐ 2. limitation of liability;
- ☐ 3. condition(s) of liability; and
- ☐ 4. statement of joint and several liability.

☐ Statement of licensee's regulatory obligations as reason for bond.

☐ Scope and duration of bond includes the following:

- ☐ 1. restricted to single obligation;
- ☐ 2. continuing;
- ☐ 3. provisions for renewal; and
- ☐ 4. payable to a standby trust fund.

☐ Termination includes the following:

- ☐ 1. by company issuing the surety;
- ☐ 2. by principal; and
- ☐ 3. effective date of termination or revocation.

☐ The company issuing the surety must notify the licensee and the NRC by certified mail at least 90 days prior to cancellation or nonrenewal.

Checklist 5-B Terms and Conditions Needed in Decommissioning Surety Bonds (continued)

☐ An automatic payment provision must be included that, if the licensee is unable to secure alternative financial assurance to replace the bond within 30 days of notification of cancellation, the NRC may draw upon the bond prior to cancellation.

☐ Adjustment of penal sum.

☐ Severability provision.

☐ Liability limit of the bond.

☐ Date.

☐ Signatures.

☐ Premium.

A.5.1 Qualifications of the Issuer

To determine whether a company issuing the surety bond is qualified, licensees should consult the most recent edition of the U.S. Department of the Treasury's Circular 570, which is published annually on approximately July 1 and is updated periodically in the *Federal Register*. *(*Circular 570 can also be found on the World Wide Web at <http://www.fms.treas.gov/index.html>.) The company issuing the surety bond must be listed in *Circular 570* as qualified in the State where the surety bond was signed, and the company's underwriting limitation (also specified in Circular 570) must be at least as great as the level of coverage required for the license. A company issuing a surety can only exceed its underwriting limitation if it brings another qualified company into the agreement to share the risk. When acting together, none of the companies may exceed its individual underwriting limitation.

Also, as noted above, a surety bond must be payable to a standby trust fund. Section A.12 provides information on the qualifications of trustees of standby trusts.

A.5.2 Level of Coverage

A surety bond must be in an amount that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning. The exception to this rule is a surety bond that is being combined with another financial mechanism. For a combination of mechanisms, the *sum* of the coverage provided by the mechanisms must be at least equal to the required coverage level. If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the surety bond, the licensee must either (1) revise the surety bond to assure the higher amount or (2) obtain another financial assurance mechanism to make up the difference between the new coverage level and the amount of the surety bond.

A.5.3 Recommended Documentation

As summarized in Checklist 5-A, licensees who wish to use surety bonds to provide financial assurance for decommissioning must submit a copy of the surety bond and other documentation as discussed below. Supporting documentation may differ for licensees who submit surety bonds that differ from the recommended model.

The *surety bond* (along with any riders or amendments) signed by an authorized representative from the issuing company. The wording of a surety bond may vary, but Section A.5.4 of this appendix is a model surety bond that is acceptable to and recommended by the NRC. Licensees who wish to use other wording should refer to Checklist 5-B to be sure that the alternative wording contains all of the necessary terms and conditions.

A *copy of the broker/agent's power of attorney* authorizing the broker/agent to issue bonds on behalf of the issuing company. The power of attorney ensures that the surety bond is enforceable.

A *standby trust fund* must be established to receive funds from the surety bond. The standby trust fund should satisfy the criteria described in Section A.12 and in Checklist 12-A of this appendix.

A.5.4 Model Surety Bond

PAYMENT SURETY BOND

Date bond executed:_____

Effective date:_____

Principal: [*Insert legal name and business address of licensee*]

Type of organization: [*Insert "proprietorship," "partnership," "corporation," or "LLC"*]

State of incorporation:_____ (if applicable)

NRC license number, docket number, name and address of facility, and amount for decommissioning activities guaranteed by this bond:_____

Surety: [*Insert name and business address*]

Type of organization: [*Insert "proprietorship," "partnership," or "corporation"*]

State of incorporation:_____ (if applicable)

Surety's qualification in jurisdiction where licensed facility is located.

Surety's bond number:_____

Total penal sum of bond: $_____

Know all persons by these presents, that we, the Principal and Surety hereto, are firmly bound to the U.S. Nuclear Regulatory Commission (hereinafter called NRC) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety; but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS, the U.S. Nuclear Regulatory Commission, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the *Code of Federal Regulations*,

Part [*insert 30, 40, 70, or 72*], applicable to the Principal, which require that a license holder or an applicant for a facility license provide financial assurance that funds will be available when needed for facility decommissioning;

NOW, THEREFORE, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of decommissioning of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility;

Or, if the Principal shall fund the standby trust fund in such amount(s) after an order to begin facility decommissioning is issued by NRC or a U.S. District Court or other court of competent jurisdiction;

Or, if the Principal shall provide alternative financial assurance, and obtain NRC's written approval of such assurance, within 30 days after the date a notice of cancellation from the Surety is received by both the Principal and NRC, then this obligation shall be null and void; otherwise it is to remain in full force and effect.

The Surety shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by NRC that the Principal has failed to perform as guaranteed by this bond, the Surety shall place funds in the amount guaranteed for the facility into the standby trust fund.

The liability of the Surety shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety hereunder exceed the amount of said penal sum.

The Surety may cancel the bond by sending notice of cancellation by certified mail to the Principal and to NRC provided, however, that cancellation shall not occur during the 90 days beginning on the date of receipt of the notice of cancellation by both the Principal and NRC, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to NRC and to the Surety 90 days prior to the proposed date of termination, provided, however, that no such notice shall become effective until the Surety receives written authorization for termination of the bond from NRC.

The Principal and Surety hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new amount, provided that the penal sum does not increase by more than 20 percent in any one year and no decrease in the penal sum takes place without the written permission of NRC.

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

In Witness Whereof, the Principal and Surety have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety.

Principal

[*Signatures*]
[*Names*]
[*Titles*]
[*Corporate seal*]

Corporate Surety

[*Name and address*]

State of incorporation:_____

Liability limit: $_____

[*Signatures*]
[*Names and titles*]
[*Corporate seal*]

[*For every co-surety, provide signatures, names and titles, corporate seal, and other information in the same manner as for the Sureties above.*]

Bond Premium: $_____

A.6 Letters of Credit

A *letter of credit* is extended by a bank on behalf of a licensee and essentially acts as an irrevocable guarantee of payment to the NRC. The credit may be used only to fund decommissioning in the event the licensee does not conduct decommissioning on its own. A letter of credit used to provide financial assurance for decommissioning must be irrevocable, meaning that it may not be canceled prior to its expiration date. Also, the arrangement requires that the licensee repay (with interest) any funds drawn from the letter of credit.

A letter of credit used for decommissioning financial assurance must be open ended or, if written for a specified term (such as 5 years), must be renewed automatically unless 90 days or more prior to the renewal date, the issuing bank notifies both the NRC and the licensee of its intention not to renew. A letter of credit must also provide that the full face amount of the credit be paid to the beneficiary automatically prior to expiration, without proof of forfeiture, if the licensee fails to provide a replacement mechanism acceptable to the NRC within 30 days after receipt of notification of cancellation.

Funds drawn from a letter of credit must be placed directly into a "standby trust fund" if the licensee fails to conduct decommissioning as required. A standby trust fund is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source (such as a letter of credit). Funds in the standby trust would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. (See Section A.12 for more information on standby trust funds.)

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular letter-of-credit submissions acceptable.

- Section A.6.1 describes qualifications required of the issuer.
- Section A.6.2 addresses the adequacy of coverage.
- Section A.6.3 discusses the documentation that supports a letter of credit.
- Section A.6.4 presents a model letter of credit that the NRC has found to be acceptable.

This section also contains two checklists that are designed to assist licensees who wish to use letters of credit. Checklist 6-A summarizes the primary criteria the NRC uses to evaluate letters of credit. Checklist 6-B (which should be used only by licensees who revise or do not use the model wording for letters of credit) presents terms and conditions that are recommended for letters of credit.

Checklist 6-A Letters of Credit

☐ Documentation is complete when the following are included:

☐ 1. letter of credit (originally signed duplicate) contains contact information for financial institution and NRC license and docket numbers;

☐ 2. standby trust agreement and all supporting documentation (see Section A.12 and attach Checklist 12-A); and

☐ 3. Checklist 6-B (if model letter of credit wording is modified or not used).

☐ The financial institution is regulated by a Federal or State agency.

☐ The amount of the letter of credit equals or exceeds the required coverage level.

Checklist 6-B Terms and Conditions Needed in Decommissioning Letters of Credit

Use this checklist only if deviating from the wording recommended in Section A.6.4.

☐ The instrument must be entitled an "irrevocable letter of credit."

☐ The name of the issuing financial institution must be identified on the letter of credit.

☐ The letter should be limited in amount.

☐ The letter of credit must contain a specified expiration date or be written for a definite term.

☐ The issuer's obligation to pay should arise only upon presentation of a draft or other documents specified in the letter of credit.

☐ The letter of credit must be automatically renewed at each expiration date unless notification by certified mail is received by the NRC and the licensee at least 90 days prior to nonrenewal.

☐ An automatic payment provision must be included stating that, if the licensee is unable to secure alternative financial assurance to replace the letter of credit within 30 days of notification of cancellation, the NRC may draw upon the letter of credit prior to cancellation.

☐ Statement of licensee's regulatory obligations as reason for the letter of credit.

☐ The letter of credit must be payable to a standby trust.

☐ Notice of insolvency or violation of banking requirements.

☐ The bank must not be called upon to determine a question of fact or law at issue between the licensee and the NRC.

☐ The licensee should have an unqualified obligation to reimburse the issuer for payments made under the letter of credit.

☐ Signature and title of officials of issuing institution (signature block).

☐ Date (signature block).

☐ Standards under which the letter of credit may be interpreted (i.e., *Uniform Customs and Practice for Documentary Credits* or Uniform Commercial Code).

A.6.1 Qualifications of the Issuer

A bank issuing a letter of credit to a licensee should be a financial institution whose operations are regulated and examined by a Federal or State agency.

- The word "National" in the title of a financial institution signals that the institution is *Federally regulated*, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable issuer of a letter of credit, licensees should access the Federal Deposit Insurance Corporation's (FDIC) Institution Directory on the World Wide Web at <http://www2.fdic.gov/idasp/>.

  Alternatively, licensees may contact the appropriate district office of the Office of the Comptroller of the Currency (OCC) and confirm that the institution is Federally regulated. (The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>.) As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:

  - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.
  - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.
  - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.
  - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

- The word "State" in the title of a financial institution signals that the institution is *State regulated*. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable issuer of a letter of credit, licensees should access the FDIC's Institution Directory on the World Wide Web at <http://www2.fdic.gov/idasp/>.

  Alternatively, licensees may contact the applicable State banking authority and confirm that the institution is State regulated.

- The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated, as are many domestic branches of foreign banks.

- Also, as noted above, a letter of credit must be payable to a standby trust fund. Section A.12 provides information on the qualifications of trustees of standby trusts.

A.6.2 Level of Coverage

A letter of credit must be in an amount that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning. The exception to this rule is a letter of credit that is being combined with another financial mechanism. For a combination of mechanisms, the *sum* of the coverage provided by the mechanisms must be at least equal to the required coverage level. If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the letter of credit, the licensee must either (1) revise the letter of credit to assure the higher amount or (2) obtain another financial assurance mechanism to make up the difference between the new coverage level and the amount of the letter of credit.

A.6.3 Recommended Documentation

Licensees who use letters of credit to provide financial assurance for decommissioning must submit a copy of the letter of credit and other documentation as discussed below and summarized in Checklist 6-A. Supporting documentation may differ for licensees who submit letters of credit that differ from the recommended model.

The *letter of credit* (along with any amendments) signed by an authorized representative from the issuing bank. The wording of a letter of credit may vary, but Section A.6.4 of this appendix is a model letter of credit that is acceptable to and recommended by the NRC. Licensees who use other wording should refer to Checklist 6-B to be sure that their wording contains all the necessary terms and conditions.

A *standby trust fund* must be established to receive funds from the letter of credit. The standby trust fund should satisfy the criteria described in Section A.12 and in Checklist 12-A of this appendix.

A.6.4 Model Letter of Credit

IRREVOCABLE STANDBY LETTER OF CREDIT NO. [*INSERT NUMBER*]

This Credit Expires [*insert date*]

Issued To: U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir or Madam:

We hereby establish our Irrevocable Standby Letter of Credit No. _____ in your favor, at the request and for the account of [*insert name, address, and NRC license and docket numbers of licensee*] up to the aggregate amount of [*insert dollar amount in words*], U.S. dollars $_____, available upon presentation of:

(1) your sight draft, bearing reference to this Letter of Credit No. _____; and

(2) your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of the U.S. Nuclear Regulatory Commission."

This letter of credit is issued in accordance with regulations issued under the authority of the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. NRC has promulgated regulations in Title 10, Chapter I, of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, or 72*], which require that a holder of, or an applicant for, a materials license issued under 10 CFR Part [*insert 30, 40, 70 or 72*] provide assurance that funds will be available when needed for decommissioning.

This letter of credit is effective as of [*insert date*] and shall expire on [*insert date at least 1 year later*], but such expiration date shall be automatically extended for a period of [*insert time period of at least 1 year*] on [*insert date*] and on each successive expiration date, unless, at least 90 days before the current expiration date, we notify both you and [*insert name of licensee*], by certified mail, as shown on the signed return receipts. If [*insert name of licensee*] is unable to secure alternative financial assurance to replace this letter of credit within 30 days of notification of cancellation, NRC may draw upon the full value of this letter of credit prior to cancellation. The bank shall give immediate notice to the applicant and NRC of any notice received or action filed alleging (1) the insolvency or bankruptcy of the financial institution or (2) any violation of regulatory requirements that could result in suspension or revocation of the bank's charter or license to do business. The financial institution also shall give immediate notice if the bank, for any reason, becomes unable to fulfill its obligation under the letter of credit.

Whenever this letter of credit is drawn on, under and in compliance with the terms of this letter of credit, we shall duly honor such draft upon its presentation to us within 30 days, and we shall deposit the amount of the draft directly into the standby trust fund of [*insert name of licensee*] in accordance with your instructions.

Each draft must bear on its face the clause: "Drawn under Letter of Credit No. _____, dated _____, and the total of this draft and all other drafts previously drawn under this letter of credit does not exceed [*insert amount of letter of credit*]."

[*Signature(s) and title(s) of official(s) of issuing institution*]
[*Name, address, and phone number of issuing institution*]
[*Date*]

This credit is subject to [*insert "the most recent edition of the Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce," or "the Uniform Commercial Code"*].

A.7 Insurance Policies

A decommissioning *insurance policy* is a guarantee by an insurance company to fund decommissioning. An insurance policy used for decommissioning financial assurance must be open ended or, if written for a specified term (such as 5 years), must be renewed automatically unless 90 days or more prior to the renewal date, the issuer notifies both the NRC and the licensee of its intention not to renew. An insurance policy must also provide that the full face amount of the policy be paid to the beneficiary automatically prior to expiration, without proof of forfeiture, if the licensee fails to provide a replacement mechanism acceptable to the NRC within 30 days after receipt of notification of cancellation.

Funds drawn from an insurance policy must be placed directly into a "standby trust fund" if the licensee fails to conduct decommissioning as required. A standby trust fund is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source (such as an insurance policy). Funds in the standby trust would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. (See Section A.12 for more information on standby trust funds.)

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular insurance policy submissions acceptable.

- Section A.7.1 describes qualifications required of the issuer (the insurance company).
- Section A.7.2 addresses the adequacy of coverage.
- Section A.7.3 discusses the documentation that supports an insurance policy.

This section also contains two checklists designed to assist licensees in preparing acceptable insurance policies. Checklist 7-A summarizes the primary criteria used by the NRC to evaluate insurance policies. Checklist 7-B presents terms and conditions that are recommended for insurance policies. The NRC has not yet developed model insurance policy wording that is acceptable to insurers and to the NRC.

Checklist 7-A Insurance Policies

☐ Documentation is complete when the following are included:

- ☐ 1. insurance policy (originally signed duplicate);
- ☐ 2. standby trust agreement and all supporting documentation (see Section A.12 and attach Checklist 12-A); and
- ☐ 3. Checklist 7-B.

☐ The insurance company is licensed by State regulatory authorities to transact business as an insurer in one or more U.S. States.

☐ The amount of the insurance policy equals or exceeds the required coverage level.

Checklist 7-B Terms and Conditions Needed in Decommissioning Insurance Policies

☐ Name and address of licensee.

☐ NRC license number; docket number; name and address of facility.

☐ Name and address of insurer.

☐ Amount of insurance policy (limit of liability).

☐ Premium.

☐ Effective date of policy.

☐ Expiration date of policy.

☐ Statement of licensee's regulatory obligations as reason for policy.

☐ The insurance policy must be either open ended or renewed automatically.

☐ The insurer issuing the mechanism must notify the licensee and the NRC by certified mail at least 90 days prior to cancellation or nonrenewal.

☐ An automatic payment provision must be included that, if the licensee is unable to secure alternative financial assurance to replace the policy within 30 days of notification of cancellation, the NRC may draw upon the policy prior to cancellation.

☐ The insurance policy must be payable to a standby trust.

☐ Signatures.

☐ Date.

A.7.1 Qualifications of the Issuer

An insurance company that issues a policy to provide financial assurance for decommissioning must be licensed by State regulatory authorities to transact business as an insurer in one or more U.S. States. This standard prevents licensees from using policies issued by insurers that are not subject to oversight by at least one U.S. State regulatory authority. Insurance policies issued by "captive" insurers (insurers owned by at least one of the parties for which they provide coverage) may not be used by licensees to provide financial assurance for decommissioning. Captive insurers (1) are less strictly regulated than commercial insurers, (2) may not be monitored closely after their operations have been approved, and (3) usually do not have access to guarantee funds that pay claims in the event the insurer is not able to do so.

To determine whether a particular insurer is qualified, licensees should contact the State insurance commission for the State in which the insurer is located or the National Association of Insurance Commissioners (NAIC) at (816) 842-3600 or <http://www.naic.org/cis/>, and confirm that the insurer is licensed by a State regulatory authority to transact business as an insurer in one or more U.S. States.

Also, as noted above, an insurance policy must be payable to a standby trust fund. Information on the qualifications of trustees of standby trusts is provided in Section A.12.

A.7.2 Level of Coverage

An insurance policy used as a decommissioning financial assurance mechanism must provide coverage that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning. The exception to this rule is an insurance policy that is being combined with another financial mechanism. For a combination of mechanisms, the *sum* of the coverage provided by the mechanisms must be at least equal to the required coverage level. Note that an annuity policy that would gradually increase coverage over time to equal decommissioning costs would *not* be acceptable (unless accompanied by some other financial assurance mechanism to make up any shortfall). If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the insurance policy, the licensee must either (1) revise the insurance policy to assure the higher amount or (2) obtain another financial assurance mechanism to make up the difference between the new coverage level and the amount of the insurance policy.

A.7.3 Recommended Documentation

Licensees who use insurance policies to provide financial assurance for decommissioning must submit a copy of the insurance policy and other documentation as discussed below and summarized in Checklist 7-A.

- A copy of the *insurance policy* (along with any endorsements or amendments) signed by an authorized representative from the insurance company. Licensees should refer to Checklist 7-B to be sure that the insurance policy contains all of the necessary terms and conditions. Licensees should also maintain in their records any *certificates of insurance* signed by

individuals authorized to act for the licensee and the insurer. Certificates of insurance can be helpful in clarifying any ambiguities that may exist in the insurance policy.

- A *standby trust fund* must be established to receive funds from the insurance policy. The standby trust fund should satisfy the criteria described in Section A.12 and in Checklist 12-A of this appendix.

A.8 Parent Company Guarantees

A *parent company guarantee* is a guarantee from a licensee's parent company that it will fund decommissioning activities if the licensee fails to do so. The parent company must annually pass (within 90 days after the close of each succeeding fiscal year) one of two financial tests specified in Appendix A to 10 CFR Part 30 to demonstrate that it has adequate financial strength to provide the guarantee. The financial tests specified in Appendix A to 10 CFR Part 30 also apply to licensees regulated under 10 CFR Part 40, 10 CFR Part 70, and 10 CFR Part 72. The financial test alternatives (see below) consider accounting ratios, net worth, assets, and bond rating data relative to fixed criteria. Also, the parent company's financial statements must have been prepared in accordance with generally accepted accounting principles applicable to the United States, and an independent certified public accountant must have verified the accuracy of the financial test data relative to the audited financial statements.

A parent company guarantee must remain in force unless the parent company sends notice of cancellation by certified mail to both the NRC and the licensee at least 120 days in advance (as evidenced by the return receipts). However, a parent company guarantee may be used only as long as the parent company meets the financial test criteria. If the parent company no longer passes the financial test, it must provide alternative financial assurance if the licensee does not do so.

If the guarantee is drawn upon because the licensee fails to carry out decommissioning, the parent company must fund decommissioning activities. Funds drawn from a parent company guarantee should be placed directly into a "standby trust fund." A standby trust fund is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source (such as a parent company guarantee). Funds in the standby trust would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. (See Section A.12 for more information on standby trust funds.)

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular parent company guarantee submissions acceptable.

- Section A.8.1 describes qualifications required of the parent company guarantor.
- Section A.8.2 addresses the adequacy of coverage.
- Section A.8.3 discusses the documentation that supports a parent company guarantee.
- Section A.8.4 presents a model chief executive officer (CEO) letter acceptable to the NRC.
- Section A.8.5 presents a model chief financial officer (CFO) letter acceptable to the NRC.
- Section A.8.6 presents a model parent company guarantee financial test I acceptable to the NRC.
- Section A.8.7 presents a model parent company guarantee financial test II acceptable to the NRC.
- Section A.8.8 presents a model auditor's special report acceptable to the NRC.

- Section A.8.9 presents a model schedule reconciling amounts contained in the CFO's letter with amounts in financial statements acceptable to the NRC.

This section also contains two checklists designed to assist licensees in preparing acceptable parent company guarantees. Checklist 8-A summarizes the primary criteria the NRC uses to evaluate parent company guarantees. Checklist 8-B (which should be used only by licensees who revise or do not use the model wording for parent company guarantees) presents terms and conditions that are recommended for parent company guarantees.

Checklist 8-A Parent Company Guarantees

☐ Documentation is complete when the following are included:

☐ 1. parent company guarantee agreement (originally signed duplicate);

☐ 2. letter from chief executive officer of licensee;

☐ 3. letter from chief financial officer of parent company, including parent company guarantee financial test (Financial Test I or II);

☐ 4. auditor's special report confirming the chief financial officer (CFO) letter and reconciling amounts in the CFO letter with parent company's financial statements;

☐ 5. parent company's audited financial statements for the most recent fiscal year, including the auditor's opinion on the financial statements;

☐ 6. standby trust agreement and all supporting documentation (see Section A.12 and attach Checklist 12-A); and

☐ 7. checklist 8-B (if model parent company guarantee wording is modified or not used).

☐ The parent company has majority control of the licensee (if not, details on the parent-subsidiary relationship have been submitted to the NRC for review).

☐ The amount of the parent company guarantee equals or exceeds the required coverage level.

Checklist 8-B Terms and Conditions Needed in Parent Company Guarantees

Use this checklist only if deviating from the wording recommended in Section A.8.10.

☐ Name and address of guarantor.

☐ Name and address of licensee.

☐ Name and address of regulatory agency.

☐ The following five recitals are included:

- ☐ 1. the authority of the guarantor to enter into the guarantee;
- ☐ 2. the licensee's regulatory obligations as reason for the parent guarantee;
- ☐ 3. the names, addresses, and license numbers of the facilities for which the guarantee provides financial assurance and the amounts guaranteed for decommissioning activities;
- ☐ 4. financial test I or II used by guarantor to demonstrate financial strength; and
- ☐ 5. the guarantor's authority to provide the guarantee, such as ownership of the licensee as evidenced by majority control of the voting stock of the licensee.

☐ Description of the primary obligation (required activities).

☐ Unequivocal statement of guarantee includes the following:

- ☐ 1. recitation of the consideration for the guarantee; and
- ☐ 2. liability of the guarantor:
  - ☐ a. limitation of liability,
  - ☐ b. conditions of liability, and
  - ☐ c. effect on liability of a change in the status of the licensee.

☐ Statement that guarantor remains bound despite amendment or modification of license, reduction or extension of time of performance of required activities, or any other modification or alteration of an obligation of the licensee.

☐ Notice requirements.

☐ Discharge of the guarantor (release of obligations).

Checklist 8-B Terms and Conditions Needed in Parent Company Guarantees (continued)

☐ Termination and revocation:

- ☐ 1. termination on occurrence of contingency;
- ☐ 2. voluntary revocation by guarantor; and
- ☐ 3. effective date of termination or revocation.

☐ Guarantor's agreement to be subject to Commission orders.

☐ Guarantor's agreement to Commission's remedies in case of financial distress (i.e., bankruptcy or insolvency events).

☐ Guarantor's agreement to notify in case of financial distress (i.e., bankruptcy or insolvency events).

☐ Date.

☐ Signatures.

- ☐ 1. Authorized signature for the guarantor.
- ☐ 2. Authorized signature for licensee.

☐ Signature of witness or notary (signature block).

A.8.1 Qualifications of the Parent Company Guarantor

A parent company guarantee must be provided by the parent company of the licensee. Normally, the parent company must have majority control of the licensee (although the NRC may consider exceptions to this rule on a case-by-case basis). To qualify to provide the guarantee, the parent company must meet one of the two financial tests specified in Appendix A to 10 CFR Part 30. These two financial tests, shown below, differ in that one includes a bond rating criterion while the other does not. Parent companies without an actual bond rating may still use the bond rating alternative of the financial test by obtaining a so-called "indicative" bond rating from either Standard & Poor's or Moody's. Indicative bond ratings, which are available for a fee, are for information only and are provided as an indication of what a rating would be if the firm were to issue debt. A parent company seeking to use an indicative bond rating should submit the rating and name of the rating service as part of the financial test demonstration. In this case, however, the company would not be able to provide the NRC with information on the dates of issuance and maturity of the bond, nor would it be able to certify that the rating pertained to its "most recent bond issuance." Rather, the parent company would explain that the rating is an indicative rating. The parent company would also update the indicative rating every year as it repeats the passage of the financial test.

For purposes of the financial test, bond ratings must apply to outstanding, rated bonds that are not secured by insurance, a letter of credit, or other collateral or guarantee. The bonds must also have been issued *directly* by the parent company rather than by any other entity.

In addition, for the purposes of these financial tests, "total net worth" is defined to exclude the net book value and goodwill of the nuclear facility and site. "Tangible net worth" is defined to exclude all intangible assets and the net book value of the nuclear facility and site.

As noted above, a parent company guarantee should be payable to a standby trust fund. Information on the qualifications of trustees of standby trusts is provided in Section A.12.

Financial Test I

The parent company must have the following:

(i) Two of the following three ratios: A ratio of total liabilities to total net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and/or a ratio of current assets to current liabilities greater than 1.5; and

(ii) Net working capital and tangible net worth each at least six times the amount of decommissioning funds being assured by the parent company guarantee for the total of all nuclear facilities or parts thereof (or prescribed amount, if certification is used); and

(iii) Tangible net worth of at least $21 million; and

(iv) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the current decommissioning cost estimates (or prescribed amount, if applicable).

Financial Test II

The parent company must have the following:

(i) A current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, A, or BBB (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, A, or Baa (including adjustments of 1, 2, or 3) as issued by Moody's; and

(ii) Total net worth at least six times the amount of decommissioning funds being assured by a parent company guarantee for the total of all nuclear facilities or parts thereof (or prescribed amount, if certification is used); and

(iii) Tangible net worth of at least $21 million; and

(iv) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the current decommissioning cost estimates (or prescribed amount, if applicable).

A.8.2 Level of Coverage

A parent company guarantee must be in an amount that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning, or, if a sinking fund is used in combination with the parent company guarantee, the amount of the difference between the amount of the sinking fund and the prescribed amount or estimated cost of decommissioning. If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the parent company guarantee (or the sum of the sinking fund and parent company guarantee), the licensee must revise the guarantee to assure the higher amount (or must replace the guarantee with a different financial assurance mechanism that is in the amount of the new coverage level).

A.8.3 Recommended Documentation

The terms and conditions of a parent company guarantee are governed by a written guarantee agreement. The wording of a parent company guarantee agreement may vary, but Section A.8.10 of this appendix is a model parent company guarantee agreement that is acceptable to and recommended by the NRC. Other documentation that is to be submitted with a parent company guarantee is identified below and summarized in Checklist 8-A.

Supporting documentation may differ for licensees who submit parent company guarantees that differ from the recommended model.

The *guarantee agreement* is the written document that specifies the terms and conditions of the parent company guarantee. The wording in the model guarantee presented in Section A.8.10 is acceptable to the NRC. Licensees who use other wording should refer to Checklist 8-B to be sure that the alternative wording contains all of the necessary terms and conditions.

The *chief executive officer (CEO) letter* (Section A.8.4) is a letter from the *CEO of the licensee* that (1) certifies that the licensee is a going concern, (2) identifies the amount of the licensee's tangible net worth, (3) specifies whether the licensee is required to file a Form 10-K with the U.S. Securities and Exchange Commission (SEC), and (4) states the date on which the licensee's fiscal year ends.

The *chief financial officer (CFO) letter* (Section A.8.5) is a letter from the *CFO of the parent company* that (1) identifies the names, addresses, license numbers, and estimated decommissioning costs of the facilities covered by the guarantee and (2) demonstrates the parent company's ability to pass either of the two financial tests specified in Appendix A to 10 CFR Part 30. The parent company must pass the financial test for *all* costs covered by a financial test.

These include costs covered by (1) the parent company guarantee, (2) other NRC or Agreement State parent company guarantees or self-guarantees, and (3) parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., the U.S. Environmental Protection Agency).

The *auditor's special report* (Section A.8.8) is a report from the parent company's independent certified public accountant that compares the data used by the parent company in the financial test demonstration with the amounts in its annual financial statements, evaluates the parent company's off-balance sheet transactions, and provides an opinion on whether those transactions could materially adversely affect the parent company's ability to pay for decommissioning costs. The auditor's report must also verify that a bond rating, if used to demonstrate passage of the financial test, meets the requirements specified in the rule. If needed, this report may also include a *schedule attachment* (Section A.8.9) reconciling the financial test numbers with amounts in the parent company's financial statements.

A copy of the parent company's *audited financial statements* for the most recent completed fiscal year. These financial statements should include the independent certified public accountant's opinion on the statements.

Evidence that the parent company has majority control of the licensee. Such evidence can include incorporation agreements (i.e., copies of submissions to the appropriate State Corporation Commission), Schedule 22 from the parent company's SEC Form 10-K, or a certified corporate resolution that the licensee and the parent company guarantor are separate and distinct corporate entities and that the parent company controls a majority of the voting stock of the subsidiary. If the parent company does not have majority control of the licensee's voting stock, the licensee should provide details on the parent-subsidiary relationship to the NRC for review.

A *standby trust fund* must be used with parent company guarantees. The standby trust fund should be ready to receive funds from the guarantee. The standby trust fund that satisfies the criteria described in Section A.12 and in Checklist 12-A of this appendix must be established before the parent company guarantee agreement is submitted.

A.8.4 Model Chief Executive Officer Letter

[*Address to U.S. Nuclear Regulatory Commission*]

> I am the chief executive officer of [*insert name and address of licensee*], a [*insert "proprietorship," "partnership," "corporation," or "LLC"*]. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part [*insert 30, 40, 70, or 72*].
>
> I hereby certify that [*insert name of licensee*] is currently a going concern, and that it possesses positive tangible net worth in the amount of [*insert amount*].
>
> This firm [*insert "is required" or "is not required"*] to file a Form 10-K with the U.S. Securities and Exchange Commission for the latest fiscal year. This fiscal year of this firm ends on [*insert month and day*].
>
> I hereby certify that the content of this letter is true and correct to the best of my knowledge.

[*Signature*]
[*Name*]
[*Title*]
[*Date*]

A.8.5 Model Chief Financial Officer Letter

[*Address to U.S. Nuclear Regulatory Commission*]

I am the chief financial officer of [*insert name and address of parent guarantor*], a [*insert "proprietorship," "partnership," "corporation," or "LLC"*]. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part [*insert 30, 40, 70, or 72*].

[*Complete the following paragraph regarding facility(ies) and associated cost estimates or certified amounts. For each facility, include its license number, name, address, and current cost estimates or certified amounts for the specified activities.*]

This firm guarantees, through the parent company guarantee submitted to demonstrate compliance under 10 CFR Part [*insert 30, 40, 70, or 72*], the decommissioning of the following facilities owned or operated by subsidiaries of this firm. The current cost estimates or certified amounts for decommissioning, so guaranteed, are shown for each facility:

Name of Facility	License Number	Location of Facility	Certified Amounts or Current Cost Estimates

This firm [*insert "is required" or "is not required"*] to file a Form 10-K with the U.S. Securities and Exchange Commission for the latest fiscal year.

This fiscal year of this firm ends on [*insert month and day*]. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended [*insert date*]. A copy of this firm's most recent financial statements is enclosed.

[*Insert completed Financial Test I or II of the parent company.*]

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

[*Signature*]
[*Name*]
[*Title*]
[*Date*]

A.8.6 Model Parent Company Guarantee Financial Test I

1. Current decommissioning cost estimates or certified amounts

   a. Decommissioning amounts covered by this parent company guarantee $_____

   b. All decommissioning amounts covered by other NRC or Agreement State parent company guarantees or self-guarantee $_____

   c. All amounts covered by parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., EPA) $_____

TOTAL $_____

*2. Total liabilities (if any portion of the cost estimates for decommissioning is included in total liabilities on your firm's financial statements, you may deduct the amount of that portion from this line and add that amount to lines 3 and 4) $_____

*3. Tangible net worth** $_____

*4. Total net worth*** $_____

*5. Current assets $_____

*6. Current liabilities $_____

*7. Net working capital (line 5 minus line 6) $_____

*8. The sum of net income plus depreciation, depletion, and amortization $_____

*9. Total assets in United States $_____

	Yes	No
10. Is line 3 at least $21 million?	____	____
11. Is line 3 at least 6 times line 1?	____	____
12. Is line 7 at least 6 times line 1?	____	____
13. Are at least 90 percent of firms' assets located in the United States? If not, complete line 14.	____	____
14. Is line 9 at least 6 times line 1?	____	____

Guarantor must meet two of the following three ratios:

15. Is line 2 divided by line 4 less than 2.0? ___ ___

16. Is line 8 divided by line 2 greater than 0.1? ___ ___

17. Is line 5 divided by line 6 greater than 1.5? ___ ___

Notes:

* Denotes figures derived from financial statements.

** Tangible net worth is defined as net worth minus all intangible assets and excluding the net book value of the nuclear facility and site.

*** Excluding the net book value and goodwill of the nuclear facility and site.

A.8.7 Model Parent Company Guarantee Financial Test II

1. Current decommissioning cost estimates or certified amounts

   a. Decommissioning amounts covered by this parent company guarantee $_____

   b. All decommissioning amounts covered by other NRC or Agreement State parent company guarantees or self-guarantees $_____

   c. All amounts covered by parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., EPA) $_____

TOTAL $_____

2. Current bond rating of most recent uninsured, uncollateralized, and unencumbered issuance of this firm

   Rating _____

   Name of rating service _____

3. Date of issuance of bond _____

4. Date of maturity of bond _____

*5. Tangible net worth** (if any portion of estimates for decommissioning is included in total liabilities on your firm's financial statements, you may add the amount of that portion to this line) $_____

*6. Total net worth*** $_____

*7. Total assets in United States $_____

	Yes	No
8. Is line 5 at least $21 million?	____	____
9. Is line 6 at least 6 times line 1?	____	____
10. Are at least 90 percent of firm's assets located in the United States? If not, complete line 11.	____	____
11. Is line 7 at least 6 times line 1?	____	____

12. Is the current rating, specified on line 2, for its most recent uninsured, uncollateralized, and unencumbered bond issuance AAA, AA, A, or BBB (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, A, or Baa (including adjustments of 1, 2, or 3), as issued by Moody's? ___ ___

Notes:

* Denotes figures derived from financial statements.

** Tangible net worth is defined as net worth minus all intangible assets and excluding the net book value of the nuclear facility and site.

*** Excluding the net book value and goodwill of the nuclear facility and site.

A.8.8 Model Auditor's Special Report

CONFIRMATION OF CHIEF FINANCIAL OFFICER'S LETTER

We have examined the financial statements of [*insert name of parent guarantor*] for the year ended [*insert date*], and have issued our report thereon dated [*insert date*]. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary.

[*Insert name of parent guarantor*] has prepared documents to demonstrate its financial responsibility under NRC's financial assurance regulations, 10 CFR Part [*insert 30, 40, 70, or 72*]. This letter is furnished to assist the licensee [*insert name and NRC license number*] in complying with these regulations and should not be used for other purposes.

The attached schedule reconciles the specified information furnished in the chief financial officer's (CFO's) letter in response to the regulations with the company's financial statements. In connection therewith, we have

1. Confirmed that the amounts in the column "Per Financial Statements" agree with amounts contained in the company's financial statements for the year ended [*insert date*];

2. Confirmed that the amounts in the column "Per CFO's Letter" agree with the letter prepared in response to NRC's request;

3. Confirmed that the amounts, if any, in the column "Reconciling Items" are adequately explained in the attached schedule, that each reconciling item represents an appropriate adjustment to the financial data, and that the amount of each reconciling item is accurate; and

4. Recomputed the totals and percentages.

   Because the procedures in 1–4 above do not constitute a full examination made in accordance with generally accepted auditing standards, we do not express an opinion on the manner in which the amounts were derived in the items referred to above. In connection with the procedures referred to above, no matters came to our attention that cause us to believe that the chief financial officer's letter and supporting information should be adjusted.

We have evaluated the off-balance sheet transactions [*insert name of parent guarantor*] and it is our opinion that these transactions [*insert "could" or "could not"*] materially adversely affect the ability of [*insert name of parent guarantor*] to pay decommissioning costs.

We [*insert "have" or "have not"*] confirmed that the bond rating, if used to demonstrate passage of the financial test, conforms to the description furnished in the CFO's letter in response to the regulations.

_____
Signature

_____
Date

A.8.9 Model Schedule Reconciling Amounts Contained in Chief Financial Officer's Letter with Amounts in Financial Statements

XYZ COMPANY
YEAR ENDED DECEMBER 31, 20XX

Per Line Number in CFO's Letter		Per Financial Statements	Reconciling Items	CFO's Letter
6	Total current liabilities	X		
	Long-term debt	X		
	Deferred income taxes	X		
		XXX		
	Accrued decommissioning costs included in current liabilities		X	
	Total liabilities (less accrued decommissioning costs)			X
4	Total net worth	XX		
	Less: Cost in excess of value of tangible assets acquired	X		
		X		
	Accrued decommissioning costs included in current liabilities		X	
	Tangible net worth (plus decommissioning costs)			X

Note:

The model schedule above does not illustrate an entire schedule. Rather, it illustrates the form of schedule the NRC expects to be submitted by licensees. Details and reconciling items will differ in specific situation.

A.8.10 Model Parent Company Guarantee Agreement

PARENT COMPANY GUARANTEE

Guarantee made this [*insert date*] by [*insert name of guaranteeing entity*], a [*insert "proprietorship," "partnership," "corporation," or "LLC"*] organized under the laws of the State of [*insert name of State*], herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), beneficiary, on behalf of our subsidiary [*insert name of licensee*], of [*insert business address*].

Recitals

1. The guarantor has full authority and capacity to enter into this guarantee [*if the guarantor is a corporation, insert the following: "under its bylaws, articles of incorporation, and the laws of the State of [insert guarantor's State of incorporation], its State of incorporation."*] [*If the guarantor has a Board of Directors, insert the following: "Guarantor has approval from its Board of Directors to enter into this guarantee."*]
2. This guarantee is being issued so that [*insert name of the licensee*] will be in compliance with regulations issued by NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, or 72*] which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.
3. The guarantee is issued to provide financial assurance for decommissioning activities for [*identify name and address of licensed facility(ies) and corresponding NRC license number(s)*] as required by 10 CFR Part [*insert 30, 40, 70, or 72*]. The decommissioning costs for these activities are as follows: [*insert amount of decommissioning costs guaranteed for each identified facility*].
4. The guarantor meets or exceeds the following financial test criteria [*insert statement indicating which financial test is being used*] and agrees to comply with all notification requirements as specified in 10 CFR Part [*insert 30, 40, 70, or 72*] and Appendix A to 10 CFR Part 30.

The guarantor meets one of the following two financial tests:

(a)(i) Two of the following three ratios: a ratio of total liabilities to total net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and

(a)(ii) Net working capital and tangible net worth each at least six times the costs covered by financial tests; and

(a)(iii) Tangible net worth of at least $21 million; and

(a)(iv) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the costs covered by financial tests.

OR

(b)(i) A current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, A, or BBB (including adjustment of + or -), as issued by Standard & Poor's, or Aaa, Aa, A or Baa (including adjustment of 1, 2, or 3), as issued by Moody's; and

(b)(ii) Total net worth at least six times the costs covered by financial tests; and

(b)(iii) Tangible net worth of at least $21 million; and

(b)(iv) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the costs covered by financial tests.

5. The guarantor has majority control of the voting stock for the following licensees covered by this guarantee: [*List for each licensee: name, address, the facilities owned or operated by each licensee, and the corresponding license numbers.*]

6. Decommissioning activities as used below refer to the activities required by 10 CFR Part [*insert 30, 40, 70, or 72*] for decommissioning of the facilities identified above.

7. For value received from [*insert name of licensee*], and pursuant to the guarantor's authority to enter into this guarantee, the guarantor guarantees to NRC that, if the licensee fails to perform the required decommissioning activities, as required by License No. [*insert license number*], the guarantor shall pay into the standby trust fund the amount of the current cost estimates for these activities.

8. The guarantor agrees to submit revised financial statements, financial test data, and an auditor's special report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.

9. The guarantor and the licensee agree that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, the guarantor and the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to NRC. If the licensee fails to provide alternative financial assurance as specified in 10 CFR Part [*insert 30, 40, 70, or 72*], and obtain written approval of such assurance from the NRC within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance in the name of [*insert name of licensee*] or make full payment under the guarantee to the standby trust.

10. Independent of any notification under paragraph 9 above, if the NRC determines for any reason that the guarantor no longer meets the financial test criteria or that it is disallowed from continuing as a guarantor for the facility under License No. [*insert license number*], the guarantor agrees that within 30 days after being notified by the NRC of such determination, an alternative financial assurance mechanism as specified in 10 CFR Part 30, 40, 70, or 72, as applicable, shall be established by the guarantor in the name of [*insert name of licensee*] unless [*insert name of licensee*] has done so.

11. The guarantor also agrees to notify the NRC promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternative financial assurance acceptable to the NRC.

12. The guarantor agrees that if it determines, at any time other than as described in Recital 9, that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor, it shall establish alternative financial assurance as specified in 10 CFR Part 30, 40, 70, or 72, as applicable, within 30 days, in the name of [*insert name of licensee*] unless [*insert name of licensee*] has done so.

13. The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or NRC-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*].

14. The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor.

15. The guarantor agrees to remain bound under this guarantee for as long as [*insert name of licensee*] must comply with the applicable financial assurance requirements of 10 CFR Part [*insert 30, 40, 70, or 72*], for the previously listed facilities, except that the guarantor may cancel this guarantee by sending notice by certified mail to NRC and to [*insert name of licensee*], such cancellation to become effective no earlier than 120 days after receipt of such notice by both NRC and [*insert name of licensee*] as evidenced by the return receipts.

16. The guarantor agrees that if [*insert name of licensee*] fails to provide alternative financial assurance as specified in 10 CFR Part [*insert 30, 40, or 70*], as applicable, and obtain written approval of such assurance from NRC within 90 days after a notice of cancellation by the guarantor is received by both NRC and [*insert name of licensee*] from the guarantor, the guarantor shall provide such alternative financial assurance in the name of [*insert name of licensee*] or make full payment under the guarantee.

17. The guarantor agrees that it is subject to Commission orders to make payments under the guarantee agreement.

18. The guarantor agrees that if the guarantor admits in writing its inability to pay its debts generally, or makes a general assignment for the benefit of creditors, or any proceeding is instituted by or against the guarantor seeking to adjudicate it as bankrupt or insolvent, or seeking dissolution, liquidation, winding-up, reorganization, arrangement, adjustment, protection, relief, or composition of it or its debts under any law relating to bankruptcy, insolvency, or reorganization or relief of debtors, or seeking the entry of an order for relief or the appointment of a receiver, trustee, custodian, or other similar official for the guarantor or for any substantial part of its property, or the guarantor takes any action to authorize or effect any of the actions stated in this paragraph, then the Commission may:

    (a) Declare that the financial assurance guaranteed by the parent company guarantee agreement is immediately due and payable to the standby trust set up to protect the

public health and safety and the environment, without diligence, presentment, demand, protect or any other notice of any kind, all of which are expressly waived by guarantor; and

(b) Exercise any and all of its other rights under applicable law.

19. The guarantor agrees to notify the NRC, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (U.S.C.), or the occurrence of any other event listed in recital 17 of this guarantee and by or against the guarantor; the licensee; an entity (as that term is defined in 11 U.S.C. 101(14)) controlling the licensee or listing the license or licensees as property of the estate; or an affiliate (as that term is defined in 11 U.S.C. 101(2)) of the licensee. This notification must include: a description of the event, including major creditors, the amounts involved, and the actions taken to assure that the amount of funds guaranteed by the parent company guarantee for decommissioning will be transferred to the standby trust as soon as possible; if a petition of bankruptcy was filed, the identity of the bankruptcy court in which the petition for bankruptcy was filed; and the date of filing of any petitions.

20. The guarantor expressly waives notice of acceptance of this guarantee by NRC or by [*insert name of licensee*]. The guarantor also expressly waives notice of amendments or modifications of the decommissioning requirements and of amendments or modifications of the license.

21. If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to NRC during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: _____

[*Name of guarantor*]
[*Authorized signature for guarantor*]
[*Name of person signing*]
[*Title of person signing*]

[*Name of licensee*]
[*Authorized signature for licensee*]
[*Name of person signing*]
[*Title of person signing*]

Signature of witness or notary: _____

A.9 Self-Guarantees

A *self-guarantee* is a guarantee by a licensee itself that it will fund and carry out decommissioning activities. The licensee must annually pass (within 90 days after the close of each succeeding fiscal year) the applicable financial test specified in Appendix C, D, or E to 10 CFR Part 30 to demonstrate that it has adequate financial strength to provide the guarantee. The financial tests specified in Appendices C, D, and E to 10 CFR Part 30 also apply to licensees regulated under 10 CFR Part 40, 10 CFR Part 70, and 10 CFR Part 72. The financial test alternatives consider accounting ratios, net worth, assets, operating revenues, and bond rating data relative to fixed criteria. The licensee's financial statements must also have been prepared in accordance with generally accepted accounting principles applicable to the United States, and an independent certified public accountant must have verified the accuracy of the financial test data relative to the audited financial statements. A self-guarantee may not be used in combination with other financial assurance mechanisms, except a sinking fund, and may not be used in cases in which a licensee has a parent company holding majority control of its voting stock.

The NRC's regulations for self-guarantees apply to three general categories of licensees:

- *Commercial companies that issue bonds.* Self-guarantees by these licensees are regulated under Appendix C, "Criteria Relating to Use of Financial Tests and Self-Guarantees for Providing Reasonable Assurance of Funds for Decommissioning," to 10 CFR Part 30.
- *Commercial companies that do not issue bonds*. Self-guarantees by these licensees are regulated under Appendix D, "Criteria Relating to Use of Financial Tests and Self-Guarantee for Providing Reasonable Assurance of Funds for Decommissioning by Commercial Companies That Have No Outstanding Rated Bonds," to 10 CFR Part 30.
- *Nonprofit colleges, universities, and hospitals*. Self-guarantees by these licensees are regulated under Appendix E, "Criteria Relating to Use of Financial Tests and Self-Guarantee for Providing Reasonable Assurance of Funds for Decommissioning by Nonprofit Colleges, Universities, and Hospitals," to 10 CFR Part 30.

A self-guarantee must remain in force unless the licensee sends notice of cancellation by certified mail to the NRC. For a commercial licensee who issues bonds, this notice must be sent at least 120 days in advance (as evidenced by the return receipts). For a commercial licensee who does not issue bonds or a nonprofit college, university, or hospital, the guarantee may not be canceled until an alternative financial assurance mechanism is in place. However, in all cases, a self-guarantee may be used only as long as the licensee meets the financial test criteria. If the licensee no longer passes the financial test, it must provide alternative financial assurance.

Finally, the licensee must provide a written guarantee stating that it will fund and carry out the required decommissioning activities or, upon issuance of an order by the NRC, will set up and fund a trust in the amount of the current decommissioning cost estimates or certified amounts.

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular self-guarantee submissions acceptable.

- Section A.9.1 describes qualifications required of the self-guarantor.
- Section A.9.2 addresses the adequacy of coverage.
- Section A.9.3 discusses the documentation that supports a self-guarantee.
- Section A.9.4 presents a model CEO or CFO letter that the NRC has found to be acceptable.
- Section A.9.5 presents a model self-guarantee financial test for commercial companies that issue bonds that the NRC has found to be acceptable.
- Section A.9.6 presents a model self-guarantee financial test for nonprofit colleges and universities that issue bonds that the NRC has found to be acceptable.
- Section A.9.7 presents a model self-guarantee financial test for nonprofit colleges and universities that do not issue bonds that NRC has found to be acceptable.
- Section A.9.8 presents a model self-guarantee financial test for nonprofit hospitals that issue bonds that the NRC has found to be acceptable.
- Section A.9.9 presents a model self-guarantee financial test for nonprofit hospitals that do not issue bonds that the NRC has found to be acceptable.
- Section A.9.10 presents a model auditor's special report that the NRC has found to be acceptable.
- Section A.9.11 presents a model schedule reconciling amounts contained in the CEO or CFO letter with amounts in financial statements that the NRC has found to be acceptable.
- Section A.9.12 presents a model self-guarantee agreement that the NRC has found to be acceptable.

This section also contains two checklists designed to assist licensees in preparing acceptable self-guarantees. Checklist 9-A summarizes the primary criteria the NRC uses to evaluate self-guarantees. Checklist 9-B (which should be used only by licensees who revise or do not use the model wording for self-guarantees) presents terms and conditions that are recommended for self-guarantees.

Checklist 9-A Self-Guarantees

☐ Documentation is complete when the following are included:

- ☐ 1. self-guarantee agreement (originally signed duplicate),
- ☐ 2. letter from chief executive officer (CEO) or chief financial officer (CFO) of licensee, including applicable self-guarantee financial test,
- ☐ 3. auditor's special report confirming CEO or CFO letter and reconciling amounts in the CEO or CFO letter with licensee's financial statements,
- ☐ 4. licensee's audited financial statements for the most recent fiscal year, including the auditor's opinion on the financial statements, and
- ☐ 5. Checklist 9-B (if model self-guarantee wording is modified or not used)

☐ The licensee does not have a parent company holding majority control of its voting stock.

☐ The amount of the self-guarantee equals or exceeds: (a) the required coverage level or (b) the difference between a sinking fund and the required coverage level, if the self-guarantee is being combined with a sinking fund.

Checklist 9-B Terms and Conditions Needed in Self-Guarantees

Use this checklist only if deviating from the wording recommended in Section A.9.12.

☐ Name and address of self-guarantor (licensee).

☐ Name and address of regulatory agency.

☐ The following four recitals are included:

- ☐ 1. the authority of the self-guarantor to enter into the guarantee;
- ☐ 2. a statement of the licensee's regulatory obligations as reason for the self-guarantee;
- ☐ 3. identification of the facility(ies) (name, address, and license number) for which the guarantee provides financial assurance and the amounts guaranteed for decommissioning activities; and
- ☐ 4. identification of financial test used by self-guarantor to demonstrate financial strength.

☐ Description of the primary obligation (required activities).

☐ Unequivocal statement of guarantee to include the following:

- ☐ 1. condition(s) of liability, and
- ☐ 2. effect on liability of a change in the status of the licensee.

☐ Statement that self-guarantor remains bound despite amendment or modification of license, reduction or extension of time of performance of required activities, or any other modification or alteration of an obligation of the licensee.

☐ Notice requirements.

☐ Discharge of the self-guarantor (release of obligations).

☐ Termination and revocation to include the following:

- ☐ 1. termination on occurrence of contingency,
- ☐ 2. voluntary revocation by self-guarantor, and
- ☐ 3. effective date of termination or revocation.

☐ Self-guarantor's agreement to be subject to Commission orders.

☐ Self-guarantor's agreement to Commission's remedies in case of financial distress (i.e., bankruptcy or insolvency events).

☐ Self-guarantor's agreement to notify in case of financial distress (i.e., bankruptcy or insolvency events).

☐ Date.

☐ Signatures.

☐ Signature of witness or notary (signature block).

A.9.1 Qualifications of the Self-Guarantor

As noted above, a licensee using a self-guarantee to provide financial assurance for decommissioning must *not* have a parent company holding majority control of its voting stock (see 10 CFR 30.35(f)(2), 10 CFR 40.36(e)(2), 10 CFR 70.25(f)(2), and 10 CFR 72.30(e)(2)). To qualify to provide the guarantee, the licensee also must meet the applicable financial test specified in Appendix C, D, or E to 10 CFR Part 30.

- The financial test specified in Appendix C pertains to commercial companies that issue bonds.
- The financial test specified in Appendix D pertains to commercial companies that do not issue bonds.
- The financial tests specified in Appendix E pertain to nonprofit colleges, universities, and hospitals.

Licensees without an actual bond rating may still use the financial tests involving bond ratings by obtaining a so-called "indicative" bond rating from either Standard & Poor's or Moody's. Indicative bond ratings, which are available for a fee, are for information only and are provided as an indication of what a rating would be if the firm were to issue debt. A licensee seeking to use an indicative bond rating should submit the rating and name of the rating service as part of the financial test demonstration. In this case, however, the licensee would not be able to provide the NRC with information on the dates of issuance and maturity of the bond, nor would it be able to certify that the rating pertained to its "most recent bond issuance." Rather, the licensee would need to explain that the rating is an indicative rating. The licensee would also need to update the indicative rating every year as it repeats the passage of the financial test.

For purposes of the financial tests, bond ratings must apply to outstanding, rated bonds that are not secured by insurance, a letter of credit, or other collateral or guarantee and that have been issued *directly* by the licensee, rather than by any other entity (e.g., an educational authority). In addition, ratings on revenue bonds may not be used in the financial test. The scope of revenue bond ratings is typically quite limited in that the rating considers only the adequacy of specific revenue sources pledged to repay the bonds. Revenue bonds frequently require that the pledged revenue be used to repay the bonded debt before paying other operating expenses and, therefore, do not meet the NRC's regulatory requirement that the bonds be "uninsured, uncollateralized, and unencumbered." If the revenue sources are clearly adequate to repay the bonds, the revenue bond rating may be high, even if the issuer's revenue is clearly not adequate to pay other operating expenses. Thus, unlike bonds that pledge an entity's full faith and credit, ratings on revenue bonds do not reflect the overall financial condition of the issuer, as intended by the NRC's self-guarantee regulations.

In addition, for the purposes of these financial tests, "total net worth" is defined to exclude the net book value and goodwill of the nuclear facility and site. "Tangible net worth" is defined to exclude all intangible assets and the net book value of the nuclear facility and site.

A.9.1.1 Financial Test for Commercial Companies that Issue Bonds

The licensee must have the following:

(i) Tangible net worth, calculated to exclude the net book value of the nuclear facility and site and any intangible assets, of at least $21 million and total net worth at least 10 times the amount of decommissioning funds being assured (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used);

(ii) Assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used); and

(iii) A current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, or A (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's.

(Note: To pass the financial test, a commercial licensee who issues bonds also must have at least one class of equity securities registered under the Securities Exchange Act of 1934.)

A.9.1.2 Financial Test for Commercial Companies that Do Not Issue Bonds

The licensee must have the following:

(i) Tangible net worth of at least $21 million and total net worth of at least 10 times the amount of decommissioning funds being assured (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used);

(ii) Assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the amount of funds being assured (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used); and

(iii) A ratio of cash flow divided by total liabilities greater than 0.15 and a ratio of total liabilities divided by total net worth less than 1.5.

(Note: Cash flow equals the sum of net income plus depreciation, depletion, and amortization.)

A.9.1.3 Financial Test for Nonprofit Colleges and Universities that Issue Bonds

The licensee must have a current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, or A (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's.

(Note: An "uninsured, uncollateralized, and unencumbered" bond issuance is one that is backed only by the issuer's full faith and credit. Such issuances are not guaranteed by a bond insurance company or backed by collateral, a letter of credit, claims on a specific revenue source, or any other property or credit.)

A.9.1.4 Financial Test for Nonprofit Colleges and Universities that Do Not Issue Bonds

The licensee must have unrestricted endowment consisting of assets located in the United States of at least $50 million or at least 30 times the current decommissioning cost estimates (or prescribed amount if a certification is used), whichever is greater, for all decommissioning activities for which the college or university is responsible as a self-guaranteeing licensee for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used).

A.9.1.5 Financial Test for Nonprofit Hospitals that Issue Bonds

The licensee must have a current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, or A (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's.

(Note: An "uninsured, uncollateralized, and unencumbered" bond issuance is one that is backed only by the issuer's full faith and credit. Such issuances are not guaranteed by a bond insurance company or backed by collateral, a letter of credit, claims on a specific revenue source, or any other property or credit.)

A.9.1.6 Financial Test for Nonprofit Hospitals that Do Not Issue Bonds

The licensee must have the following:

(i) (Total revenues less total expenditures) divided by total revenues must be equal to or greater than 0.04; and

(ii) Long-term debt divided by net fixed assets must be less than or equal to 0.67; and

(iii) (Current assets and depreciation fund) divided by current liabilities must be greater than or equal to 2.55; and

(iv) Operating revenues must be at least 100 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the hospital is responsible as a self-guaranteeing licensee.

A.9.2 Level of Coverage

A self-guarantee must be in an amount that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning, which includes an adequate contingency. If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the self-guarantee, the licensee must revise the guarantee to assure the higher amount (or must replace the guarantee with a different financial assurance mechanism that is in the amount of the new coverage level). If the self-guarantee is being combined with a sinking fund, the licensee must: (1) increase the amount of the guarantee, (2) increase the sinking fund balance, or (3) use a combination of both 1 and 2 in order that the level of coverage is at least equal to the licensee's new prescribed amount or new estimated cost of decommissioning.

A.9.3 Recommended Documentation

The terms and conditions of a self-guarantee are governed by a written guarantee agreement. The wording of a self-guarantee agreement may vary, but Section A.9.12 of this appendix is a model self-guarantee agreement that is acceptable to and recommended by the NRC. Other documentation that is to be submitted with a self-guarantee is listed below and is summarized in Checklist 9-A. Supporting documentation may differ for licensees who submit self-guarantees that differ from the recommended model.

- The *guarantee agreement* is the written document that specifies the terms and conditions of the self-guarantee. The wording contained in the model guarantee presented in Section A.9.12 is acceptable to the NRC. Licensees who use other wording should refer to Checklist 9-B to be sure that the alternative wording contains all the necessary terms and conditions.
- The *chief executive officer* (CEO) or *chief financial officer* (CFO) *letter* (Section A.9.4) is a letter from either the CEO or CFO of the licensee that (1) identifies the names, addresses, license numbers, and estimated decommissioning costs of the facilities covered by the guarantee, (2) certifies that the licensee is a going concern, (3) identifies the amount of the licensee's tangible net worth, (4) specifies whether the licensee is required to file a Form 10-K with the U.S. Securities and Exchange Commission, (5) lists the date on which the licensee's fiscal year ends, and (6) demonstrates the licensee's ability to pass the applicable financial test specified in Appendix C, D, or E to 10 CFR Part 30. The licensee must pass the financial test for ***all*** costs covered by a financial test. These include costs covered by (1) the self-guarantee, (2) other NRC or Agreement State parent company guarantees or self-guarantees, and (3) parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., EPA).

- The *auditor's special report* (Section A.9.10) is a report from the licensee's independent certified public accountant that compares the data used by the licensee in the financial test demonstration with the amounts in its annual financial statements. If needed, this report may also include a *schedule attachment* (Section A.9.11) reconciling the financial test numbers with amounts in the licensee's financial statements.
- A copy of the licensee's *audited financial statements* for the most recently completed fiscal year. These financial statements should include the independent certified public accountant's opinion on the statements.

A.9.4 Model Chief Executive Officer (CEO) or Chief Financial Officer (CFO) Letter

[*Address to U.S. Nuclear Regulatory Commission*]

I am the [*insert "chief executive officer" or "chief financial officer"*] of [*insert name and address of licensee*], a [*insert "proprietorship," "partnership," "corporation," "LLC," "nonprofit college," "nonprofit university," or "nonprofit hospital"*]. This letter is in support of this firm's use of the self-guarantee financial test to demonstrate financial assurance, as specified in 10 CFR Part [*insert 30, 40, 70, or 72*]. This firm has no parent company holding majority control of its voting stock.

[*Complete the following paragraph regarding facilities and associated cost estimates or certified amounts. For each facility, include its license number, name, address, and current cost estimates or certified amounts for the specified activities.*]

This firm guarantees, through the self-guarantee submitted to demonstrate compliance under 10 CFR Part [*insert 30, 40, 70, or 72*], the decommissioning of the following facilities owned or operated by this firm. The current cost estimates or certified amounts for decommissioning, so guaranteed, are shown for each facility:

Name of Facility	License Number	Location of Facility	Certified Amounts or Current Cost Estimates

I hereby certify that [*insert name of licensee*] is currently a going concern, and that it possesses positive tangible net worth in the amount of [*insert amount*].

The fiscal year of this firm ends on [*insert month and day*]. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended [*insert date*]. A copy of this firm's most recent financial statements is enclosed.

This firm [*insert "is required" or "is not required"*] to file a Form 10-K with the U.S. Securities and Exchange Commission for the latest fiscal year. [*If the licensee is a commercial company that issues bonds, insert the following: "This firm has at least one class of equity securities registered under the Securities Exchange Act of 1934."*]

This firm satisfies the following self-guarantee test:

[*Insert completed demonstration of the applicable self-guarantee financial test.*]

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

[*Signature*]
[*Name*]
[*Title*]
[*Date*]

A.9.5 Model Self-Guarantee Financial Test for Commercial Companies that Issue Bonds (10 CFR Part 30, Appendix C)

1. Current decommissioning cost estimates or certified amounts

   a. Decommissioning amounts covered by this self-guarantee $_____

   b. All decommissioning amounts covered by other NRC or Agreement State parent company guarantees or self-guarantees $_____

   c. All amounts covered by parent company guarantees, self-guarantees, or financial tests of other Federal or State agencies (e.g., EPA) $_____

TOTAL $_____

2. Current bond rating of most recent uninsured, uncollateralized, and unencumbered issuance of this firm

   Rating _____

   Name of rating service _____

3. Date of issuance of bond _____

4. Date of maturity of bond _____

*5. Tangible net worth** (if any portion of estimates for decommissioning is included in total liabilities on your firm's financial statements, you may add the amount of that portion to this line) $_____

*6. Total net worth*** $_____

*7. Total assets in United States $_____

	Yes	No
8. Is line 5 at least $21 million?	____	____
9. Is line 6 at least 10 times line 1?	____	____
10. Are at least 90 percent of firm's assets located in the United States? If not, complete line 11.	____	____
11. Is line 7 at least 10 times line 1?	____	____

12. Is the rating specified on line 2 AAA, AA, or A (including adjustments of + and -), as issued by Standard and Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's? ___ ___

13. Does the licensee have at least one class of equity securities registered under the Securities Exchange Act of 1934? ___ ___

Notes:

* Denotes figures derived from financial statements.

** Tangible net worth is defined as net worth minus all intangible assets and excluding the net book value of the nuclear facility and site.

*** Excluding the net book value and goodwill of the nuclear facility and site.

A.9.6 Model Self-Guarantee Financial Test for Nonprofit Colleges and Universities that Issue Bonds (10 CFR Part 30, Appendix E)

1. Current bond rating of most recent uninsured, uncollateralized, and unencumbered issuance of this institution

   Rating _____

   Name of rating service _____

2. Date of issuance of bond _____

3. Date of maturity of bond _____

	Yes	No
4. Is the current rating specified on line 1 AAA, AA, or A (including adjustments of + and -), if issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), if issued by Moody's?	___	___

A.9.7 Model Self-Guarantee Financial Test For Nonprofit Colleges and Universities that Do Not Issue Bonds (10 CFR Part 30, Appendix E)

1. Current decommissioning cost estimates or certified amounts

   a. Decommissioning amounts covered by this self-guarantee $_____

   b. All decommissioning amounts covered by other NRC or Agreement State self-guarantees $_____

   c. All amounts covered by self-guarantees or financial tests of other Federal or State agencies (e.g., EPA) $_____

TOTAL $_____

*2. Total assets in United States in unrestricted endowment $_____

	Yes	No
3. Is line 2 at least $50 million, or at least 30 times line 1, whichever is greater?	____	____

Note:

* Denotes figures derived from financial statements.

A.9.8 Model Self-Guarantee Financial Test for Nonprofit Hospitals that Issue Bonds (10 CFR Part 30, Appendix E)

1. Current bond rating of most recent uninsured, uncollateralized, and unencumbered issuance of this institution

   Rating _____

   Name of rating service _____

2. Date of issuance of bond _____

3. Date of maturity of bond _____

	Yes	No
4. Is the current rating specified on line 1 AAA, AA, or A (including adjustments of + and -), if issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), if issued by Moody's?	___	___

A.9.9 Model Self-Guarantee Financial Test for Nonprofit Hospitals that Do Not Issue Bonds (10 CFR Part 30, Appendix E)

1. Current decommissioning cost estimates or certified amounts

   a. Decommissioning amounts covered by this self-guarantee $_____

   b. All decommissioning amounts covered by other NRC or Agreement State self-guarantees $_____

   c. All amounts covered by self-guarantees or financial tests of other Federal or State agencies (e.g., EPA) $_____

TOTAL $_____

*2. Total revenues $_____

*3. Operating revenues $_____

*4. Total expenditures $_____

*5. Long-term debt $_____

*6. Net fixed assets $_____

*7. Current assets $_____

*8. Depreciation fund $_____

*9. Current liabilities $_____

	Yes	No
10. Is line 3 at least 100 times line 1?	____	____

Guarantor must meet each of the following ratios:

11. Is (line 2 minus line 4) divided by line 2 at least 0.04?	____	____
12. Is line 5 divided by line 6 less than or equal to 0.67?	____	____
13. Is (line 7 plus line 8) divided by line 9 at least 2.55?	____	____

Note:

* Denotes figures derived from financial statements.

A.9.10 Model Auditor's Special Report

CONFIRMATION OF LETTER FROM

[*Insert "CHIEF EXECUTIVE OFFICER" or "CHIEF FINANCIAL OFFICER"*]

We have examined the financial statements of [*insert name of self-guarantor*] for the year ended [*insert date*], and have issued our report thereon dated [*insert date*]. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary.

[*Insert name of self-guarantor*] has prepared documents to demonstrate its financial responsibility under the United States. Nuclear Regulatory Commission's (NRC's) financial assurance regulations, 10 CFR Part [*insert 30, 40, 70, or 72*]. This letter is furnished to assist the licensee [*insert name and NRC license number*] in complying with these regulations and should not be used for other purposes.

The attached schedule reconciles the specified information furnished in the [*insert "chief executive officer's (CEO's)" or "chief financial officer's (CFO's)"*] letter in response to the regulations with the [*insert "company's" or "institution's"*] financial statements. In connection therewith, we have:

1. Confirmed that the amounts in the column "Per Financial Statements" agree with amounts contained in the [*insert "company's" or "institution's"*] financial statements for the year ended [*insert date*];

2. Confirmed that the amounts in the column "Per [*insert "CEO's" or "CFO's"*] Letter" agree with the letter prepared in response to NRC's request;

3. Confirmed that the amounts, if any, in the column "Reconciling Items" are adequately explained in the attached schedule, that each reconciling item represents an appropriate adjustment to the financial data, and that the amount of each reconciling item is accurate; and

4. Recomputed the totals and percentages.

Because the procedures in 1–4 above do not constitute a full examination made in accordance with generally accepted auditing standards, we do not express an opinion on the manner in which the amounts were derived in the items referred to above. In connection with the procedures referred to above, no matters came to our attention that cause us to believe that the [*insert "CEO's" or "CFO's"*] letter and supporting information should be adjusted.

We have evaluated the off-balance sheet transactions [*insert name of self-guarantor*] and it is our opinion that these transactions [*insert "could" or "could not"*] materially adversely affect the ability of [*insert name of self-guarantor*] to pay decommissioning costs.

We [*insert "have" or "have not"*] confirmed that the bond rating, if used to demonstrate passage of the financial test, conforms to the description furnished in the CFO's letter in response to the regulations.

_____
Signature

_____
Date

A.9.11 Model Schedule Reconciling Amounts Contained in Chief Executive Officer's or Chief Financial Officer's Letter with Amounts in Financial Statements

XYZ COMPANY
YEAR ENDED DECEMBER 31, 20XX

Per Line Number in CFO's Letter		Per Financial Statements	Reconciling Items	CFO's Letter
	Total net worth	XX		
	Less: Cost in excess of value of tangible assets acquired	X		
		X		
	Accrued decommissioning costs included in current liabilities		X	
5	Tangible net worth (plus decommissioning costs)			X

Note:

The model schedule above does not illustrate an entire schedule. Rather, it illustrates the form of schedule the NRC expects to be submitted by licensees. Details and reconciling items will differ in specific situation.

A.9.12 Model Self-Guarantee Agreement

SELF-GUARANTEE

Guarantee made this [*insert date*] by [*insert name of self-guaranteeing entity*], a [*insert "proprietorship," "partnership," "corporation," "LLC," "nonprofit college," "nonprofit university," or "nonprofit hospital"*] organized under the laws of the State of [*insert name of State*], herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC) on behalf of ourselves as licensee.

Recitals

1. The guarantor has full authority and capacity to enter into this self-guarantee [*if the guarantor is a corporation, insert the following: "under its bylaws, articles of incorporation, and the laws of the State of [insert guarantor's State of incorporation], its State of incorporation."*] [*If the guarantor has a Board of Directors, insert the following: "Guarantor has approval from its Board of Directors to enter into this self-guarantee."*]
2. This self-guarantee is being issued to comply with regulations issued by NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, or 72*], which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.
3. The self-guarantee is issued to provide financial assurance for decommissioning activities for [*identify name and address of licensed facilities and corresponding NRC license numbers*] as required by 10 CFR Part [*insert 30, 40, 70, or 72*]. The decommissioning costs for these activities are as follows: [*insert amount of decommissioning costs guaranteed for each identified facility*].
4. The guarantor meets or exceeds the following financial test criteria [*insert statement indicating which financial test is being used*] and agrees to comply with all notification requirements as specified in 10 CFR Part [*insert 30, 40, 70, or 72*] and Appendix [*insert C, D, or E*] to 10 CFR Part 30.

The guarantor meets the following self-guarantee test:

[*If the guarantor is a commercial company that issues bonds, insert the following test.*]

(a) Tangible net worth of at least $21 million, and total net worth at least 10 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used); and

(b) Assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the current decommissioning cost estimates (or prescribed amount if

a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor; and

(c) At least one class of equity securities registered under the Securities Exchange Act of 1934; and

(d) A current rating for its most recent bond issuance of AAA, AA, or A (including adjustments of + and -), as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's.

[*If the guarantor is a commercial company that does not issue bonds, insert the following test.*]

(a) Tangible net worth of at least $21 million and total net worth of at least 10 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used); and

(b) Assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the company is responsible as a self-guaranteeing licensee and as a parent-guarantor for the total of all nuclear facilities or parts thereof (or the current amount required if certification is used); and

(c) A ratio of cash flow divided by total liabilities greater than 0.15 and a ratio of total liabilities divided by total net worth less than 1.5.

[*If the guarantor is a nonprofit college or university that issues bonds, insert the following test.*]

(a) A current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, or A (including adjustments of + and -) as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3), as issued by Moody's.

[*If the guarantor is a nonprofit college or university that does not issue bonds, insert the following test.*]

(a) Unrestricted endowment consisting of assets located in the United States of at least $50 million, or at least 30 times the current decommissioning cost estimates (or prescribed amount if a certification is used), whichever is greater, for all decommissioning activities for which the college or university is responsible as a self-guaranteeing licensee.

[*If the guarantor is a nonprofit hospital that issues bonds, insert the following test.*]

(a) A current rating for its most recent uninsured, uncollateralized, and unencumbered bond issuance of AAA, AA, or A (including adjustments of + and -) as issued by Standard & Poor's, or Aaa, Aa, or A (including adjustments of 1, 2, or 3) as issued by Moody's.

[*If the guarantor is a nonprofit hospital that does not issue bonds, insert the following test.*]

(a) (Total revenues less total expenditures) divided by total revenues must be equal to or greater than 0.04; and

(b) Long-term debt divided by net fixed assets must be less than or equal to 0.67; and

(c) (Current assets and depreciation fund) divided by current liabilities must be greater than or equal to 2.55; and

(d) Operating revenues must be at least 100 times the current decommissioning cost estimates (or prescribed amount if a certification is used) for all decommissioning activities for which the hospital is responsible as a self-guaranteeing licensee.

5. The guarantor does not have a parent company holding majority control of its voting stock.

6. Decommissioning activities as used below refer to the activities required by 10 CFR Part [*insert 30, 40, 70, or 72*] for decommissioning of the facilities identified above.

7. Pursuant to the guarantor's authority to enter into this guarantee, the guarantor guarantees to NRC that the guarantor shall:

(a) carry out the required decommissioning activities, as required by License No. [*insert license number*] or

(b) set up a standby trust fund acceptable to the NRC as specified in 10 CFR Part [insert 30, 40, 70, or 72] in the amount of the current cost estimates for these activities.

8. The guarantor agrees to submit revised financial statements, financial test data, and an auditor's special report and reconciling schedule annually within 90 days of the close of its fiscal year.

[*If the guarantor is a commercial company that issues bonds, insert the following language.*]

9. The guarantor agrees that if, at the end of any fiscal year before termination of this self-guarantee, it fails to meet the self-guarantee financial test criteria, it shall send, by certified mail, immediate notice to NRC that it intends to provide alternative financial assurance as specified in 10 CFR Part [*insert 30, 40, 70, or 72*]. Within 120 days of such notice, the guarantor shall establish such financial assurance.

[*If the guarantor is a commercial company that does not issue bonds or is a nonprofit college, university, or hospital, insert the following language*.]

10. The guarantor agrees that if, at the end of any fiscal year before termination of this self-guarantee, it fails to meet the self-guarantee financial test criteria, it shall send within 90 days of the end of the fiscal year, by certified mail, notice to NRC that it intends to provide alternative financial assurance as specified in 10 CFR Part [*insert 30, 40, 70, or 72*]. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance.

11. The guarantor also agrees to notify the NRC in writing in advance of any proposed change in or transfer of ownership of the licensed activity and to maintain this guarantee until the new licensee provides alternative financial assurance acceptable to the beneficiary.

12. The guarantor agrees that if it determines, at any time other than as described in Recital 9, that it no longer meets the self-guarantee financial test criteria or it is disallowed from continuing as a self-guarantor, it shall establish alternative financial assurance as specified in 10 CFR Part 30, 40, 70, or 72, as applicable, within 30 days.

13. The guarantor, as well as its successors and assigns, agrees to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of the license or NRC-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*].

14. The guarantor agrees that it shall be liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor. Such litigation costs shall not be deducted from or otherwise reduce the financial assurance provided by this guarantee.

15. The guarantor agrees to remain bound under this self-guarantee for as long as it, as licensee, must comply with the applicable financial assurance requirements of 10 CFR Part [*insert 30, 40, 70, or 72*], for the previously listed facilities, except that the guarantor may cancel this self-guarantee by sending notice by certified mail to NRC, such cancellation to become effective [*if the guarantor is a commercial company that issues bonds, insert "no earlier than 120 days after receipt of such notice by NRC, as evidenced by the return receipt"*] [*if the guarantor is a commercial company that does not issue bonds or is a nonprofit college, university, or hospital, insert "not before an alternative financial assurance mechanism has been put in place by the guarantor"]*.

16. *The guarantor agrees that if it, as licensee, fails to p*rovide *alternative financial assurance as specified in 10 CFR Part [insert 30, 40, 70, or 72], as applicable, and obtain written approval of such assurance from NRC within 90 days after a notice of cancellation by the* guarantor is received by NRC from the guarantor, the guarantor shall make full payment under the self-guarantee.

17. The guarantor expressly waives notice of acceptance of this self-guarantee by NRC. The guarantor also expressly waives notice of amendments or modifications of the decommissioning requirements.

18. If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to its independent auditor and to NRC during each year in which this self-guarantee is in effect.

19. The guarantor agrees that if the guarantor admits in writing its inability to pay its debts generally, or makes a general assignment for the benefit of creditors, or any proceeding is instituted by or against the guarantor seeking to adjudicate it as bankrupt or insolvent, or seeking dissolution, liquidation, winding-up, reorganization, arrangement, adjustment, protection, relief or composition of it or its debts under any law relating to bankruptcy, insolvency, or reorganization or relief of debtors, or seeking the entry of an order for relief

or the appointment of a receiver, trustee, custodian, or other similar official for the guarantor or for any substantial part of its property, or the guarantor takes any action to authorize or effect any of the actions stated in this paragraph, then the Commission may:

(a) Declare that the financial assurance guaranteed by the guarantee agreement is immediately due and payable to the standby trust set up to protect the public health and safety and the environment, without diligence, presentment, demand, protect, or any other notice of any kind, all of which are expressly waived by guarantor; and

(b) Exercise any and all of its other rights under applicable law.

20. The guarantor agrees to notify the NRC, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code, or the occurrence of any other event listed in paragraph 17 of this guarantee and by or against the guarantor; the licensee; an entity (as that term is defined in 11 U.S.C. 101(14)) controlling the licensee or listing the license or licensees as property of the estate; or an affiliate (as that term is defined in 11 U.S.C. 101(2)) of the licensee. This notification must include: a description of the event, including major creditors, the amounts involved, and the actions taken to assure that the amount of funds guaranteed by the guarantee for decommissioning will be transferred to the standby trust as soon as possible; if a petition of bankruptcy was filed, the identity of the bankruptcy court in which the petition for bankruptcy was filed; and the date of filing of any petitions.

21. The guarantor expressly waives notice of acceptance of this guarantee by NRC or by [*insert name of licensee*]. The guarantor also expressly waives notice of amendments or modifications of the decommissioning requirements and of amendments or modifications of the license.

[*Insert the following recital only if the guarantor issues bonds*.]

22. The guarantor agrees that if, at any time before termination of this self-guarantee, its most recent bond issuance ceases to be rated in any category of ‘‘A-’’ and above by Standard and Poor’s or in any category of ‘‘A3’’ and above by Moody’s, the licensee will notify the Commission in writing within 20 days after publication of the change by the rating service.

I hereby certify that this self-guarantee is true and correct to the best of my knowledge.

Effective date: _____

[*Name of self-guarantor*]
[*Authorized signature for self-guarantor*]
[*Name of person signing*]
[*Title of person signing*]

Signature of witness or notary: _____

A.10 External Sinking Funds

An *external sinking fund* is a mechanism through which a licensee can gradually prepay for decommissioning by combining the use of a prepayment mechanism (trust fund is the only allowable form of prepayment) with a surety method (i.e., surety bond or letter of credit), parent company guarantee or self-guarantee, or insurance. As the value of the prepayment mechanism increases over time, the amount of coverage provided by the surety method, parent company guarantee or self-guarantee, or insurance can be reduced.

Exception: Licensees under 10 CFR Part 72 that qualify to use the assurance method of 10 CFR 72.30(e)(5) and either (1) recover, either directly or indirectly, the estimated total cost of decommissioning through rates established by "cost of service" or similar ratemaking regulation or (2) have a source of revenues for its external sinking fund that is a "non-bypassable charge," the total amount of which will provide funds estimated to be needed for decommissioning, may use an external sinking fund without having to couple it with a surety method or insurance. For qualified licensees, a sinking fund that is not coupled with another financial assurance mechanism is acceptable if the amount accumulated in the fund, plus the amount authorized for recovery through rates or as a "non-bypassable charge", plus earnings consistent with 10 CFR 50.75(e)(1)(ii), covers the total estimated cost of decommissioning.

The remainder of this section discusses the primary criteria that determine whether particular external sinking fund submissions will be acceptable to NRC.

- Section A.10.1 describes qualifications required of the issuer.
- Section A.10.2 addresses funding and the adequacy of coverage.
- Section A.10.3 discusses the documentation that supports an external sinking fund.

This section also contains a checklist designed to assist licensees in preparing acceptable external sinking funds. Checklist 10 summarizes the primary criteria the NRC uses to evaluate external sinking funds.

A.10.1 Qualifications of the Issuer

As noted above, an external sinking fund combines a prepayment mechanism with a surety method, parent company guarantee or self-guarantee, or insurance. These mechanisms may be provided by separate entities or, in some cases, by a single issuer. In all cases, however, issuers of both the prepayment mechanism and the surety method, parent company guarantee or self-guarantee, or insurance must meet appropriate qualifications. Information on the qualifications of issuers of prepayment mechanisms is provided in Section A.4 of this appendix. Information on the qualifications of issuers of surety methods or insurance is provided in Sections A.5 through A.7 of this appendix.

Checklist 10 External Sinking Funds

☐ Documentation is complete when both of the following are included:

☐ 1. prepayment mechanism (originally signed duplicate) and all supporting documentation (see Section A.4 and attach Checklist 4-A, as applicable); and

☐ 2. surety method, parent company guarantee or self-guarantee, or insurance (originally signed duplicate) and all supporting documentation (see Sections A.5 through A.9 and attach Checklists 5-A through 9-A, as applicable).

☐ The total amount of the external sinking fund plus the surety, guarantee, or insurance equals or exceeds the required coverage level.

A.10.2 Level of Coverage

- An external sinking fund must be in an amount that, in total, is at least equal to the licensee's prescribed amount or estimated cost of decommissioning. **[Exception:** Licensees under 10 CFR Part 72 that qualify to use the assurance method of 10 CFR 72.30(e)(5) and either (1) recover, either directly or indirectly, the estimated total cost of decommissioning through rates established by cost of service or similar ratemaking regulation or (2) have a source of revenues for its external sinking fund that is a "non-bypassable charge," the total amount of which will provide funds estimated to be needed for decommissioning, may use an external sinking fund without having to couple it with a surety method or insurance. For qualified licensees, a sinking fund that is not coupled with another financial assurance mechanism is acceptable if the amount accumulated in the fund, plus the amount authorized for recovery through rates or as a "non-bypassable charge," plus earnings consistent with 10 CFR 50.75(e)(1)(ii), covers the total estimated cost of decommissioning.**]**
- The prepayment mechanism may be funded initially in any amount. The surety method, parent company guarantee or self-guarantee, or insurance must then assure the difference between the prepaid amount and the prescribed amount or estimated cost of decommissioning. Subsequently, the licensee must make contributions at least annually to the prepayment mechanism, which increases in value. As the value of the prepayment mechanism increases over time, the amount of coverage provided by the surety method, parent company guarantee or self-guarantee, or insurance can be reduced. Assets held in the prepayment portion of an external sinking fund must be valued at their *current market value*. The total coverage provided by both mechanisms, however, must at all times be at least equal to the licensee's prescribed amount or estimated cost of decommissioning. If the licensee's prescribed amount or estimated decommissioning cost increases to a level above the amount assured by the external sinking fund, the licensee must revise either the prepayment mechanism or the surety, guarantee or insurance so that the combination of the two mechanisms assures the higher amount.

A.10.3 Recommended Documentation

Licensees who use external sinking funds to provide financial assurance for decommissioning must submit a copy of all documentation supporting the prepayment mechanism (see Section A.4.3) *and* the surety method or insurance (see Sections A.5 through A.7).

A.11 Statements of Intent

A *statement of intent* is a commitment by a Federal, State, or local government licensee to request and obtain decommissioning funds from its funding body when necessary. The purpose of a statement of intent is to ensure that, early in the life of their facilities, government licensees make their funding bodies aware of (1) decommissioning requirements and costs and (2) the eventual need for funding. A statement of intent should demonstrate that a government licensee can request special funding from its funding body when necessary. This is different from a guarantee or commitment of a licensee's own funds. Therefore, it is not satisfactory for a licensee to demonstrate that it is authorized to enter into contracts and guarantees committing its own funds or to promise to allocate funds from its operating budget, from other general appropriations (either current or future), or from other internal resources. A statement of intent must include a site-specific decommissioning cost estimate or a certification of financial assurance.

Under the financial assurance regulations (10 CFR 30.35(f)(4), 10 CFR 40.36(e)(4), 10 CFR 70.25(f)(4), and 10 CFR 72.30(e)(4)), a statement of intent may only be used by a Federal, State, or local government *licensee*.

The remainder of this section discusses the primary criteria that determine whether a particular statement-of-intent submission will be acceptable to NRC.

- Section A.11.1 describes qualifications required of the issuer.
- Section A.11.2 addresses the adequacy of coverage.
- Section A.11.3 discusses the documentation that supports a statement of intent.
- Section A.11.4 presents a model statement of intent acceptable to the NRC.

This section also contains two checklists designed to assist licensees in preparing acceptable statements of intent. Checklist 11-A summarizes the primary criteria the NRC uses to evaluate statements of intent. Checklist 11-B (which should be used only by licensees who revise or do not use the wording in the model statements of intent) presents terms and conditions that are recommended for statements of intent.

Checklist 11-A Statements of Intent

☐ Documentation is complete when the following are included:

☐ 1. statement of intent (originally signed duplicate);

☐ 2. documentation verifying that the signatory is authorized to represent the licensee in providing the statement of intent (signatory should be head of agency or designee); and

☐ 3. Checklist 11-B (if model statement of intent wording is modified or not used).

☐ The amount of the statement of intent equals or exceeds the required coverage level.

Checklist 11-B Terms and Conditions Needed in Decommissioning Statements of Intent

Use this checklist only if deviating from the wording recommended in Section A.11.4.

☐ Description of authority of government entity to make the statement of intent.

☐ Identification of Federal, State, or local government licensee.

☐ Description of facility(ies) (name, address, and license number) for which statement of intent provides financial assurance and corresponding costs of required activities.

☐ Specification of the amount of funds being assured.

☐ Statement that funds for required activities will be requested and obtained from the appropriate funding body when necessary.

☐ Recitation of authority for signatory to sign the statement of intent.

☐ Signatures.

☐ Names and titles of signatories.

☐ Date.

A.11.1 Qualifications of the Issuer

Under the NRC's decommissioning financial assurance regulations (10 CFR 30.35(f)(4), 10 CFR 40.36(e)(4), 10 CFR 70.25(f)(4), and 10 CFR 72.30(e)(4)), only Federal, State, or local government licensees may issue statements of intent to provide financial assurance for decommissioning. The signatory should be the head of the agency or designee.

In addition, the signatory of the statement of intent must have the authority to request funding for decommissioning from the governmental body that provides funding to the licensee. The signatory must be the head of the agency, department, or institution holding the license or another person designated by the agency head to exercise the authority to commit the agency to requesting funds for decommissioning.

A.11.2 Level of Coverage

A statement of intent must be in an amount that is at least equal to the licensee's prescribed amount or estimated cost of decommissioning. The exception to this rule is a statement of intent that is being combined with another financial mechanism. For a combination of mechanisms, the *sum* of the coverage provided by the mechanisms must be at least equal to the required coverage level. If the licensee's certification amount or estimated decommissioning cost increases to a level above the amount assured by the statement of intent, the licensee must either (1) revise the statement of intent to assure the higher amount or (2) obtain another financial assurance mechanism to make up the difference between the new coverage level and the amount of the statement of intent.

A.11.3 Recommended Documentation

Licensees who use statements of intent to provide financial assurance for decommissioning must submit a copy of the statement of intent and other documentation as discussed below and summarized in Checklist 11-A. Supporting documentation may differ for licensees who submit statements of intent that differ from the recommended model.

- The *statement of intent* signed by an authorized representative of the licensee. The wording of a statement of intent may vary, but Section A.11.4 of this appendix is a model statement of intent that is acceptable to and recommended by NRC. Licensees who use other wording should use Checklist 11-B to be sure that their wording contains all the necessary terms and conditions.
- Documentation verifying that the person signing the statement of intent is authorized to represent the licensee in the transaction (i.e., has the authority to request and obtain decommissioning funds from the appropriate funding body when necessary). The authority should originate in a statute authorizing the head of the agency, department, or institution to request funds. The statement of intent should contain a complete citation of the statute or designation of authority for the signatory to sign the statement of intent. If the agency head designates another person within the agency to exercise that authority, the delegation of authority should be controlled by appropriate procedures issued by the agency and

documented in written form. Documentation to be submitted with the statement of intent should include a copy of the relevant portion of the statute granting authority. When the agency head designates another person to exercise the authority, documentation should include a copy of the agency procedure used to make the designation and a copy of the document used to record the designation of authority.

A.11.4 Model Statement of Intent

TO: U.S. Nuclear Regulatory Commission
Washington, DC 20555
[*or appropriate Regional address*]

STATEMENT OF INTENT

As [*insert title of signatory*] of [*insert name of licensee*], I exercise express authority and responsibility to request from [*insert name of appropriate governmental funding body*] funds for decommissioning activities associated with operations authorized by U.S. Nuclear Regulatory Commission Material License No. [*insert license number*]. This authority is established by [*insert name of documents governing control of funds*]. Within this authority, I intend to request that funds be made available when necessary in the amount of [*insert dollar amount*] to decommission [*insert facility names, addresses, and estimated costs of required activities or applicable prescribed amounts*]. I intend to request and obtain these funds sufficiently in advance of decommissioning to prevent delay of required activities.

A copy of [*insert name of documents*] is attached as evidence that I am authorized to represent [*insert name of licensee*] in this transaction.

[*Signature*]
[*Name*]
[*Title*]
[*Date*]

Attachment: As stated

A.12 Standby Trust Funds

A *standby trust fund* is simply a trust fund that is not yet funded but is otherwise ready to accept monies in the event they are received from a particular source (such as a surety bond, letter of credit, or insurance). Once a standby trust is funded, the funds would then be available to pay the costs of decommissioning, just as they would with an ordinary trust fund. As in the case of an ordinary trust fund, monies in a standby trust fund are legally segregated for a specific purpose and are administered by a trustee with a fiduciary responsibility to keep or use the property in the fund for the benefit of the beneficiary.

Under the NRC's decommissioning financial assurance regulations (10 CFR 30.35(f)(2)(ii), 10 CFR 40.36(e)(2)(ii), 10 CFR 70.25(f)(2)(ii)), and 10 CFR 72.30(e)(2)(ii)), a standby trust agreement must be established to receive funds from a surety method (i.e., surety bond or letter of credit) or insurance. If the funds from these mechanisms were paid directly to the NRC rather than to a standby trust fund, the NRC would be required to deposit the funds in the U.S. Treasury as general revenue. Consequently, the funds would not be available to pay for decommissioning costs.

The remainder of this section discusses the primary criteria that determine whether the NRC will find particular standby trust fund submissions acceptable.

- Section A.12.1 describes qualifications required of the trustee.
- Section A.12.2 addresses funding and the adequacy of coverage.
- Section A.12.3 discusses the documentation that supports a standby trust fund.
- Section A.12.4 presents a model standby trust fund submission acceptable to the NRC.

This section also contains two checklists designed to assist licensees in preparing acceptable decommissioning standby trusts. Checklist 12-A summarizes the primary criteria the NRC uses to evaluate standby trust funds. Checklist 12-B (which should be used only by licensees who revise or do not use the model wording for standby trust agreements) presents terms and conditions that are recommended for standby trust agreements.

Checklist 12-A Standby Trust Funds

☐ Documentation is complete when the following are included:

- ☐ 1. standby trust agreement (originally signed duplicate);
- ☐ 2. Schedule A;
- ☐ 3. Schedule B;
- ☐ 4. Schedule C;
- ☐ 5. specimen certificate of events;
- ☐ 6. specimen certificate of resolution;
- ☐ 7. letter of acknowledgment; and
- ☐ 8. Checklist 12-B (if model standby trust wording is modified or not used).

    - ☐ The trustee is qualified when the following conditions are true:
    - ☐ The financial institution is regulated by a Federal or State agency.

☐ The financial institution has authority to act as a trustee and has trust operations that are regulated and examined by a Federal or State agency.

Checklist 12-B Terms and Conditions Needed in Decommissioning Standby Trust Agreements

Use this checklist only if deviating from the wording recommended in Section A.12.4. The referenced sections are from the model standby trust agreement.

☐ Execution date of standby trust.

☐ Purpose of standby trust ("whereas" clauses).

☐ Statement of licensee's regulatory obligations as reason for the standby trust fund.

☐ Grantor or grantors (introductory paragraph).

☐ Trustee or trustees (introductory paragraph):

- ☐ 1. names and addresses; and
- ☐ 2. bank or corporate trustee.

☐ Identification of facilities (name, address, and license number) and cost estimates or prescribed amount (Section 2 and Schedule A).

☐ Words of transfer, conveyance, and delivery in trust (Section 3).

☐ Description of trust property (Section 4 and Schedule B):

- ☐ 1. cash;
- ☐ 2. securities; and
- ☐ 3. other liquid assets.

☐ Additions to trust (Section 4).

☐ Distribution of trust principal (Section 5) when the following conditions are met:

- ☐ 1. disbursement to licensee upon proper certification;
- ☐ 2. payment for activities at NRC's direction in writing;
- ☐ 3. refund to grantor at NRC's written specification upon completion of decommissioning; and
- ☐ 4. maximum withdrawal of funds at one time for a particular license limited to 10 percent of the remaining funds available for that license unless NRC written approval is attached.

☐ Trust management (Sections 6–8):

- ☐ 1. discretionary powers;
- ☐ 2. fiduciary duty;
- ☐ 3. commingling and investment;
- ☐ 4. sale or exchange of trust property;
- ☐ 5. scope of investments;
- ☐ 6. express powers of trustee;
- ☐ 7. borrowing money and encumbering trust assets;
- ☐ 8. insurance (optional);
- ☐ 9. operation of business (optional); and
- ☐ 10. compromise of claims (optional).

Checklist 12-B Terms and Conditions Needed in Decommissioning Standby Trust Agreements (continued)

- ☐ Taxes and expenses (Section 9).
- ☐ Annual valuation (Section 10).
- ☐ Advice of counsel (Section 11).
- ☐ Authority, compensation, and tenure of trustees (Sections 12–14):
  - ☐ 1. trustee compensation (Schedule C);
  - ☐ 2. successor trustee; and
  - ☐ 3. instructions to trustee.
- ☐ Amendment of agreement (Section 15).
- ☐ Irrevocability and termination (Section 16).
- ☐ Immunity and indemnification (Section 17).
- ☐ Law to govern construction and operation of trust (Section 18).
- ☐ Interpretation and severability (Section 19).
- ☐ Signatures and titles.
- ☐ Acknowledgments, seals, or attestations, if necessary or desired (witness by notary public).
- ☐ Acceptance of standby trust by trustee or trustees (acknowledgment).

A.12.1 Qualifications of the Trustee

The decommissioning financial assurance regulations (10 CFR 30.35(f)(2)(ii), 10 CFR 40.36(e)(2)(ii), 10 CFR 70.25(f)(2)(ii)), and 10 CFR 72.30(e)(2)(ii)) require that the trustee be acceptable to NRC. Acceptable trustees include appropriate Federal or State government agencies and financial institutions that have the authority to act as trustees and whose trust operations are regulated and examined by a Federal or State agency. Trust operations are regulated separately from other banking operations, and it is very common for a regulated bank not to have the authority to act as a trustee. In addition, the NRC's requirement for trustees is not usually met by individuals who are not acting as a representative of a financial institution.

- The word "National" in the title of a financial institution signals that the institution is Federally regulated, as do the words "National Association" or the initials "N.A." following its title. To determine whether such a financial institution qualifies as an acceptable trustee, licensees should access the Federal Financial Institutions Examination Council's (FFIEC) Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

  Alternatively, licensees may contact the appropriate district office of the Office of the Comptroller of the Currency (OCC) and confirm that the institution (1) is Federally regulated *and* (2) has Federally regulated trust operations. (The OCC's home page on the World Wide Web is located at <http://www.occ.treas.gov>.) As of the date of this revision, the four district offices of the OCC, along with the States and territories under their jurisdiction, are as follows:

  - Northeastern District Office (Telephone: (212) 790-4055)—CT, DE, northeast KY, ME, MD, MA, NH, NJ, NY, NC, PA, RI, SC, VT, VA, WV, District of Columbia, Puerto Rico, and Virgin Islands.

  - Southern District Office (Telephone: (214) 720-7052)—AL, AR, FL, GA, southern KY, LA, MS, southeast MO, OK, TN, and TX.

  - Central District Office (Telephone: (312) 360-8881)—IL, IN, northeast and southeast IA, central KY, MI, MN, eastern MO, ND, OH, and WI.

  - Western District Office (Telephone: (720) 475-7650)—AK, AZ, CA, CO, HI, ID, central and western IA, KS, western MO, MT, NE, NM, NV, OR, SD, UT, WA, WY, and Guam.

- The word "State" in the title of a financial institution signals that the institution is State regulated. U.S. branches of foreign banks are usually regulated by the State in which they are located. To determine whether a State-regulated financial institution qualifies as an acceptable trustee, licensees should access the FFIEC's Trusts Institutions Search database on the World Wide Web at <http://www.fdic.gov/bank/individual/trust/>, and look to see that the bank branch has full trust powers.

  Alternatively, licensees may contact the applicable State banking authority and confirm that the institution (1) is State regulated, *and* (2) has State-regulated trust operations.

- The titles of some financial institutions do not suggest that they are either Federally regulated or State regulated. In many such cases (but not all), these institutions are State regulated, as are many domestic branches of foreign banks.

The licensee may need or choose to replace the current trustee with a new trustee. To be acceptable to the NRC, any successor trustee must meet the same standard as the original trustee (i.e., must be an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency). To ensure that the change in trustee does not negatively impact the standby trust, the licensee should replace the trustee only after sufficient notification (i.e., 90 days or more) has been provided to both the NRC and the current trustee.

A.12.2 Level of Coverage

Standby trusts generally do not need to contain any money or property at the time they are established. State law in some States may require a standby trust fund to contain a de minimis level of funding in order to be effective. The standby trust should, however, anticipate that it will or may be funded in the full prescribed amount or estimated decommissioning cost. For example, the standby trust agreement should allow the trustee to access the full level of coverage as appropriate to complete decommissioning activities. (In the model wording for a standby trust agreement, for example, the trustee is authorized to make decommissioning payments only up to the amount listed in Schedule A to the standby trust agreement. If the amount listed in Schedule A is not at least as great as the NRC-approved cost estimate or prescribed amount, the trustee may not be able to make sufficient payments to complete decommissioning, even if there are sufficient monies in the standby trust.)

If the funds from the licensee's primary financial assurance mechanism are deposited into a standby trust fund, the trust must at all times contain sufficient assets, valued at their *current market value*, to complete decommissioning activities.

A.12.3 Recommended Documentation

The terms and conditions of a standby trust are governed by a written standby trust agreement. The wording of a standby trust agreement may vary, but Section A.12.4 of this appendix is a model standby trust agreement that would meet NRC's requirements and is recommended by the NRC. In addition to the standby trust agreement, other documentation is to be submitted with a standby trust, as summarized in Checklist 12-A, including the following:

- The *standby trust agreement* (along with any amendments) is the written document that specifies the terms and conditions of the standby trust. The wording contained in the model standby trust in Section A.12.4 is acceptable to the NRC. Licensees who use other wording should refer to Checklist 12-B to be sure that the alternative wording contains all the necessary terms and conditions.
- *Schedule A* (Section A.12.5) identifies the name and address of the licensee, the NRC license numbers covered by the standby trust, the addresses of the licensed activity, the amount of regulatory assurances demonstrated by the standby trust agreement, and the date on which these amounts were last adjusted and approved by the NRC.
- *Schedule B* (Section A.12.5) lists the property (i.e., cash, securities, or other liquid assets) initially used to establish the standby trust fund. A standby trust may be established with no property in the fund initially. In this case, Schedule B may simply state "none."
- *Schedule C* (Section A.12.5) specifies the compensation to be paid by the licensee to the trustee for its services.
- The *specimen certificate of events* (Section A.12.6) and the *specimen certificate of resolution* (Section A.12.7) provide the required format for instructing the trustee to release monies from the standby trust in order to fund decommissioning activities at the licensee's facility. When submitted as part of a financial assurance package, the specimen certificates should be unexecuted drafts. (Actual authorization to release funds from the standby trust is accomplished when completed and notarized versions of these certificates are signed by the secretary of the licensee and presented to the trustee.)
- The notarized *letter of acknowledgment* (Section A.12.8) verifies the execution of the standby trust agreement and certifies the trustee's signature and authority to enter into the agreement.
- Supporting documentation may differ for licensees who submit standby trusts that differ from the recommended model.

A.12.4 Model Standby Trust Agreement

STANDBY TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [*insert date*] by and between [*insert name of licensee*], a [*insert name of State*] [*insert "corporation," "partnership," "proprietorship," or "LLC"*], herein referred to as the "Grantor," and [*insert name and address of a trustee acceptable to NRC*], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I, of the *Code of Federal Regulations*, Part [*insert 30, 40, 70, or 72*]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a [*insert "letter of credit," "surety bond," "insurance policy," "parent company guarantee," or "self-guarantee"*] to provide [*insert "all" or "part"*] of such financial assurance for the facilities identified herein; and

WHEREAS, when payment is made under a [*insert "letter of credit," "surety bond," "insurance policy," "parent company guarantee," or "self-guarantee"*], this standby trust shall be used for the receipt of such payment; and

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee;

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the trustee who enters into this Agreement and any successor trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [*insert license number*] issued pursuant to 10 CFR Part [i*nsert 30, 40, 70, or 72*], as shown in Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a standby trust fund (the Fund) for the benefit of NRC. The Grantor and the Trustee intend that no third party shall have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

(a) A certificate duly executed by the Secretary of the Grantor attesting to the occurrence of the events, and in the form set forth in the attached Certificate of Events, and

(b) A certificate attesting to the following conditions:

(1) that decommissioning is proceeding pursuant to an NRC-approved plan;

(2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan; and

(3) that NRC has been given 30 days prior notice of [*insert name of licensee*]'s intent to withdraw funds from the trust fund.

No withdrawal from the Fund for a particular license can exceed 10 percent of the remaining funds available for that license unless NRC written approval is attached.

In addition, the Trustee shall make payments from the Fund as NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by NRC from the Fund for expenditures for required activities in such amounts as NRC shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims, except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal government, and in obligations of the Federal government such as GNMA, FNMA, and FHLM bonds and certificates or State and Municipal bonds rated BBB or higher by Standard & Poor's or Baa or higher by Moody's Investment Services; and

(c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and NRC or to reinvest in securities at the direction of the Grantor;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve Bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this

Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this standby trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the standby trust fund, furnish to the Grantor and to NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and NRC shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantor. (See Schedule C.)

Section 13. Successor Trustee. Upon 90 days notice to NRC and the Grantor, the Trustee may resign; upon 90 days notice to NRC and the Trustee, the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee, the successor accepts the appointment, the successor is ready to assume its duties as trustee, and NRC has agreed, in writing, that the successor is an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. When the resignation or replacement is effective, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust, in a writing sent to the Grantor, NRC, and the present Trustee, by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this Agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. If NRC issues orders, requests, or instructions to the Trustee, these shall be in writing, signed by NRC or its designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the

right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or NRC hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or NRC, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. All amendments shall meet the relevant regulatory requirements of NRC.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the Grantor or NRC issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [*insert name of State*].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this Agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

[*Insert name of licensee (Grantor)*]
[*Signature of representative of Grantor*]
[*Title*]

ATTEST:
[*Title*]
[*Seal*]

[*Insert name and address of Trustee*]
[*Signature of representative of Trustee*]

[*Title*]

ATTEST:
[*Title*]
[*Seal*]

A.12.5 Model Standby Trust Agreement Schedules

Schedule A

This Agreement demonstrates financial assurance for the following cost estimates or prescribed amounts for the following licensed activities:

U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER(S)	NAME AND ADDRESS OF LICENSEE	ADDRESS OF LICENSED ACTIVITY	COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT

The cost estimates listed here were last adjusted and approved by NRC on [*insert date*].

Schedule B

DOLLAR AMOUNT _____

AS EVIDENCED BY _____

Schedule C

[*Insert name, address, and phone number of Trustee.*]

Trustee's fees shall be $_____ per year.

A.12.6 Model Specimen Certificate of Events

[*Insert name and address of trustee*]

Attention: Trust Division

Gentlemen:

In accordance with the terms of the Agreement with you dated _____, I, _____, Secretary of [*insert name of licensee*], hereby certify that the following events have occurred:

1. [*Insert name of licensee*] is required to commence the decommissioning of its facility located at [*insert location of facility*] (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on _____ (copy of approval attached).

3. The Board of Directors of [*insert name of licensee*] has adopted the attached resolution authorizing the commencement of the decommissioning.

_____
Secretary of [*insert name of licensee*]

_____
Date

A.12.7 Model Specimen Certificate of Resolution

I, _____, do hereby certify that I am Secretary of [*insert name of licensee*], a [*insert State of incorporation*] corporation, and that the resolution listed below was duly adopted at a meeting of this Corporation's Board of Directors on _____, 20___.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this ___ day of _____, 20___.

_____
Secretary

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate, to commence decommissioning activities at [*insert name of facility*] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approve with and upon the advice of Counsel.

A.12.8 Model Letter of Acknowledgment

STATE OF _____.

To Wit: _____.

CITY OF _____.

On this ___ day of _____, before me, a notary public in and for the city and State aforesaid, personally appeared _____, and she/he did depose and say that she/he is the [*insert title*] of _____ [*if applicable, insert ", national banking association" or ", State banking association"*], Trustee, which executed the above instrument; that she/he knows the seal of said association; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the association; and that she/he signed her/his name thereto by like order.

_____
[*Signature of notary public*]

My Commission Expires: _____
[*Date*]

A.13 Financial Assurance Demonstrations Included in a Decommissioning Plan

At the end of licensed operations, licensees must maintain all decommissioning financial assurance established pursuant to 10 CFR 30.35, 10 CFR 40.36, or 10 CFR 70.25. In addition, licensees must submit a DP in accordance with 10 CFR 30.36, 10 CFR 40.42, or 10 CFR 70.38, if (1) such a plan is required by a license condition or (2) the procedures and activities necessary to carry out decommissioning (and, if applicable, site control and maintenance) have not been approved by the NRC and these procedures could increase the potential health and safety impacts to workers or the public.

The purpose of this section is to provide general guidance to licensees on preparing the financial assurance demonstration that is to be included as part of a DP under 10 CFR 30.36, 10 CFR 40.42, and 10 CFR 70.38. The decommissioning financial assurance demonstration must include the following:

- an updated, detailed cost estimate for decommissioning and, if the license is being terminated under restricted conditions, for control and maintenance of the site following license termination;
- one or more financial assurance mechanisms (including supporting documentation);
- a comparison of the cost estimate to the level of coverage provided by the financial assurance mechanisms; and
- if applicable, a description of the means to be employed for adjusting the cost estimate and associated funding level over any storage or surveillance period.

These requirements are summarized below in Checklist 13-A.

In preparing cost estimates for inclusion in DPs, licensees should refer to the detailed guidance and cost-estimating tables in Section A.3 of this appendix and to the supplementary guidance included below. In preparing financial assurance mechanisms for inclusion in DPs, licensees should refer to the detailed guidance, checklists, and recommended wording in Sections A.4 through A.12 of this appendix, as well as the supplementary guidance included below.

The remainder of this section is divided into two parts. Section A.13.1 addresses financial assurance demonstrations in cases where the license will be terminated for unrestricted release. Section A.13.2 addresses financial assurance demonstrations in cases where the license will be terminated under restricted conditions.

Checklist 13-A Decommissioning Plans

License Number(s):_____

Applicable Parts of 10 CFR (check all that apply): ☐ Part 30 ☐ Part 40 ☐ Part 70

License will be terminated: ☐ For unrestricted release (see Section A.13.1)
☐ Under restricted conditions (see Section A.13.2)

☐ Prepare an updated site-specific cost estimate (see Section A.3 and Section A.13.1.1 or A.13.2.1).

☐ Prepare a financial assurance mechanism (see Sections A.4–A.12 and Section A.13.1.2 or A.13.2.2).

☐ Compare the cost estimate to the level of financial assurance provided (see Section A.13.1.3 or A.13.2.3).

☐ Determine the means that will be used to adjust the site-specific cost estimate and associated funding level over any storage or surveillance period (see Section A.13.1.4 or A.13.2.4).

☐ Include the necessary documentation:

- ☐ updated, detailed, site-specific cost estimate;
- ☐ description of the means that will be used to adjust the site-specific cost estimate and associated funding level;
- ☐ comparison of the cost estimate to the level of coverage provided by the financial assurance mechanism(s); and
- ☐ financial instrument(s) and supporting documentation.

A.13.1 License Termination for Unrestricted Release

A.13.1.1 Decommissioning Cost Estimate

Cost estimates included in a DP for license termination for unrestricted release are similar in many respects to those required for DFPs submitted at the time of license application or renewal. As a result, licensees should refer to the detailed guidance in Section A.3 for specific instructions on preparing a cost estimate.

Licensees who have already prepared cost estimates as part of DFPs do not need to prepare entirely new cost estimates for inclusion in their DPs. Rather, to reduce burden, these licensees may simply update their existing cost estimates to reflect any changes that have occurred since the estimate was last submitted to the NRC. Cost estimates should be updated to reflect completed decommissioning activities, current contamination levels, inflation, changes in waste

disposal costs and other prices of goods and services, changes in decommissioning procedures, and any other changes in facility conditions. In order to facilitate NRC's review, licensees should prepare documentation explaining in detail how the cost estimate has been updated. Licensees should also ensure that the updated cost estimate includes all of the items called for in Section A.3.

Licensees who have not already prepared a decommissioning cost estimate (e.g., because they had previously been using a certification of financial assurance) should prepare the cost estimate using the guidance above, as well as the guidance and cost-estimating tables contained in Section A.3.

A.13.1.2 Financial Assurance Mechanism

As specified in 10 CFR 30.36(e), 10 CFR 40.42(e), and 10 CFR 70.38(e), licensees must maintain financial assurance for decommissioning until the license has been terminated. The amount of this financial assurance must be adjusted as necessary to cover the updated cost estimate for decommissioning. (The text of the financial assurance mechanism(s) could remain unchanged in this case.)

Alternatively, licensees may choose to provide a new financial assurance mechanism in place of their previous mechanism(s). In preparing the new mechanism, licensees should consult the guidance provided in Sections A.4 through A.12 of this appendix, as applicable. The new mechanism would need to be in an amount that is at least as great as the updated cost estimate for decommissioning.

Acceptable mechanisms for providing financial assurance for decommissioning include the following:

- Trust funds (see Section A.4)
- Surety bonds (see Section A.5)
- Letters of credit (see Section A.6)
- Insurance policies (see Section A.7)
- Parent company guarantees (see Section A.8)
- Self-guarantees (see Section A.9)
- External sinking funds (see Section A.10)
- Statements of intent (see Section A.11)
- Standby trust fund (see Section A.12)

A.13.1.3 Comparison of the Cost Estimate to the Current Level of Financial Assurance

The DP must include a comparison of the amount of the updated cost estimate for decommissioning to the amount of coverage provided by the licensee's financial assurance mechanism(s). If the cost estimate exceeds the financial assurance coverage, the licensee must increase the amount of coverage to at least the amount of the cost estimate. If the cost estimate is less than the financial assurance coverage, the licensee may retain the current level of coverage or reduce the level of coverage as appropriate.

A.13.1.4 Means for Adjusting the Cost Estimate and Associated Funding Level

The DP must include a description of the means the licensee will employ for adjusting the cost estimate and associated funding level over any storage or surveillance period. In general, the cost estimate should be adjusted to account for completed decommissioning activities, for inflation and other changes in the prices of goods and services (e.g., waste disposal cost increases), for changes in facility conditions, and for changes in decommissioning procedures. As discussed above, if at any time the cost estimate exceeds the financial assurance coverage, the licensee must increase the amount of coverage to at least the amount of the cost estimate.

A.13.2 License Termination under Restricted Conditions

A.13.2.1 Cost Estimate for Decommissioning and Site Control and Maintenance

Cost estimates included in a DP for license termination under restricted conditions are similar in many respects to those required for DFPs submitted at the time of license application or renewal. As a result, licensees should refer to the detailed guidance in Section A.3 of this appendix for specific instructions on preparing a cost estimate.

Costs for Site Control and Maintenance

In addition to costs for standard decommissioning activities, the cost estimate also must include costs for site control and maintenance activities. These estimated costs must be sufficient to allow an independent third party to conduct site control and maintenance activities if the site landowner is unwilling or unable to do so. Control and maintenance of a site would not necessarily have to be carried out by an independent third party. For example, the site landowner (who may be the former licensee) may carry out such activities if capable and could be paid directly from the financial assurance funds provided for performing the work, if appropriate.

The primary component of site control and maintenance costs is the cost associated with institutional controls, including proprietary institutional controls, governmental institutional controls, and physical controls. Proprietary institutional controls include easements, restrictive

covenants, equitable servitudes, reverter clauses, and government ownership of land. Governmental institutional controls include zoning, deed restrictions, water supply restrictions, building permit requirements, and property law regulations. Physical controls include fences, markers, and earthen covers. At a minimum, the following costs should be estimated for the institutional controls that will be employed at the site:

- Establishment and Implementation. The cost estimate should include the costs of putting institutional controls into place (e.g., construction costs for physical barriers).
- Enforcement. Mechanisms for enforcement of controls include periodic inspection, surveys, control, monitoring, and maintenance of physical barriers at the site; inspections of the property; and maintenance of deed restrictions and monitoring of deed compliance.
- Recordkeeping. The party responsible for site control and maintenance should maintain records containing at least (1) a legal description of the property, (2) the name or names of the current owners of the property as reflected in public land records, (3) identification of the parties who can enforce the restrictions, (4) the reason for the restrictions, (5) the duration of the restrictions, (6) permission to install and maintain physical controls, if any are used, (7) the location of a copy of the final radiation status report that is available for public inspection, and (8) official actions and financial payments.
- Periodic Site Checks. Under 10 CFR 20.1403(e)(2)(iii), the party responsible for site control and maintenance must perform periodic checks of the site no less frequently than every 5 years to ensure that the institutional controls continue to function effectively. The periodic checks should include an onsite inspection to verify that prohibited activities are not being conducted. Also, although a review of the deed to ensure that deed restrictions are still in place is usually not necessary, the deed should be reviewed if there is any cause to believe that the restrictions are not still properly part of the deed.
- Corrective Actions. In some cases, corrective actions must be taken in the event a restriction needs to be broken. Because the need for corrective actions cannot be predicted, costs for these activities cannot be explicitly accounted for in the cost estimate. Rather, the cost estimate should include a sufficient contingency factor to cover these costs. For example, a "no excavation" restriction may need to be broken if a water main under the site bursts and must be repaired.

The cost estimate for site control and maintenance should be consistent with the amount of radioactivity remaining at the site, the radionuclides involved, the characteristics of the residual radioactivity at the site, and site-specific exposure scenarios, pathways, and parameters. The estimate should include adequate periods of site control and should account for all associated costs during this period. Finally, the estimate should be based on activities that are sufficient to prevent the annual dose to the average member of the critical group from exceeding 0.25mSv (25 mrem).

Preparing the Cost Estimate

Licensees who have already prepared cost estimates as part of DFPs do not need to prepare entirely new cost estimates for inclusion in their DPs. Rather, to reduce burden, these licensees may simply update their existing cost estimates to reflect (1) the costs associated with site

control and maintenance and (2) any changes that have occurred since the estimate was last submitted to the NRC. Cost estimates should be updated to reflect completed decommissioning activities, current contamination levels, inflation, changes in waste disposal costs and other prices of goods and services, changes in decommissioning procedures, and any other changes in facility conditions. In order to facilitate NRC's review, licensees should prepare documentation explaining in detail how the cost estimate has been updated. Licensees should also ensure that the updated cost estimate includes all of the items called for in Section A.3 of this appendix.

Licensees who have not already prepared a decommissioning cost estimate (e.g., because they had previously been using a certification of financial assurance) should prepare the cost estimate using the guidance above, as well as the guidance and cost-estimating tables contained in Section A.3 of this appendix.

A.13.2.2 Financial Assurance Mechanism

As specified in 10 CFR 30.36(e), 10 CFR 40.42(e), and 10 CFR 70.38(e), licensees must maintain financial assurance for decommissioning until the license has been terminated. The amount of this financial assurance must be adjusted as necessary to cover the updated cost estimate for decommissioning.

In addition, pursuant to 10 CFR 20.1403(c), licensees requesting license termination under restricted conditions must also provide financial assurance for site control and maintenance. If a licensee wishes to use its existing trust fund to provide coverage for site control and maintenance, the text of the trust fund agreement would need to be changed as necessary to reflect its applicability to site control and maintenance activities. Also, the amount of coverage provided by the trust fund would need to be adjusted to cover the estimated costs for site control and maintenance.

Alternatively, licensees may choose to provide a new, separate mechanism to cover site control and maintenance costs, or may provide a new financial assurance mechanism to cover *both* decommissioning and site control and maintenance costs. In preparing the new mechanism(s), licensees should consult the guidance provided in Sections A.4 through A.12 of this appendix, as applicable. The new mechanism(s) would need to be in an amount that is at least as great as the updated cost estimate for decommissioning and site control and maintenance.

Acceptable mechanisms for providing financial assurance for decommissioning and site control and maintenance include special arrangements with a government entity, as described later in this section, as well as trust funds, which are explained in Section A.4 of this appendix.

Regardless of the mechanism used, the licensee or custodian for the site should permit public access to records on financing for site controls and maintenance. These records should be available for inspection by the public for a period of 25 years.

Special Arrangements with a Government Entity

In addition to the mechanisms listed above, licensees may provide financial assurance through a special arrangement deemed acceptable by a governmental entity when the governmental entity assumes custody and ownership of a site. Licensees choosing to use such an arrangement should submit documentation of the terms and conditions governing the arrangement. Also, the government entity with whom the arrangement is made should have the authority to receive and hold funds for specified purposes (e.g., decommissioning, site control and maintenance). Checklist 13-B below summarizes the primary criteria the NRC uses to evaluate special arrangements.

Checklist 13-B Special Arrangements with a Government Entity

☐ Documentation of the arrangement is provided.

☐ The government entity has the authority to receive and hold funds for specified purposes.

☐ The amount of financial assurance provided by the arrangement equals or exceeds the required coverage level.

A.13.2.3 Comparison of the Cost Estimate to the Current Level of Financial Assurance

The DP must include a comparison of the amount of the updated cost estimate for decommissioning and site control and maintenance with the amount of coverage provided by the licensee's financial assurance mechanism(s). In determining the amount of financial assurance coverage for site control and maintenance (but *not* decommissioning), licensees may assume a real (i.e., inflation adjusted), after-tax rate of return of up to 1 percent per year *if* funds are set aside in an account (e.g., a trust or escrow) segregated from the licensee's assets and outside its administrative control. The rationale for the value of 1 percent per year is taken from NUREG-0706, Volume 1, "Final Environmental Impact Statement on Uranium Milling: Project M-25, Summary and Text," Section 14.34 at page 14-14 (Agencywide Documents Access and Management System Accession No. ML032751663). If the cost estimate exceeds the financial assurance coverage, the licensee must increase the amount of coverage to at least the amount of the cost estimate. If the cost estimate is less than the financial assurance coverage, the licensee may retain the current level of coverage or reduce the level of coverage as appropriate.

A.13.2.4 Means for Adjusting the Cost Estimate and Associated Funding Level

The DP must include a description of the means the licensee will employ for adjusting the cost estimate and associated funding level over any storage or surveillance period. In general, the cost estimate should be adjusted to account for completed decommissioning activities, for inflation and other changes in the prices of goods and services (e.g., waste disposal cost increases), for changes in facility conditions, and for changes in procedures for decommissioning

and/or site control and maintenance. As discussed above, if at any time the cost estimate exceeds the financial assurance coverage, the licensee must increase the amount of coverage to at least the amount of the cost estimate.

A.14 Bibliography for Cost Estimating and Financial Assurance

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10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material."

10 CFR Part 40, "Domestic Licensing of Source Material."

10 CFR Part 61, "Licensing Requirements For Land Disposal of Radioactive Waste."

10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

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— — — — —. NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility." Washington, DC. April 1994.

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— — — — —. Policy and Guidance Directive Fuel Cycle 90-2, "Standard Review Plan for Evaluating Compliance with Decommissioning Requirements for Source, Byproduct, and Special Nuclear Material License Applications." Washington, DC. April 1991.

A.15 Attachments 1 and 2

Attachments 1 and 2 are taken directly from the Standard Review Plan (SRP) (NUREG-1727).

ATTACHMENT 1

Table for Determining Financial Assurance Requirements Under 10 CFR Part 30, 10 CFR Part 40, and 10 CFR Part 70 by Type of Isotope and Activity Level

ISOTOPE	*Sealed Sources/ Plated Foils under 10 CFR Part 30*		*Unsealed Sources under 10 CFR Parts 30, 40, and 70*			
	Financial Assurance Not Required	**$113,000 Certification Allowed**	**Financial Assurance Not Required**	**$225,000 Certification Allowed**	**$1,125,000 Certification Allowed**	**DFP Required**
Americium-241	≤100 Ci	>100 Ci	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Antimony-125	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Barium-133	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Bismuth-210	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Cadmium-109	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Calcium-45	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Carbon-14	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Cerium-144	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Cesium-134	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Cesium-135	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Cesium-137	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Chlorine-36	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Cobalt-60	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Europium-152 13yr	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Europium-154	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Europium-155	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Gadolinium-153	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Holmium-166	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Hydrogen-3	≤10,000,000 Ci	>10,000,000 Ci	≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci, ≤100 Ci	>100 Ci

APPENDIX A

ISOTOPE	*Sealed Sources/ Plated Foils under 10 CFR Part 30*		*Unsealed Sources under 10 CFR Parts 30, 40, and 70*			
	Financial Assurance Not Required	**$113,000 Certification Allowed**	**Financial Assurance Not Required**	**$225,000 Certification Allowed**	**$1,125,000 Certification Allowed**	**DFP Required**
Indium-115	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Iodine-129	≤1,000 Ci	>1,000 Ci	≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi
Iron-55	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Krypton-85	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Manganese-54	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Nickel-59	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Nickel-63	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Niobium-93m	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Platinum-193	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Plutonium-239	-	-	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Polonium-210	≤1,000 Ci	>1,000 Ci	≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi
Promethium-147	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Radium-226	≤100 Ci	>100 Ci	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Rubidium-87	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Ruthenium-106	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Samarium-151	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Silver-110m	≤10,000 Ci	>10,000 Ci	≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi
Strontium-90	≤1,000 Ci	>1,000 Ci	≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi
Technetium-97	≤1,000,000 Ci	>1,000,000 Ci	≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci, ≤10 Ci	>10 Ci
Technetium-99	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci

ISOTOPE	*Sealed Sources/ Plated Foils under 10 CFR Part 30*		*Unsealed Sources under 10 CFR Parts 30, 40, and 70*			
	Financial Assurance Not Required	**$113,000 Certification Allowed**	**Financial Assurance Not Required**	**$225,000 Certification Allowed**	**$1,125,000 Certification Allowed**	**DFP Required**
Thallium-204	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Thorium (natural)	-	-	≤10 mCi	>10 mCi, ≤100 mCi	-	>100 mCi
Thulium-170	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Thulium-171	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Tungsten-181	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Uranium (natural)	-	-	≤10 mCi	>10 mCi, ≤100 mCi	-	>100 mCi
Uranium-233	-	-	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Uranium-234/235	-	-	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Zinc-65	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Zirconium-93	≤100,000 Ci	>100,000 Ci	≤10 mCi	>10 mCi, ≤100 mCi	>100 mCi, ≤1 Ci	>1 Ci
Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition (with a half-life greater than 120 days)	≤100 Ci	>100 Ci	≤0.01 mCi	>0.01 mCi, ≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi
Any radionuclide other than alpha- emitting radionuclides not listed above or mixtures of beta emitters of unknown composition (with a half-life greater than 120 days)	≤1,000 Ci	>1,000 Ci	≤0.1 mCi	>0.1 mCi, ≤1 mCi	>1 mCi, ≤10 mCi	>10 mCi

ATTACHMENT 2

Table for Determining Quantities of Licensed Material Requiring Labeling
(Source: Appendix B to 10 CFR Part 30)

APPENDIX B TO 10 CFR PART 30
Quantities[1] of Licensed Material Requiring Labeling

Material	Microcuries	Material	Microcuries	Material	Microcuries	Material	Microcuries
Americium-241	0.01	Gadolinium-159	100	Osmium-191	100	Tantalum-182	10
Antimony-122	100	Gallium-72	10	Osmium-193	100	Technetium-96	10
Antimony-124	10	Germanium-71	100	Palladium-103	100	Technetium-97m	100
Antimony-125	10	Gold-198	100	Palladium-109	100	Technetium-97	100
Arsenic-73	100	Gold-199	100	Phosphorus-32	10	Technetium-99m	100
Arsenic-74	10	Hafnium-181	10	Platinum-191	100	Technetium-99	10
Arsenic-76	10	Holmium-166	100	Platinum-193m	100	Tellurium-125m	10
Arsenic-77	100	Hydrogen-3	1,000	Platinum-193	100	Tellurium-127m	10
Barium-131	10	Indium-113m	100	Platinum-197m	100	Tellurium-127	100
Barium-133	10	Indium-114m	10	Platinum-197	100	Tellurium-129m	10
Barium-140	10	Indium-115m	100	Plutonium-239	0.01	Tellurium-129	100
Bismuth-210	1	Indium-115	10	Polonium-210	0.1	Tellurium-131m	10
Bromine-82	10	Iodine-125	1	Potassium-42	10	Tellurium-132	10
Cadmium-109	10	Iodine-126	1	Praseodymium-142	100	Terbium-160	10
Cadmium-115m	10	Iodine-129	0.1	Praseodymium-143	100	Thallium-200	100
Cadmium-115	100	Iodine-131	1	Promethium-147	10	Thallium-201	100
Calcium-45	10	Iodine-132	10	Promethium-149	10	Thallium-202	100
Calcium-47	10	Iodine-133	1	Radium-226	0.01	Thallium-204	10
Carbon-14	100	Iodine-134	10	Rhenium-186	100	Thorium(natural)[1]	100
Cerium-141	100	Iodine-135	10	Rhenium-188	100	Thulium-170	10
Cerium-143	100	Iridium-192	10	Rhodium-103m	100	Thulium-171	10
Cerium-144	1	Iridium-194	100	Rhodium-105	100	Tin-113	10
Cesium-131	1,000	Iron-55	100	Rubidium-86	10	Tin-125	10
Cesium-134m	100	Iron-59	10	Rubidium-87	10	Tungsten-181	10
Cesium-134	1	Krypton-85	100	Ruthenium-97	100	Tungsten-185	10
Cesium-135	10	Krypton-87	10	Ruthenium-103	10	Tungsten-187	100
Cesium-136	10	Lanthanum-140	10	Ruthenium-105	10	Uranium(natural)[2]	100
Cesium-137	10	Lutetium-177	100	Ruthenium-106	1	Uranium-233	0.01
Chlorine-36	10	Manganese-52	10	Samarium-151	10	Uranium-234	0.01
Chlorine-38	10	Manganese-54	10	Samarium-153	100	Uranium-235	0.01
Chromium-51	1,000	Manganese-56	10	Scandium-46	10	Vanadium-48	10
Cobalt-58m	10	Mercury-197m	100	Scandium-47	100	Xenon-131m	1,000
Cobalt-58	10	Mercury-197	100	Scandium-48	10	Xenon-133	100
Cobalt-60	1	Mercury-203	10	Selenium-75	10	Xenon-135	100
Copper-64	100	Molybdenum-99	100	Silicon-31	100	Ytterbium-175	100
Dysprosium-165	10	Neodymium-147	100	Silver-105	10	Yttrium-90	10
Dysprosium-166	100	Neodymium-149	100	Silver-110m	1	Yttrium-91	10
Erbium-169	100	Nickel-59	100	Silver-111	100	Yttrium-92	100
Erbium-171	100	Nickel-63	10	Sodium-24	10	Yttrium-93	100
Europium-152 9.2 h	100	Nickel-65	100	Strontium-85	10	Zinc-65	10
Europium-152 13 yr	1	Niobium-93m	10	Strontium-89	1	Zinc-69m	100
Europium-154	1	Niobium-95	10	Strontium-90	0.1	Zinc-69	1,000
Europium-155	10	Niobium-97	10	Strontium-91	10	Zirconium-93	10
Fluorine-18	1,000	Osmium-185	10	Strontium-92	10	Zirconium-95	10
Gadolinium-153	10	Osmium-191m	100	Sulphur-35	100	Zirconium-97	10

Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition.	0.01
Any radionuclide other than alpha-emitting radionuclides not listed above or mixtures of beta emitters of unknown composition.	0.1

[1] Based on alpha disintegration rate of Th-232, Th-230, and their daughter products.

[2] Based on alpha disintegration rate of U-238, U-234, and U-235.

NOTE: For purposes of §20.303, where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" (i.e., "unity").

Appendix B

U.S. Nuclear Regulatory Commission Response to Comments

The U.S. Nuclear Regulatory Commission (NRC) published Revision 1 of NUREG-1757, Volume 3, for public comment on January 22, 2008. The comment period lasted for 107 days. During that period, the NRC received comments from two organizations: the Portland General Electric Company (PGE) on behalf of the Trojan Independent Spent Fuel Storage Installation (ISFSI) and the Nuclear Energy Institute (NEI). With only minor differences, the majority of the NEI comments were identical to those from PGE. The following tables present the PGE comments, as well as the single unique NEI comment, and the NRC response to each.

Table B-1 Comments from the Portland General Electric Company, Trojan Independent Spent Fuel Storage Installation

Comment:

Various sections of the draft Guidance Document address the contents of a decommissioning funding plan; however, they do not cover all of the above information specified in the proposed rule. It is recommended that the following draft Guidance Document sections be changed to conform to the proposed rule changes in section 72.30(b)(1) through (b)(6):

- Page xxv, Decommissioning Funding Plan (DFP) definition
- Page 4-5, last paragraph and last bullet
- Page A-28, Checklist 3 (also add a Part 72 box)
- Page A-35, Section A.3.3, first paragraph and bullets (also add reference to 72.30(b)

NRC Response:

The U.S. Nuclear Regulatory Commission (NRC) staff agrees with the commenter and has revised the text at the places indicated in the comment. The definition of Decommissioning Funding Plan was amended, and references to Title 10 of the *Code of Federal Regulations* (10 CFR) 72.30, "Financial Assurance and Recordkeeping for Decommissioning," or 10 CFR 72.30(b) were added to the pages indicated in the comment (in some cases pagination has changed slightly). The staff also revised Checklist 3 and Section A.3.3.

Comment:

The definition on page xxiv of the draft Guidance Document appears to be consistent with the section 72.30(b)(6) change. Parts 30, 40, and 70 licensees typically submit a "certification to a prescribed amount of financial assurance." Various sections of the draft Guidance Document currently state that Parts 30, 40, and 70 licensees are required to submit a certification and that Part 72 licensees do not need to submit a certification of financial assurance for decommissioning with their decommissioning funding plan. In accordance with the above proposed rule change, Part 72 licensees will be required to submit a certification of financial assurance to the NRC at the time of license renewal and at intervals not to exceed 3 years. It is recommended that the following sections of the draft Guidance Document be changed to conform to the above 72.30(b)(6) proposed rule change, including the requirement to submit it every 3 years:

- Page 4-3, last paragraph
- Page 4-4, last paragraph
- Page 4-5, last paragraph
- Page A-10, DFP paragraph
- Page A-20, first paragraph
- Page A-25, section A.2.3
- Page A-26, section A.2.4

Table B-1 Comments from the Portland General Electric Company, Trojan Independent Spent Fuel Storage Installation (continued)

NRC Response:

The NRC staff agrees with the commenter and has revised the text at the places indicated in the comment to specify that licensees under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," are now required to submit a certification of financial assurance. Where appropriate, the staff has also specified the 3-year period for submissions. The staff made no change to Section A.2.3 because 10 CFR Part 72 licensees are not able to use prescribed certification amounts.

Comment:

Section 10 CFR 72.30(c) coupled with 72.30(b) of the proposed rule contains a new requirement for Part 72 licensees to submit an updated decommissioning funding plan to the NRC for approval at intervals not to exceed 3 years. Section 72.30(c) states, in part:

> *"(c) At the time of license renewal and at intervals not to exceed 3 years the decommissioning funding plan must be re-submitted with adjustments as necessary to account for changes in costs and the extent of contamination. If the amount of financial assurance will be adjusted, this cannot be done until the updated decommissioning funding plan is approved. The decommissioning funding plan must update the information submitted with the original or prior approved plan and must specifically consider …"*

When the above proposed rule change is considered along with the draft Guidance Document requirements related to the content of Trust Agreements, there is a significant impact on PGE as a Part 72 ISFSI Site-Specific Licensee. The draft Guidance Document Page A-62 for section A.4.5 Model Trust Agreement Schedules and page A-181 for section A.12.5 Model Standby Trust Agreement Schedules contain requirements for Trust Agreement document Schedule A to contain the following information:

- *Amount of Cost Estimate … Demonstrated by this Agreement*
- *Date that the Cost Estimate listed here was last adjusted and approved by NRC*

It is not clear why the Trust Agreement Contract document between the licensee and the trustee needs to contain these two pieces of information when this information will already be retained in the NRC's records system under the licensee's docket number. In accordance with the proposed rule section 72.30(c) above, a Part 72 Site-Specific Licensee would obtain NRC approval of their updated decommissioning funding plan, which includes the decommissioning cost estimate, every 3 years. The updated funding plan and associated cost estimate will be adjusted for inflation and radioactive waste burial costs and may also include a change to the projected date of ISFSI decommissioning if the USDOE schedule for assuming title to the licensee's spent fuel has changed. To keep the Trust Agreement current, the licensee will need to change Schedule A every 3 years to reflect the amount of the adjusted cost estimate and the NRC approval date.

For PGE Company, any changes to the current Trust Agreement require review and approval by the PGE Board of Directors and the Trustee's representative. Requiring the Board of Directors and the Trustee to review and approve a change to the Trust Agreement every 3 years, to reflect the amount of the adjusted cost estimate and the NRC approval date, is considered an unnecessary burden, since this is already docketed information. It is recommended that the draft Guidance Document page A-62 and page A-181 for Model Trust Agreement Schedule A be revised to delete the requirements for Part 72 licensees to include the following information in their Trust Agreement Schedule A:

Table B-1 Comments from the Portland General Electric Company, Trojan Independent Spent Fuel Storage Installation (continued)

- *Amount of Cost Estimate … Demonstrated by this Agreement*
- *Date that the Cost Estimate listed here was last adjusted and approved by NRC*

NRC Response:

The existing regulation in 10 CFR 72.30(c)(1) states that liquid assets must be sufficient to pay decommissioning costs. The NRC staff believes that, as a result, the trust agreement must spell out the decommissioning cost that is being covered. The NRC does not agree that updating the cost estimate dollar amount in Schedule A is unnecessarily burdensome. Updating of the trust agreement and approval of the updated trust by the Board of Directors and the Trustee to reflect the amount of the updated cost estimate will ensure that the trust continues to reflect the current decommissioning cost estimate. No change was made in response to the comment to the guidance document.

Comment:

Section 10 CFR 72.30(e) of the proposed rule change adds a new requirement for Part 72 licensees that states, in part:

> *"(e) The financial instrument must include the licensee's name, license number, and docket number; and the name, address, and other contact information of the issuer, and, if a trust is used, the trustee. When any of the foregoing information changes, the licensee must, within 30 days, submit financial instruments reflecting such changes."*

The draft Guidance Document was not changed to conform to the above proposed rule change. Many sections of the draft Guidance Document currently contain wording similar to: *"Unlike other material licensees, part 72 licensees are not required to submit originals of the financial instruments used to provide financial assurance."* It is recommended that the Guidance Document be changed to reflect that Part 72 licensees are required to submit copies of financial instruments to the NRC within 30 days, whenever changes specified in section 72.30(e) are made to these financial instruments. Changes to the following Guidance Document sections should be considered:

- Page 4-1, first paragraph
- Page 4-2, third paragraph
- Page A-25, section A.2.3

NRC Response:

The NRC staff agrees with the proposed changes to page 4-1 and Section A.2.3 and has revised the guidance to reflect the new requirements for financial instruments. The staff has also revised the guidance (at the places indicated in the comment) to reflect that, if the information changes, 10 CFR Part 72 licensees will be required to submit updated financial instruments. The staff concluded that no change was necessary to page 4-2.

Comment:

The NRC proposed rule change added sub-sections to 10 CFR 72 that resulted in renumbering of some sub-sections (e.g., 72.30(d) was changed to 72.30(f)), and the draft Guidance Document was not changed to conform with this change. The following sections of the Guidance Document should be changed to reflect the renumbering of 10 CFR 72 sections:

- Page 3-1, Regulatory Requirements: change 72.30(d) to 72.30(f)
- Page 3-2, References to Other Records: change 72.30(d) to 72.30(f)

Table B-1 Comments from the Portland General Electric Company, Trojan Independent Spent Fuel Storage Installation (continued)

- Pages 3-3, 3-4 and 3-5, section 3.1.2, Items 2, 3, 4 and 5: change 72.30(d) to 72.30(f)
- Page 3-7, section 3.3, Regulatory Requirements: change 72.30(d) to 72.30(f)
- Page 4-10, last paragraph, change "all nine of" to say "all eleven of"
- Page A-208, Endnote 32: change 72.30(c)(2) to 72.30(e)(2)

NRC Response:

The NRC staff agrees and has corrected the section numbering at the places indicated in the comment.

Comment:

Section 10 CFR 72.30(c)(2)(ii) of the current rule and renumbered section 72.30(e)(2)(ii) in the proposed rule state:

> *"(ii) The surety method or insurance must be payable to a trust established for decommissioning costs. The trustee and trust must be acceptable to the Commission. An acceptable trustee includes an appropriate State or Federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency."*

As indicated above, the proposed rule change only renumbered this section. During our review of the draft Guidance Document, it was noted that page A-168, second paragraph and page A-169, section A.12.1 do not contain a reference to the above section 72.30(e)(2)(ii) that allows a Part 72 licensee to use a standby trust.

Although this change is not within the scope of the proposed rule change, it is recommended that the wording in the second paragraph on page A-168 and page A-169, section A.12.1 of the draft Guidance Document be changed to add a reference to section 72.30(e)(2)(ii).

NRC Response:

The NRC staff agrees and has made the recommended changes.

Comment:

Section 10 CFR 72.30(c)(4) of the current rule and renumbered section 72.30(e)(4) in the proposed rule state:

> *"(4) In the case of Federal, State, or local government licensees, a statement of intent containing a cost estimate for decommissioning, and indicating that funds for decommissioning will be obtained when necessary."*

As indicated above, the proposed rule change only renumbered this section. During our review of the draft Guidance Document, it was noted that page A-164, second paragraph and section A.11.1, do not contain a reference to the above section 72.30(e)(4) that allows a Part 72 licensee to use a statement of intent.

Although this change is not within the scope of the proposed rule change, it is recommended that the wording in the second paragraph and in section A.11.1 on page A-164 of the draft Guidance Document be changed to add a reference to section 72.30(e)(4).

NRC Response:

The NRC staff agrees and has made the recommended changes.

Table B-1 Comments from the Portland General Electric Company, Trojan Independent Spent Fuel Storage Installation (continued)

Comment:

Section 10 CFR 72.30(c)(5) of the current rule and renumbered section 72.30(e)(5) in the proposed rule state:

> *"(5) In the case of licensees who are issued a power reactor license under Part 50 of this chapter, the methods of 10 CFR 50.75(b), (e), and (h), as applicable."*

As indicated above, the proposed rule change only renumbered this section. During our review of the draft Guidance Document, it was noted that page 4-33, section 4.3.2.7, last bullet, still contains wording that was changed in a previous rulemaking. Specifically, this Guidance Document wording states, in part:

> *"Exception: Part 72 licensees who are electric utility licensees (as defined in 10 CFR Part 50) may use an external sinking fund without having to couple it with a surety method or insurance (i.e., they may use a gradually funded prepayment mechanism only), in which case the amount of the fund may be below the cost estimate or prescribed amount prior to decommissioning."*

The NRC final rule effective December 24, 2003 (Decommissioning Trust Provisions, 67 FR 78332, dated December 24, 2002) changed the words "who are electric utility licensees" to say "who are issued a power reactor license under Part 50 of this chapter."

Although this change is not within the scope of the proposed rule change, it is recommended that the wording in the last bullet on page 4-33, section 4.3.2.7 of the draft Guidance Document be changed to reflect the above wording in section 72.30(e)(5).

NRC Response:

The NRC staff agrees and has made the recommended changes.

Table B-2 Comments from the Nuclear Energy Institute

NEI submitted comments that were, with the exception of minor differences in wording at a few points, the same as the comments submitted by the Portland General Electric Company. Refer to Table B-1 for these comments and the NRC responses. In addition, the NEI submitted the following comment:

Comment:

Section 10 CFR 72.3(c) *[sic.]* states: At the time of license renewal and at intervals not to exceed 3 years the decommissioning funding plan must be re-submitted with adjustments as necessary to account for changes in costs and the extent of contamination.

The draft Guidance Document does not conform to this part of the proposed rule. Guidance Document section A.3.2 states that the DFP should be updated every 3 years but does not address submission to the NRC. Section A.3.3, titled: Submitting the Required Documentation, does not include the proposed rule requirement to re-submit the DFP at intervals not to exceed 3 years.

It is recommended that the Guidance Document section A.3.3 be revised to conform with the proposed rule regarding re-submittal of the updated DFP to the NRC.

NRC Response:

The NRC staff agrees and has made the suggested revision.

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11. ABSTRACT *(200 words or less)*

The U.S. Nuclear Regulatory Commission (NRC) consolidated and updated numerous decommissioning guidance documents into this three-volume NUREG. Specifically, the three volumes address the foll owing topics: (1) "Decommissioning Process for Materials Licensees"; (2) "Characterization, Survey, and Determination of Radiological Criteria"; and (3) "Financial Assurance, Recordkeeping, and Timeliness." This three-volume NUREG series replaces NUREG-1727 ("NMSS Decommissioning Standard Review Plan," issued September 2000) and NUREG/BR-0241 ("NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees," issued March 1997). This NUREG series is intended for use by NRC staff, licen sees, and others. Volume 3 of this NUREG series provides guidance on the technical aspects of com pliance with requirements for timeliness in decommissioning of materials facilities, the requirements for financial assuran ce for decommissioning, and the recordkeeping requirements related to eventual decommissioning. Licensees should use this gu idance in preparing decommissioning plans, license termination plans, final status surveys, and other technical decommissi oning reports for submittal to the NRC. The NRC staff will use this guidance in reviewing these documents and related licen se amendment requests. Volume 3 is intended to apply only to the decommissioning of materials facilities licensed under Tit le 10 of the Code of Federal Regulations Parts 30, 40, 70, and 72.

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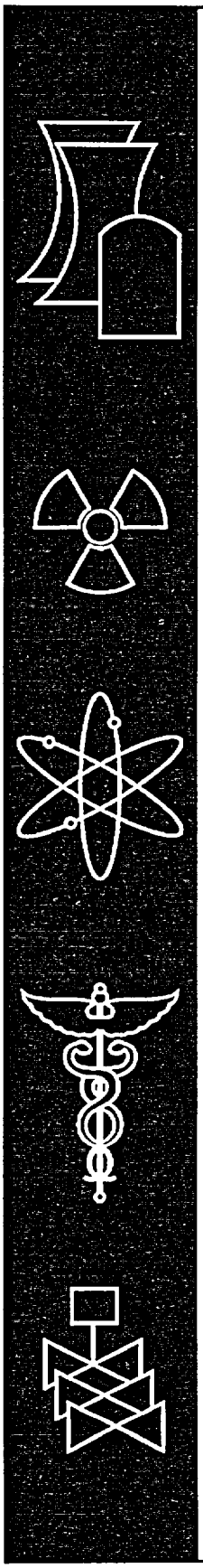

Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities

Supplement 1

Regarding the Decommissioning of Nuclear Power Reactors

Main Report, Appendices A through M

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
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NUREG-0586, Supplement 1
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Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities

Supplement 1

Regarding the Decommissioning of Nuclear Power Reactors

Main Report, Appendices A through M

Final Report

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Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
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Abstract

This document is a supplement to the U.S. Nuclear Regulatory Commission (NRC) document *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* issued in 1988 (NUREG-0586, referred to here as the 1988 Generic Environmental Impact Statement [GEIS]). This Supplement was prepared because of technological advances in decommissioning operations, experience gained by licensees, and changes made to NRC regulations since the 1988 GEIS.

This Supplement updates the information provided in the 1988 GEIS. It is intended to be used to evaluate environmental impacts during the decommissioning of nuclear power reactors as residual radioactivity at the site is reduced to levels that allow for termination of the NRC license. This Supplement addresses only the decommissioning of nuclear power reactors licensed by the NRC. It updates the sections of the 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor stations. It goes beyond the 1988 GEIS to explicitly consider high-temperature gas-cooled reactors and fast breeder reactors. This document can be considered a stand-alone document for power reactor facilities such that readers should not need to refer back to the 1988 GEIS. The environmental impacts described in this Supplement supercede those described for power reactor facilities in the 1988 GEIS.

The scope of this Supplement is based on the decommissioning activities performed to remove radioactive materials from structures, systems, and components from the time that the licensee certifies that it has permanently ceased power operations until the license is terminated. The scope of the document was determined through public scoping meetings and meetings with other Federal agencies and the nuclear industry. An evaluation process was then developed to determine environmental impacts from nuclear power reactor facilities that are being decommissioned. The evaluation process involved determining the specific activities that occur during reactor decommissioning and obtaining data from site visits and from licensees at reactor facilities currently being decommissioned. The data obtained from the sites were analyzed and then evaluated against a list of variables that defined the parameters for facilities that are currently operating but which will one day be decommissioned. This evaluation resulted in a range of impacts for each environmental issue that may be used for comparison by licensees that are or will be decommissioning their facilities.

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Executive Summary

This document is a supplement to the U.S. Nuclear Regulatory Commission (NRC) document *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities,* issued in 1988 (NUREG-0586, referred to hereafter as the 1988 Generic Environmental Impact Statement [GEIS]).[a] As a supplement, this document considers the technological advances in decommissioning, the experience gained by licensees, and changes made to NRC regulations since the 1988 GEIS. The information from the 1988 GEIS that is still current and applicable to permanently shut down and currently operating commercial nuclear power reactors is included here. This Supplement is intended to be used to evaluate environmental impacts during the decommissioning of nuclear power reactors as residual radioactivity at the site is reduced to levels that allow for termination of the NRC license.

The NRC elected to supplement the GEIS:

(1) to further the purposes of the National Environmental Policy Act (NEPA)

(2) to update the information in the GEIS

(3) to provide additional information to the public on decommissioning activities

(2) to establish an envelope of environmental impacts that could be associated with decommissioning activities.

Unlike the 1988 GEIS, which took a broad look at decommissioning of a variety of sites and activities, this Supplement addresses only nuclear power reactors licensed by the NRC. It updates the sections of the 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor stations. It goes beyond the 1988 GEIS and considers the existing permanently shut down high-temperature gas-cooled reactor and fast breeder reactor. It does not include research and test reactors or the power reactor facilities that have been involved in a significant accident resulting in large-scale contamination of structures, systems, and components (SSCs). It also does not include other types of fuel-cycle facilities, such as fuel-reprocessing plants or small mixed oxide fuel-fabrication plants.

The intent of this Supplement is to consider in a comprehensive manner all aspects related to the radiological decommissioning of nuclear reactor facilities by incorporating updated information, regulations, and analyses. Since the 1988 GEIS was written, the NRC and the industry have gained substantially more nuclear power facility decommissioning experience. Based on the number of reactors shut down and the date that they permanently ceased

(a) The GEIS is considered "generic" in that it evaluates environmental impacts from decommissioning activities common to a number of nuclear power facilities.

operations, over 200 facility-years' worth of decommissioning experience have accumulated since the NRC published the 1988 GEIS. Currently, there are 19 commercial power reactor facilities in the decommissioning process. This includes nine that permanently ceased operations after the NRC published the 1988 GEIS. Since the 1988 GEIS, there are three facilities that have completed decommissioning and terminated their licenses. There are also new technologies and approaches applicable to decommissioning that the 1988 GEIS does not address. The regulations for decommissioning reactors have also undergone significant changes since the 1988 GEIS.

Scope of the Supplement

The content of this Supplement was initially defined by the scope of the 1988 GEIS and was modified based on current decommissioning regulations, input received during four public scoping meetings, letters and comments received during the scoping period, and meetings between the NRC and the U.S. Environmental Protection Agency (EPA) and the Council on Environmental Quality (CEQ). The public comments received during the scoping process that were considered to be with the scope of the environmental review are provided in Volume 2 Appendix N. The NRC staff published for comment Supplement 1 to the GEIS in October 2001. Public meetings in San Francisco, California, Boston Massachusetts, Chicago, Illinois and Atlanta, Georgia were held in December, 2001 to describe the preliminary results of the NRC environmental review, to answer questions, and to provide members of the public with information to assist them in formatting comments on the draft Supplement. All comments received on the draft Supplement were considered by the staff in developing the final document and are presented in Appendices O and P.

The scope of this Supplement is based on the decommissioning activities performed to remove radioactive materials from SSCs from the time that the licensee certifies that it has permanently ceased power operations until the license is terminated. As a result, the activities performed before permanent cessation of operations (except for decommissioning planning) or impacts that are related to the decision to permanently cease operations (for example, the impact from the loss of generation capacity) are outside the scope of this document.

The Commission defines decommissioning as "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license." The staff has included activities that are directly related to the removal of radioactive material from the facility or that must be performed in order to facilitate the removal of contaminated SSCs, as well as the activities and impacts related to the removal of uncontaminated SSCs (such as the intake structure or cooling towers) that were required for the operation of the reactor.

The decommissioning process continues until the licensee requests termination of the license and demonstrates that radioactive material has been removed to the levels that permit

termination of the NRC license. At that point, the NRC no longer has jurisdiction over the site and the owner of the site is no longer subject to NRC regulations. As a result, activities performed after license termination and the resulting impacts are outside the scope of this Supplement. These activities may include any non-NRC required monitoring, site restoration (grading, planting of vegetation, etc.), continued dismantlement (removal of uncontaminated structures or those that have been radiologically decontaminated), or continued use of the site for activities such as power production using natural gas, oil, or coal.

Any potential radiological impacts following license termination that are related to activities performed during the decommissioning period are not considered in this Supplement. Those impacts are covered by the *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities* (NUREG-1496). Nonradiological impacts following license termination that are related to activities performed during the decommissioning period are considered in this Supplement.

Levels of Significance and Applicability of Environmental Impacts

This Supplement provides a measure of (a) the significance and severity of potential environmental impacts and (b) the applicability of these impacts to a variety of plants both permanently shut down and operating. The significance of the environmental impacts is described as either SMALL, MODERATE or LARGE. The applicability of these impacts to a variety of plants is categorized as either generic or site-specific.

Levels of Significance: For decommissioning, the staff is using a standard of significance derived from the CEQ terminology for "significantly" (40 CFR 1508.27, which considers "context" and "intensity"). The NRC has defined three significance levels: SMALL, MODERATE, and LARGE.

SMALL - Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in this Supplement, the NRC has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.

MODERATE - Environmental impacts are sufficient to alter noticeably but not to destabilize important attributes of the resource.

LARGE - Environmental impacts are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The discussion of each environmental issue in this Supplement includes an explanation of how the significance level was determined. In determining the significance level, the NRC staff assumed that ongoing mitigation measures would continue (including those mitigation

measures implemented during plant construction and/or operation) during decommissioning, as appropriate. Benefits of additional mitigation measures during or after decommissioning are not considered in determining significance levels.

Applicability: In addition to determining the significance of environmental impacts, this Supplement includes a determination of whether the analysis of the environmental issues could be applied to all plants, and whether additional mitigation measures would be warranted. An environmental issue may be assigned to one of two categories:

- Generic - For each environmental issue, the analysis reported in this Supplement shows the following:

  (1) Environmental impacts associated with the issue have been determined to apply either to all plants, or for some issues to plants of a specific size, specific location or having a specific type of cooling system or site characteristics, and

  (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts, and

  (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

- Site-specific - For each environmental issue that was determined to be site-specific, the analysis reported in this Supplement has shown that one or more of the generic criteria was not met. Therefore, additional plant-specific review is required. An example of a site-specific issue is threatened and endangered species.

Use and Development of this Supplement

This Supplement can be used by the public to understand the decommissioning process, the activities performed during decommissioning, and the potential environmental impacts resulting from these activities. It identifies activities that can be bounded by a generic evaluation. Licensees can rely on the information in this Supplement as a basis for meeting the requirements in 10 CFR 50.82(a)(6)(ii). This requirement states that the licensee must not perform any decommissioning activity that causes any significant environmental impact not previously reviewed. The NRC staff will also rely on this Supplement as a basis for determining if anticipated decommissioning impacts require an additional review.

The staff first created an initial list of environmental issues and activities that this Supplement should address. The initial list of environmental issues was developed from issues (such as air

quality, aquatic ecology, and radiological impacts) identified in the 1988 GEIS and in the list specified in 10 CFR Part 51, Subpart A, Appendix B, for license renewal. This list was used because it represents the potential impacts associated with nuclear power facilities. The initial list of decommissioning activities was modified based on experience, public participation in the scoping process, site visits to six facilities currently being decommissioned, and meetings with EPA and CEQ. After compiling the issue and activity lists, the staff assessed which activities might have environmental impacts for each of the issues. The next step was to identify the variables that might affect the decommissioning impact for a specific issue and activity. For example, the proximity of the plant to a barge slip or railroad might affect the licensee's decision to remove the steam generator or other large components intact and ship them to a waste site. If the barge slip needs additional dredging, or an additional railroad line needs to be installed, then the environmental impacts may change.

The analyses in this Supplement include data from both operating and decommissioning facilities in order to appropriately span the range of impacts that could be expected. Data from decommissioning facilities was used to determine whether the potential impacts from decommissioning activities for the various issues are generic or site-specific. Data from operating facilities were used to ensure that this Supplement will be valid for all commercial nuclear power reactors.

Alternatives

The alternative to the action of decommissioning is not to decommission the facility. The option to restart the reactor is not considered to be an alternative to decommissioning because the decision to permanently cease operation prevents the licensee from operating the reactor without a significant safety and environmental review by the NRC staff.

The alternative to decommissioning at the end of the licensing period is a "no action" alternative, implying that a licensee would simply abandon or leave a facility after ceasing operations. NRC regulations do not allow the option of not decommissioning. Once the facility permanently ceases operation, if the licensee does not conduct decommissioning activities to an extent that meets the license termination criteria in 10 CFR Part 20, Subpart E, then the license will not be terminated (although the licensee will not be authorized to operate the reactor). The licensee will be required to comply with the necessary requirements for the operating license. As a result, the environmental impacts for maintaining the nuclear reactor facility will be considered to be in the bounds of the appropriate, previously issued Environmental Impact Statements. Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years. The license may be renewed for periods of up to 20 years if NRC requirements are met. However, at the end of the licensing period (whether it has been extended or not), the regulations require that the facility be decommissioned.

Conclusions

Table ES-1 presents each evaluated environmental issue and identifies whether the issue is considered generic or site-specific. If the issue is considered generic, then it is assigned a significance level of either SMALL, MODERATE or LARGE. Of the environmental issues assessed, most of the impacts are generic and SMALL for all plants regardless of the activities and identified variables (see Appendix E for a list of the variables). The two issues determined to be site-specific are threatened and endangered species and environmental justice. Four issues are considered to be conditionally site-specific.

- land use involving offsite areas to support decommissioning activities
- aquatic ecology for activities beyond the operational area
- terrestrial ecology for activities beyond the operational area
- cultural and historic resources for activities beyond the operational area with no current cultural and historic resource survey.

The operational area is defined as the portion of the plant site where most or all of the site activities occur, such as reactor operation, materials and equipment storage, parking, substation operation, facility service, and maintenance. This includes areas within the protected area fences, the intake, discharge, cooling, and associated structures as well as surrounding paved, graveled, maintained landscape, or other maintained areas.

Licensees undergoing or planning decommissioning of a commercial nuclear power reactor can use this Supplement in support of their evaluation of the environmental consequences from decommissioning. The impacts identified in this Supplement are designed to span the range of impacts from all plants that are currently permanently shut down as well as the plants that are currently operating, including the plants that have or may renew their licenses beyond the original 40-year license; a renewed license can be issued for a period not to exceed 20 years beyond the expiration of the operating license. When planning a specific decommissioning activity, licensees that fall within the bounds of the impacts, as described in Chapter 4, may proceed with the activity with no further analysis. However, if the planned activity could result in environmental impacts greater than those predicted by this supplement, then the activity cannot be performed until the licensee performs a site-specific analysis of the activity. Depending on the results of the site-specific evaluation, the staff may determine that it is appropriate to consult with another agency (such as the U.S. Fish and Wildlife Service or a State Historic Preservation Office). If the activity would result in an impact that is outside the bounds of the GEIS or other environmental assessments, the licensee would be required to submit a license-amendment request.

Table ES-1. Summary of the Environmental Impacts from Decommissioning Nuclear Power Facilities

Issue	Generic	Impact
Onsite/Offsite Land Use		
- Onsite land use activities	Yes	SMALL
- Offsite land use activities	No	Site-specific
Water Use	Yes	SMALL
Water Quality		
- Surface water	Yes	SMALL
- Groundwater	Yes	SMALL
Air Quality	Yes	SMALL
Aquatic Ecology		
- Activities within the operational area	Yes	SMALL
- Activities beyond the operational area	No	Site-specific
Terrestrial Ecology		
- Activities within the operational area	Yes	SMALL
- Activities beyond the operational area	No	Site-specific
Threatened and Endangered Species	No	Site-specific
Radiological		
- Activities resulting in occupational dose to workers	Yes	SMALL
- Activities resulting in dose to the public	Yes	SMALL
Radiological Accidents	Yes	SMALL
Occupational Issues	Yes	SMALL
Cost	NA[a]	NA
Socioeconomic	Yes	SMALL
Environmental Justice	No	Site-specific
Cultural and Historic Resource Impacts		
- Activities within the operational areas	Yes	SMALL
- Activities beyond the operational areas	No	Site-specific
Aesthetics	Yes	SMALL
Noise	Yes	SMALL
Transportation	Yes	SMALL
Irretrievable Resources	Yes	SMALL

(a)A decommissioning cost assessment is not a specific National Environmental Policy Act (NEPA) requirement. However, an accurate decommissioning cost estimate is necessary for a safe and timely plant decommissioning. Therefore, this Supplement includes a decommissioning cost evaluation, but the cost is not evaluated using the environmental significance levels nor identified as a generic or site-specific issue.

Abbreviations/Acronyms

µGy	microGray(s)
µSv	microSieverts
ac	acre(s)
AEA	Atomic Energy Act of 1954
AEC	U.S. Atomic Energy Commission
ALI	annual limits on intake
ALARA	as low as reasonably achievable
ANPR	advance notice of proposed rulemaking
BLM	Bureau of Land Management
BMP	best management practice
Bq	Bequerel(s)
BWR	boiling water reactor
C	Celsius
CAA	Clean Air Act
CDE	committed dose equivalent
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Ci	Curie
CWA	Clean Water Act
DAC	derived air concentration
dB	decibel
dBA	A-weighted sound levels
dBC	C-weighted sound levels
DBA	design basis accident
DDREF	dose or dose rate effectiveness factor
DE	dose equivalent
DNL	day-night average sound level
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation

Abbreviations/Acronyms

EA	environmental assessment
EDE	effective dose equivalent
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESA	Endangered Species Act of 1973
ES&H	environment, safety and health
F	Fahrenheit
FAA	Federal Aviation Administration
FBR	fast breeder reactor
FES	final environmental statement
FHA	Federal Housing Administration
FR	Federal Register
FSAR	Final Safety Analysis Report
ft	foot/feet
FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act of 1977)
FWS	U.S. Fish and Wildlife Service
gal.	gallon(s)
GEIS	Generic Environmental Impact Statement
gpd	gallons per day
gpm	gallons per minute
GTCC	Greater-than-Class-C (waste)
Gy	gray(s)
ha	hectare(s)
HDA	high decommissioning activity
HEPA	high-efficiency particulate air (filter)
HLW	high-level waste
h	hour
HTGR	high-temperature gas-cooled reactor
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilation, and air conditioning
IAEA	International Atomic Energy Agency
in.	inch(es)
I&C	instrumentation and control

ICRP	International Commission on Radiological Protection
ISFSI	independent spent fuel storage installation
kg	kilogram(s)
km	kilometer(s)
kV	kilovolt(s)
kWh	kilowatt hour(s)
L	liter(s)
LDA	low-decommissioning activity
LER	licensee event report
LET	linear energy transfer
LLW	low-level waste
LOS	level of service
LRA	license renewal application
LTP	license termination plan
LWR	light water reactor
m	meter(s)
m^3/d	cubic meters per day
m^3/s	cubic meters per second
MARSSIM	Multi-agency Radiation Survey and Site Investigation Manual, NUREG-1575
MBTA	Migratory Bird Treaty Act of 1918
mi	mile(s)
mGy	milliGray(s)
MPC	maximum permissible concentrations
mrad	millirad(s)
mrem	millirem(s)
MRS	monitored retrievable storage
mSv	milliSievert(s)
MTHM	metric tonnes of heavy metal
MT	metric ton(s) (or tonne[s])
MTU	metric ton(s)-uranium
MW	megawatt(s)
MWd/MTU	megawatt-days per metric ton of uranium
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
MWh	megawatt hour(s)

Abbreviations/Acronyms

NA	not applicable
NAS	National Academy of Sciences
NBS	National Bureau of Standards

NCRP	National Council on Radiation Protection and Measurements
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxide(s)
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NWPA	Nuclear Waste Policy Act of 1982
ODCM	Offsite Dose Calculation Manual
OSHA	Occupational Safety and Health Administration
PAG	protective action guide
PCBs	polychlorobiphenyls
PEL	permissible exposure limit
POL	possession-only license
PPE	personal protective equipment
PSDAR	post-shutdown decommissioning activities report
PV	pressure vessel
PWR	pressurized water reactor
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act of 1976
RCS	reactor coolant system
ROW	right-of-way/rights-of-way
RPV	reactor pressure vessel
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Officer
SI	Systeme Internationale (international system of units)
SO_2	sulfur dioxide
SO_x	sulfur oxide(s)
SSCs	structures, systems, and components
Sv	sievert(s)

TEDE	total effective dose equivalent
THPO	Tribal Historic Preservation Officer
UNSCEAR	United Nations Scientific Committee on The Effects of Atomic Radiation
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VRM	Visual Resource Management (system)
wk	week(s)
YNPS	Yankee Nuclear Power Station
yr	year(s)

1.0 Introduction

1.1 Purpose and Need for This Supplement

This document supplements the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NRC 1988), issued in 1988 (NUREG-0586, referred to hereafter as the 1988 GEIS) for power reactor facilities. This Supplement updates information provided in the 1988 GEIS by considering technological advances in decommissioning activities gained since 1988 and changes in U.S. Nuclear Regulatory Commission (NRC) regulations and, where appropriate, other agency regulations. The NRC has adopted the following definition of the purpose and need of this Supplement:

> The purpose and need are to provide an analysis of environmental impacts from decommissioning activities that can be treated generically so that decommissioning activities for commercial nuclear power reactors conducted at specific sites will be bounded, to the extent practicable, by this and appropriate previously issued environmental impact statements.

This Supplement is intended to be used to evaluate environmental impacts during the decommissioning of nuclear power facilities as residual radioactivity at the site is reduced to levels that allow for termination of the NRC license. This Supplement can be considered a stand-alone document for power reactor facilities such that readers should not need to refer back to the 1988 GEIS. The environmental impacts described in this Supplement supercede those described in the 1988 GEIS for power reactor facilities.

The NRC elected to supplement the 1988 GEIS:

(1) to further the purposes of the National Environmental Policy Act (NEPA)

(2) to update the information in the 1988 GEIS

(3) to provide additional information to the public on decommissioning activities

(4) to establish an envelope of environmental impacts associated with decommissioning activities.

Unlike the 1988 GEIS, this Supplement covers only reactor facilities licensed by the NRC for commercial power production. It updates the sections of the 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor stations. It goes beyond the 1988 GEIS and considers the permanently shut down high-temperature gas-cooled reactors and fast

breeder reactors. It does not cover research and test reactors or power reactor facilities that have been involved in a significant accident resulting in large-scale contamination of structures, systems, and components (SSCs). It also does not cover other types of fuel-cycle facilities, such as fuel-reprocessing plants or small mixed oxide fuel-fabrication plants.

This Supplement incorporates updated information, regulations, and analyses. Since the 1988 GEIS was written, the NRC and the industry have gained over 200 facility-years' worth of additional decommissioning experience. Currently, there are 19 nuclear power reactor facilities in the decommissioning process. This includes nine that permanently ceased operations after the NRC published the 1988 GEIS. Since the 1988 GEIS, three facilities have completed decommissioning and terminated their licenses: Pathfinder, Shoreham, and Fort St. Vrain. This Supplement addresses new decommissioning technologies and approaches that the 1988 GEIS did not address. Also, the decommissioning regulations have changed since the 1988 GEIS.

1.2 Process Used to Determine Scope of This Supplement

The content of this Supplement was initially defined by the scope of the 1988 GEIS and was modified based on current decommissioning regulations, inputs from the scoping process and the outcome of meetings between the NRC, the U.S. Environmental Protection Agency (EPA), and the Council on Environmental Quality (CEQ).

Four public scoping meetings were held between April and June 2000 as part of the scoping process. During the meetings, the NRC outlined the GEIS revision process and accepted comments regarding the scope of this Supplement. In addition to comments obtained during the scoping meetings, the NRC received 12 letters from industry groups, other interested organizations, and private citizens. A total of 397 comments were provided during the scoping process. The staff reviewed the comments and categorized them as either relevant to this Supplement or outside of its intended scope. The staff prepared and issued a scoping summary report on April 17, 2001 (NRC 2001), that summarized the comments and NRC responses to the comments. Appendix N is an extraction of comments from the scoping summary report that were considered to be within the scope of the environmental review. The NRC staff published for comment draft Supplement 1 to the GEIS in October 2001. Public meetings in San Francisco, California, Boston, Massachusetts, Chicago, Illinois and Atlanta, Georgia, were held in December 2001, to describe the preliminary results of the NRC environmental review, to answer questions, and to provide members of the public with information to assist them in formatting comments on the draft Supplement. All comments received on the draft Supplement were considered by the staff in developing the final document. Appendix O provides a compilation of comments received on the draft Supplement and staff responses to the comments. Originally, the staff planned to publish the scoping

summary and the response to comments in Appendices A and B of this report. However, due to the length of these two appendices, the staff decided to publish these two appendices and the appendix containing the transcripts and comment letters in a second volume. In addition to the scoping meetings, meetings were held with EPA and CEQ between February and November 2000 to obtain input on the scope of the environmental review.

Site visits were conducted by the NRC staff and its contractor at six nuclear reactor facilities that are in various stages of decommissioning. The site visits were conducted to obtain information and to familiarize the NRC team with the current types of activities conducted and the resulting impacts during decommissioning. In addition to the site visits, the Nuclear Energy Institute arranged access to additional site-specific decommissioning data. In addition to the six sites visited, data was received for three other nuclear power reactor facilities.

Information used in this report was also obtained from docketed material, such as post-shutdown decommissioning activity reports (PSDARs), effluent release reports, license termination plans (LTPs), and decommissioning funding plans.

1.3 Scope of This Supplement

Except for decommissioning planning activities, this Supplement considers only activities that occur following certification that fuel has been removed from the reactor. Figure 1-1 illustrates the decommissioning process. Licensee decommissioning activities are listed in the top part of the timeline. Regulatory activities are summarized by the lower part of the timeline. This section discusses licensee decommissioning activities that are within scope and also explains why some activities and impacts are not in scope for this Supplement. Table 1-1 briefly lists decommissioning activities that are within and outside the scope of this Supplement. Additional discussion of the out-of-scope activities is provided in Appendix D.

Impacts related to the decision to permanently cease operations are outside the scope of this Supplement. This includes impacts that result directly and immediately from the act of permanently ceasing operations, regardless of when or why the decision was made. For example, when a reactor ceases operation, the flow of warmer water into the canal, lake, or river that receives the plant's thermal discharges is stopped, and this may impact the organisms in the vicinity of the thermal outfall. However, this impact is not within the scope of this Supplement because it is essentially a restoration of the existing conditions.

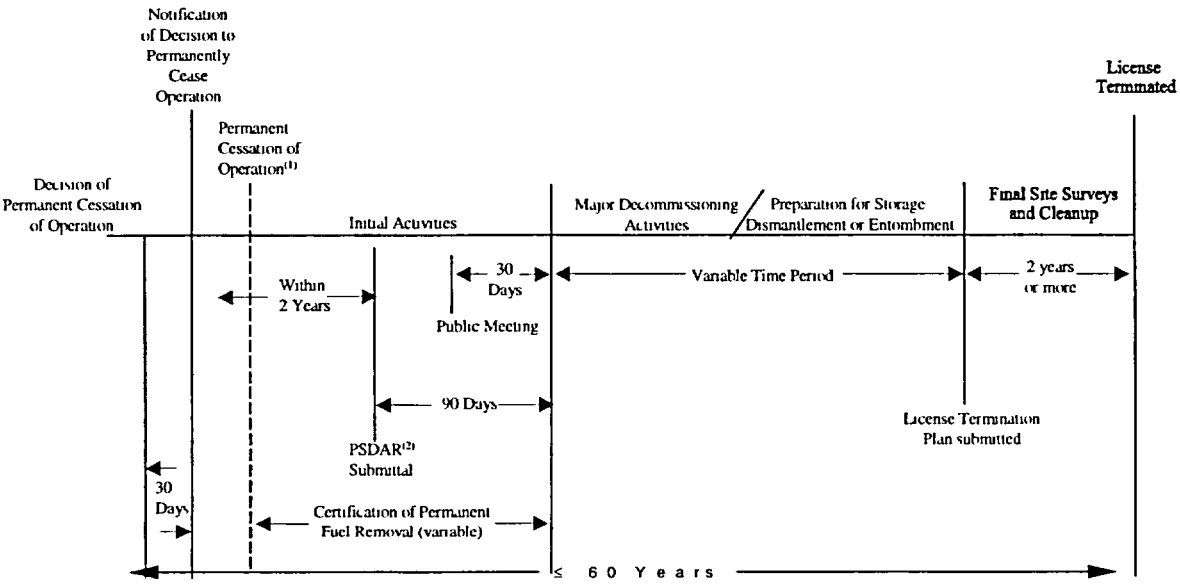

Figure 1-1.
Decommissioning Timeline

(1) The cessation of operations may occur before, concurrent with, or following the certification to permanently cease operations.
(2) The PSDAR may be submitted before permanent cessation of operations.

The licensee may declare or certify the date for permanent cessation of operations prior to the end of the license term and while still operating. In such cases, the decommissioning planning activities prior to shutdown and activities and impacts that occur following the actual shutdown of the facility are within the scope of this Supplement. In some circumstances, the licensee may not operate the facility for a period of many years without certifying that they have permanently ceased power operations. In these cases, the activities occurring before the certification is completed would be considered part of the operational phase of the facility and would be within the scope of the site-specific environmental impact statement (EIS) that covers reactor operations but are outside the scope of this Supplement.

The NRC definition for *decommission* in 10 CFR 50.2 is "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license." This Supplement is not limited only to activities directly related to the removal of radioactive material from facilities or that must be performed to facilitate removal of contaminated SSCs. The staff has included activities and impacts related

to removing uncontaminated SSCs that were required for reactor operation, such as the intake structure or cooling towers. Including uncontaminated SSCs in this Supplement is consistent with an expectation under NEPA that all impacts associated with an activity and that public concerns about the scope of the review be considered.

Various activities that are performed in conjunction with decommissioning are not considered within the scope of this Supplement, but are reviewed and regulated by the NRC under other licenses. These activities include

- independent spent fuel storage installation (ISFSI) construction, maintenance, and decommissioning – An ISFSI can be operated and decommissioned either under the same license that is used for the operating or decommissioning facility called a general license under 10 CFR Part 50, or under a specific license under 10 CFR Part 72. If a licensee chose to operate the ISFSI under a Part 50 license, it could choose to continue to maintain their Part 50 license, or seek a site -specific 10 CFR Part 72 license for the ISFSI, thus allowing termination of the Part 50 license and the end of the reactor decommissioning process. The NRC staff would also be required to conduct an environmental assessment of the licensee's request for a site-specific 10 CFR Part 72 license.

- spent fuel storage and maintenance – The Commission has independently, in a separate proceeding (the Waste Confidence Proceeding), made a finding that there is

> reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations. (54 FR 39767)

The Commission has committed to review this finding at least every 10 years. In its most recent review, the Commission concluded that experience and developments since 1990 were not such that a comprehensive review of the Waste Confidence Decision was necessary at that time (64 FR 68005). Accordingly, the Commission reaffirmed its findings of insignificant environmental impacts cited above. This finding is codified in the Commission's regulations at 10 CFR 51.23(a). The staff relies on the Waste Confidence Rule, but has elected to include in this Supplement information related to the storage and maintenance of fuel in a spent fuel pool for completeness.

Table 1-1. Activities and Impacts Within or Outside the Scope of This Supplement

In Scope
• Activities performed to remove the facility from service from the time that the licensee certifies that the facility has permanently ceased operations
• Activities (and the resulting impacts) performed in support of radiological decommissioning, including decontamination and dismantlement of radioactive structures and any activities required to support the decontamination and dismantlement process
• Activities performed in support of dismantlement of nonradiological structures, systems, and components (SSCs) required for the operation of the reactor, such as diesel generator buildings and cooling towers
• Activities performed up to license termination and their resulting impacts as provided in the definition of decommissioning Nonradiological impacts occurring after license termination from activities conducted during decommissioning
• Activities related to release of the facility
• Human health impacts from radiological and nonradiological decommissioning activities
• Activities related to preparing the facility for entombment
Out of Scope[a]
• Activities and the resulting impacts (other than planning activities) that are performed before permanent cessation of operation is certified
• Radiological impacts following license termination
• Activities (and the resulting impacts) performed to dismantle structures on the site that are not radiologically contaminated and were not required for operation of the reactor (e.g., training building and administration building)
• Activities performed to support installation of alternate energy-generating facilities during or following the decommissioning process
• Site restoration activities performed during or after the decommissioning process
• Activities (and their impacts) performed after license termination, such as - any additional non-NRC required monitoring to evaluate radiological impacts - site restoration - continued use of site for power production or other activities
• Activities performed at facilities that are separately licensed or regulated - independent spent fuel storage installation (ISFSI) construction, maintenance, or decommissioning - interim storage of Greater-than-Class-C Waste - spent fuel storage,[b] maintenance, and disposal on or away from a reactor location - low-level waste (LLW) disposal at a licensed LLW site or treatment at compactor facilities
• Activities to install engineered barriers and institutional controls for restricted release
• Public perceptions and psychological impacts
• Activities at facilities that have been permanently shut down by a major accident
• Issues related to the ENTOMB option after the facility begins the entombment period

(a) A detailed discussion of the reasons for determining that activities are out of scope can be found in Appendix D.

(b) As discussed in the text, the staff relies on the Waste Confidence Decision Review (54 FR 39767 and 64 FR 68005) but has chosen to include information related to the storage and maintenance of fuel in a spent fuel pool for completeness in this Supplement.

- spent fuel transport and disposal away from the reactor location -- Transportation of spent fuel and other high-level nuclear wastes is governed by regulations in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material." Disposal of spent fuel and high-level wastes are governed by the Nuclear Waste Policy Act (NWPA) of 1982, as amended, which defined the goals and structure of a program for permanent, deep geologic repositories for the disposal of high-level radioactive waste and nonreprocessed spent fuel. Under this Act, the U.S. Department of Energy (DOE) is responsible for developing permanent disposal capacity for spent fuel and other high-level nuclear wastes. Title 10 CFR Part 60 contains rules governing the licensing to receive and possess source, special nuclear, and by-product material at a geological repository operations area that is sited, constructed, or operated in accordance with the NWPA. However, the Commission issued the final rule to supercede the generic criteria in 10 CFR Part 60 for disposal at a geological repository with specific criteria in 10 CFR Part 63, issued on November 2, 2001 (66 FR 55732).

- LLW disposal at a licensed LLW site or treatment of LLW at compactor facilities -- Regulations related to LLW disposal are in 10 CFR Part 61 and 10 CFR Part 20, Subpart K. A final GEIS supporting the regulations in 10 CFR Part 61, "Final Generic Environmental Impact Statement for 10 CFR Part 61" was published as NUREG-0945 (NRC 1982).

A further description of these activities and the basis for not including them in the scope of this supplement is in Appendix D.

The decommissioning process continues until the licensee requests termination of the license and demonstrates that radioactive material has been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed, the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC regulations. As a result, activities performed after license termination and the resulting impacts are outside the scope of this Supplement. These activities may include any non-NRC required monitoring, site restoration (grading, planting of vegetation, etc.), continued dismantlement or continued use of the site for activities such as power production using natural gas, oil, or coal.

Any potential radiological impacts following license termination that are related to activities performed during decommissioning are not considered in this Supplement. Such impacts are covered by the Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities, NUREG-1496 (NRC 1997).

Any potential nonradiological impacts resulting from decommissioning and occurring after termination of the license are considered within the scope of this Supplement. Onsite disposal has been proposed by the industry as a method to dispose of slightly radiologically contaminated building rubble provided that the waste is buried onsite below grade, for example, in existing underground portions of the dismantled plant in such a manner as to meet the site release criteria of 10 CFR Part 20, Subpart E. This concept has been referred to as "Rubblization" (the disposal onsite of slightly contaminated material in a manner to meet the 10 CFR Part 20 release criteria).[a] On February 14, 2000, the staff informed the Commission of licensee interest in this method and the staff's intent to address Rubblization in this Supplement (NRC 2000). The staff has determined that the long-term radiological aspects of Rubblization, or onsite disposal of slightly contaminated material, would require a site-specific analysis and would be addressed at the time the LTP is submitted. The nonradiological impacts, occurring both during the decommissioning period (e.g., noise, dust, land disturbance), and the long-term impacts occurring after the decommissioning activities are completed (e.g., concrete leaching into the groundwater) can be evaluated generically and are included in the evaluation of each of the applicable environmental issues in Chapter 4 of this document.

Public perceptions and psychological impacts related to the risk of a radiological accident during decommissioning are not addressed in the 1988 GEIS and are not addressed in this Supplement. The U.S. Supreme Court stated in *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, at 774-775, that such psychological effects or impacts raised policy questions that fell outside of NEPA. This court case involved an organization of residents living in the area of Three Mile Island, People Against Nuclear Energy (PANE), that claimed the NRC should consider, as part of an EIS, the severe psychological stress caused to its members by the restart of Three Mile Island, Unit 1, after the accident at Three Mile Island, Unit 2. However, in *Metropolitan Edison Co., et al. v. People Against Nuclear Energy* (1983), the Supreme Court read NEPA to require

> a reasonably close causal relationship between a change in the physical environment and the effect at issue .... a risk of an accident is not an effect on the physical environment .... We believe that the element of risk lengthens the causal chain beyond the reach of NEPA.

(a) The term "rubblization" is frequently used to describe the crushing of structural material (e g., concrete) to facilitate disposal. The material may be concrete that is uncontaminated or contaminated with radiological material. The staff used the term Rubblization to describe the process of onsite disposal of slightly contaminated material in a manner to meet the site release criteria. For this report, in order to avoid confusion, the staff chose to use the term "demolition" instead of rubblization as the verb to describe the process of crushing structural material to allow for easy burial or disposal.

The decommissioning activities following shutdown of a facility after a major accident resulting in significant contamination of the site are outside the scope of this Supplement. For most types of accidents, decommissioning would be treated on a site-specific basis and, therefore, cannot be considered in a generic sense.

1.4 Categories for Environmental Impacts and Extent of Issues

In the analysis of potential issues in decommissioning activities, two areas in particular were found to benefit from categorization: (a) ranking the significance and severity of potential environmental impacts for proposed decommissioning activities and (b) sorting potential issues as either generic or site-specific.

1.4.1 Levels of Significance of Environmental Impacts

For decommissioning, the staff is using a standard of significance derived from the CEQ terminology for "significantly" (40 CFR 1508.27, which considers "context" and "intensity"). The NRC has defined three significance levels: SMALL, MODERATE, and LARGE.

SMALL – Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in this Supplement, the NRC has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.

MODERATE – Environmental impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE – Environmental impacts are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The discussion of each environmental issue in this Supplement includes an explanation of how the significance level was determined. In determining the significance level, the NRC staff assumed that ongoing mitigation measures would continue (including those mitigation measures implemented during plant construction and/or operation) during decommissioning, as appropriate. Benefits of additional mitigation measures during or after decommissioning are not considered in determining significance levels.

1.4.2 Regulatory Distinction of Generic and Site-Specific Approaches

In addition to determining the significance of environmental impacts, this Supplement includes a determination of whether the analysis of the environmental issue could be applied to all plants, and whether additional mitigation measures would be warranted. An environmental issue may be assigned to one of two categories (generic or site-specific) described below.

- Generic – For each environmental issue, the analysis reported in this Supplement shows the following:

  (1) Environmental impacts associated with the issue have been determined to apply either to all plants, or for some issues to plants having a specific size, specific location, or having a specific type of cooling system or other site characteristics, and

  (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts, and

  (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

- Site-specific – For each environmental issue that was determined to be site-specific, the analysis reported in this Supplement has shown that one or more of the generic criteria was not met. Therefore, additional plant-specific review is required.

1.5 Uses of This Supplement

This Supplement can be used by the public to understand the decommissioning process, the activities performed during decommissioning, and the potential environmental impacts resulting from these activities. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process.

This Supplement identifies activities that can be bounded by a generic evaluation. It also identifies the decommissioning activities and associated environmental issues that will likely require site-specific analysis before performing a decommissioning activity.

Licensees can rely on the information in this Supplement as a basis for meeting the requirements in 10 CFR 50.82(a)(6)(ii). This requirement states that the licensee must not perform any decommissioning activity that causes any significant environmental impact not previously

reviewed. Prior to conducting a decommissioning activity, the licensee must make a determination that the resulting environmental impacts fall within the bounds of this Supplement or of another EIS related to its facility. When finalized, licensees are expected to reflect the environmental impacts described in this Supplement rather than those in the 1988 GEIS. For any decommissioning activity that does not meet these conditions, the regulations prohibit the licensee from undertaking the activity until it performs a site-specific analysis of the activity. Depending on the results of the site-specific evaluation, the staff may determine that it is appropriate to consult with another agency about the potential impacts. Such agencies could include the U.S. Fish and Wildlife Service or a State Historic Preservation Office. If the activity would result in an impact that is outside the bounds of the GEIS or other environmental assessments, the licensee would be required to submit a license-amendment request. The NRC staff periodically inspects the licensee's procedures and documentation to ensure that a proper environmental review is part of the screening criteria used for proposed changes to the facility.

In addition to the NRC staff's review of the licensee's procedures and documentation, there are two points during the decommissioning process when the licensee performs an evaluation of environmental impacts. The first evaluation occurs when the licensee must submit a PSDAR to the NRC (within two years following permanent cessation of operation). The PSDAR must include a discussion that provides the reasons for concluding that the environmental impacts associated with the licensee's planned site-specific decommissioning activities will be bounded by an appropriate previously issued environmental assessments, including this Supplement. If the licensee identifies environmental impacts that are not bounded by a previous NRC environmental assessment, the licensee must address the impacts in a request for a license amendment regarding the activities. The licensee must also submit a supplement to its environmental report (ER) that describes and evaluates the additional impacts. The NRC will review the supplement to the ER in conjunction with its review of the license-amendment request.

The second evaluation is near the end of decommissioning at the time when the licensee submits an application for license termination. In accordance with 10 CFR 50.82(a)(9), a licensee must submit its LTP at least 2 years before the anticipated termination date of the license. The LTP must be a supplement to the Final Safety Analysis Report or its equivalent for the facility and is submitted as a license amendment. The NRC requires an environmental review as part of the review of the license-amendment request. Thus, the LTP must include a supplement to the ER that describes any new information or significant environmental change associated with the licensee's proposed termination activities. The NRC staff will also rely upon this supplement as a basis for determining if anticipated decommissioning impacts require an additional review.

1.6 Development of This Supplement

The requirements in 10 CFR Part 51 were followed for the development of this Supplement. This included conducting scoping meetings and obtaining public comments (see Appendix N). From these meetings and meetings with other appropriate government agencies, the staff defined the scope of this Supplement (see Sections 1.2 and 1.3). During the scoping process, the staff developed an evaluation process for determining the environmental impacts from decommissioning. Section 4.2 provides additional discussion of the process and Appendix E provides a detailed description of the analysis used to identify the environmental impacts from decommissioning. The evaluation process involved determining the specific activities that occur during decommissioning and obtaining data from site visits and from an information request to decommissioning plants that was related to the impact of these activities at currently decommissioning facilities. The data obtained from the decommissioning sites were analyzed and then evaluated against a list of variables that defined the parameters for plants that are currently operating but which will one day be decommissioned. This evaluation resulted in a range of impacts for each environmental issue that may be used for comparison by licensees that are or will be decommissioning their facilities.

1.7 Parts of This Supplement

Chapter 2 provides background, describing the basis for the current regulations and summarizing the regulations. Chapter 3 describes the types of plants covered by this Supplement, which includes permanently shutdown reactor facilities as well as operating facilities that will eventually cease power operations. Chapter 3 also describes the location and types of buildings on the sites, the systems that may still be active after permanent shutdown, and changes in effluents after permanent shutdown. Chapter 4 describes activities conducted during the decommissioning process and impacts that could arise from these activities. The analysis of the impacts is based on variables such as the option of decommissioning, location of plant, type of plant, and timing of the activity. Chapter 5 discusses the "No Action" alternative to decommissioning, which is the abandonment of the facility after the cessation of operations. Chapter 6 contains the summary of findings and conclusions.

1.8 References

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for protection against radiation."

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic licensing of production and utilization facilities."

10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions."

10 CFR 60. Code of Federal Regulations, Title 10, *Energy*, Part 60, "Disposal of high-level radioactive wastes in geologic repositories."

10 CFR 61. Code of Federal Regulations, Title 10, *Energy*, Part 61, "Licensing requirements for land disposal of radioactive waste.

10 CFR 63. Code of Federal Regulations, Title 10, *Energy*, Part 63, "Disposal of high-level radioactive wastes in a geologic repository at Yucca Mountain, Nevada."

10 CFR 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, "Packaging and transportation of radioactive material."

10 CFR 72. Code of Federal Regulations, Title 10, *Energy*, Part 72, "Licensing requirements for the independent storage of spent nuclear fuel, high-level radioactive waste, and reactor-related greater-than-Class-C waste."

40 CFR 1508. Code of Federal Regulations, Title 40, *Protection of the Environment*, Part 1508, "Terminology and Index."

54 FR 39767. "10 CFR Part 51 Waste Confidence Decision Review." *Federal Register*. September 28, 1989.

64 FR 68005. "Waste Confidence Decision Review." *Federal Register*. December 6, 1999.

66 FR 55732. "Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada." *Federal Register*. November 2, 2001.

Metropolitan Edison Co., et al v. People Against Nuclear Energy, 460 U.S. 766, at 774-775. 1983.

National Environmental Policy Act (NEPA) of 1969, as amended, 42 USC 4321 et seq.

Nuclear Waste Policy Act of 1982, as amended, 42 USC 10.101 et seq.

U.S. Nuclear Regulatory Commission (NRC). 1982. *Final Generic Environmental Impact Statement for 10 CFR Part 61*. NUREG-0945, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1988. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*. NUREG-0586, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997. *Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*. NUREG-1496, Vol. 1, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2000. "SECY-00-0041 Use of Rubblized Concrete Dismantlement to Address 10 CFR Part 20, Subpart E, Radiological Criteria for License Termination." NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2001. Letter from U.S. NRC to Distribution: "Subject: Issuance of a scoping summary report of comments received related to the intent to develop a Supplement to NUREG-0586." Dated April 17, 2001.

2.0 Background Information Related to Decommissioning Regulations

This section provides background information that will assist the reader in understanding the requirements for decommissioning and license termination. The basis for the current decommissioning regulations and a summary of the current regulations are provided below. This chapter and Chapter 3, "Description of NRC Licensed Reactor Facilities and the Decommissioning Process," will give the reader a basic understanding of the overall reactor decommissioning process and environmental impact assessments used during the process.

2.1 Basis for Current Regulations

In the mid-1990s, the Commission initiated an effort to significantly change the regulations for decommissioning power reactor facilities. The new regulations were intended to make the decommissioning process more current, efficient, and uniform. On July 29, 1996, a final rule revising 10 CFR 50.82, "Decommissioning of Nuclear Power Reactors," was published in the Federal Register (61 FR 39278). This rule redefined the decommissioning process and modified the regulations written in 1988, which had required submittal of a detailed decommissioning plan before the start of decommissioning.

The regulations were revised based on experience gained from reactor decommissionings that had occurred during the 1980s and early 1990s. Review of the activities that occur during decommissioning showed that they are similar to the activities that occur during the construction, operation, maintenance, and refueling outages of a power reactor (e.g., decontamination, steam generator replacement, and pipe removal). However, the magnitude of some activities during decommissioning (e.g., removal of piping) is considerably greater than during operations. Activities associated with the decommissioning of facilities had resulted in impacts consistent with or less than those evaluated in the 1988 *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (GEIS), NUREG-0586 (NRC 1988). Based on the above reasons, the Commission determined that review and approval by the U.S. Nuclear Regulatory Commission (NRC) staff of a detailed decommissioning plan was not necessary.

2.2 Summary of Current Regulations

2.2.1 Regulations for Decommissioning Activities

The current regulations (10 CFR 50.82) specify the regulatory actions that both the NRC and the licensee must take to decommission a nuclear power facility. Once the licensee decides to permanently cease operations, it must submit, within 30 days, a written certification to the NRC.

The notification must contain the date on which the power-generating operations ceased or will cease. The licensee must permanently remove all fuel from the reactor and submit a written certification to the NRC confirming the completion of fuel removal. Once this certification has been submitted, the licensee is no longer permitted to operate the reactor, or to put fuel back into the reactor vessel. After certification that the fuel is removed, the annual license fee to the NRC is reduced as well as the licensee's obligation to adhere to certain requirements that are needed only during reactor operations.

In addition to the certifications, the licensee must submit a post-shutdown decommissioning activities report (PSDAR) to the NRC and any affected States no later than 2 years after the date of permanent cessation of operations. Section 10 CFR 50.82 requires that the PSDAR include

- a description of the licensee's planned major decommissioning activities
- a schedule for completing these activities
- an estimate of the expected decommissioning costs
- a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by an appropriate previously issued environmental impact statement (EIS).

After receiving a PSDAR, the NRC publishes a notice of receipt in the Federal Register, makes the PSDAR available for public review and comment, and holds a public meeting in the vicinity of the facility to discuss the licensee's plans. The NRC will examine the PSDAR to determine if the required information is included and will inform the licensee in writing if there are deficiencies that must be addressed before the licensee initiates any major decommissioning activities. The regulations require a 90-day waiting period after submittal of the PSDAR before the licensee may commence major decommissioning activities.

The purpose of the PSDAR is to provide the NRC and the public with a general overview of the licensee's proposed decommissioning activities. The PSDAR serves to inform the NRC staff of the licensee's expected activities and schedule, which facilitates planning for inspections and decisions regarding NRC oversight activities. The PSDAR is also a mechanism for informing the public of the proposed decommissioning activities before those activities are conducted.

Prior to submission of the PSDAR, the licensee can conduct a variety of activities at the site including activities to ensure the safe shutdown of the facility. Systems can be drained, components removed, and certain structures demolished. However, the licensee is prohibited from undertaking any major decommissioning activity as defined in 10 CFR 50.2.

Once the PSDAR has been submitted and the 90-day period has been completed, the licensee may begin major decommissioning activities, which may include the following:

- permanent removal of major radioactive components, such as the reactor vessel, steam generators, or other components that are comparably radioactive
- permanent changes to the containment structure
- dismantling of components containing Greater-than-Class-C (GTCC) Waste.[(a)]

In accordance with 10 CFR 50.82(a)(6)(ii), licensees shall not perform any decommissioning activities "that result in significant environmental impacts not previously reviewed." If any decommissioning activity does not meet this requirement, the licensee must submit a license-amendment request before conducting the activity. The licensee also must submit a supplement to its environmental report (ER) that relates to the additional impacts. The NRC will review the ER Supplement, and prepare an environmental assessment (EA) or EIS, and amendment to the license in conjunction with its review.

The licensee can choose (1) to immediately decontaminate and dismantle the facility (DECON), or (2) to place the facility in long-term storage (SAFSTOR) followed by subsequent decontamination and dismantlement, or (3) to perform some incremental decontamination and dismantlement activities before or during the storage period of SAFSTOR. Under the current regulations, unless the licensee receives permission to the contrary, the site must be decommissioned within 60 years. Chapter 3 describes in more detail the decommissioning

(a) The NRC has adopted a waste classification system for low-level radioactive waste based on its potential hazards, and has specified disposal and waste form requirements for each of the general classes of waste: A, B, and C. The classifications are based on the key radionuclides present in the waste and their half-lives. Tables defining these three classes are contained in 10 CFR 61.55. In general, requirements for waste form, stability, and disposal methods become more stringent when going from Class A to Class C. GTCC waste exceeds the concentration limits in 10 CFR 61.55 and is generally unsuitable for near-surface disposal as low-level waste (LLW), even though it is legally defined as LLW. The NRC's regulations in 10 CFR 61.55(a)(2)(iv) require that this type of waste must be disposed of in a geologic repository unless approved for an alternative disposal method on a case-specific basis by the NRC. 10 CFR Part 72 allows for interim storage of GTCC from a commercial power reactor.

options available to the licensee. In this Supplement, the staff also evaluates another option called ENTOMB, which encases the radioactive contaminants in a structurally long-lived material.

2.2.2 Regulations for License Termination

In order to terminate the license and allow release of the site, the licensee must submit a license termination plan (LTP). In accordance with 10 CFR 50.82(a)(9), an application for license termination must be accompanied or preceded by an LTP, which is subject to NRC review and approval. The licensee must submit the LTP at least 2 years before the date of license termination. The LTP approval process is by license amendment. By regulation, the LTP must include the following:

- a site characterization
- identification of remaining dismantlement activities
- plans for site remediation
- detailed plans for the final survey of residual contamination
- a description of the end-use of the site (if restricted use is proposed)
- an updated site-specific estimate of remaining decommissioning costs
- a supplement to the ER.

The licensee must submit the LTP as a supplement to its Final Safety Analysis Report or as an equivalent document, thus formalizing the steps necessary to revise the document.

After receiving the LTP, the NRC will place a notice of receipt of the plan in the Federal Register and will make the plan available to the public for comment. The NRC will schedule a public meeting near the facility to discuss the plan's contents and the staff's process for reviewing the submittal. The NRC will also offer an opportunity for a public hearing on the license-amendment request associated with the LTP. At this stage, a site-specific EA is required. Depending on the circumstances, the EA evaluation can result in the development of a full EIS. If the LTP demonstrates that the remainder of decommissioning activities will be performed in accordance with NRC regulations, are not detrimental to the health and safety of the public, and will not have a significant adverse effect on the quality of the environment, the

Commission will approve the plan by a license amendment (subject to whatever conditions and limitations the Commission deems appropriate and necessary).

After the approval of the LTP, the NRC will continue its inspection of the site. These inspections will include validation of commitments made in the LTP. Inspections may also include confirmatory surveys to verify that areas of the site have been decontaminated to the limits established in the LTP.

On July 21, 1997, the NRC published (also in the Federal Register) a final rule entitled, "Radiological Criteria for License Termination" (64 FR 39058) prescribing specific radiological criteria for license termination. At the end of the LTP process, if the NRC determines that the remaining dismantlement has been performed in accordance with the approved LTP, and if the final radiation survey and associated documentation demonstrate that the facility and site are suitable for release, then the Commission will terminate the license.

The radiological criteria for license termination are given in 10 CFR Part 20, Subpart E. There are two broad categories of uses for the facility after the license termination: unrestricted use and restricted use.

Unrestricted use means that there are no NRC-imposed restrictions on how the site may be used. State and local jurisdictions may, and have, imposed additional restrictions or requirements on licensees. The licensee is free to continue to dismantle any remaining buildings or structures and to use or sell the land for any type of application. The Commission has established a 0.25 mSv/yr (25 mrem/yr) total effective dose equivalent (TEDE) to an average member of the critical group[a] as an acceptable criterion for release of any site for unrestricted

(a) The "critical group" is that group of individuals reasonably expected to receive the highest exposure to residual radioactivity within the assumptions of a particular scenario. The average dose to a member of the critical group is represented by the average of the doses for all members of the critical group, which in turn is assumed to represent the most likely exposure situation. For example, when considering whether it is appropriate to "release" a building that has been decontaminated (allow people to work in the building without restrictions), the critical group would be the group of employees that would regularly work in the building. If radiation in the soil is the concern, then the scenario used to represent the maximally exposed individual is that of a resident farmer. The assumptions used for this scenario are prudently conservative and tend to overestimate the potential doses. The added "sensitivity" of certain members of the population, such as pregnant women, infants, children, and any others who may be at higher risk from radiation exposures, are accounted for in the analysis. However, the most sensitive member may not always be the member of the population that receives the highest dose. This is especially true if the most sensitive member (e.g., an infant) does not participate in activities that provide the greatest dose or if they do not eat specific foods that cause the greatest dose.

use. The licensee will be required to show that the site can meet this criterion before the license will be terminated for unrestricted use. In addition, the licensee will need to show that the amounts of residual radioactivity have been reduced to levels that are as low as reasonably achievable (ALARA).[a] For sites that have been determined to be acceptable for unrestricted use, there are no requirements for further measurement of radiation levels. It is not expected that these radiation levels would change (other than to be reduced over time through radioactive decay), and there would be no mechanism for further contamination or radiological releases.

Restricted use means that there are restrictions on the facility use after license termination. A site would be considered acceptable for license termination under restricted conditions if the licensee can demonstrate that further reductions in residual radioactivity necessary to meet the requirements for unrestricted use would result in net public or environmental harm, or were not being made because the residual levels were ALARA. In addition, the licensee must have made provisions for legally enforceable institutional controls (e.g., use restrictions placed in the deed for the property) that provide reasonable assurance that the radiological criteria set by the NRC (0.25 mSv/yr [25 mrem/yr] TEDE to an average member of the critical group) will not be exceeded. The licensee must also have provided sufficient financial assurance to an amenable independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site. There are also regulations relating to the documentation of how the advice of individuals and institutions in the community who may be affected by decommissioning has been sought and incorporated in the LTP if the license is to be terminated under restricted conditions.

Residual radioactivity at the site must be reduced so that if the institutional controls were no longer in effect, there would be reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group would be ALARA and would not exceed either 1 mSv/yr (100 mrem/yr) or 5 mSv/yr (500 mrem/yr). In the latter case, the licensee must (1) demonstrate that further reductions in residual radioactivity necessary to comply with the 1 mSv/yr (100 mrem/yr) value are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm, (2) make provisions for durable institutional controls, and (3) provide sufficient financial assurance to enable a responsible government entity or independent third party to carry out periodic checks of the facility no less frequently than every 5 years to ensure that the institutional controls remain in place.

(a) The ALARA concept means that all doses are to be reduced below required levels to the lowest reasonably achievable level considering economic and societal factors. Determination of levels that are ALARA must consider any detriments, such as deaths from transportation accidents, that are expected to potentially result from disposal of radioactive waste.

Alternate release criteria may be used in specific cases. The use of alternate criteria to terminate a license requires the approval of the Commission after consideration of the NRC staff's recommendations that address comments provided by the U.S. Environmental Protection Agency and any public comments submitted pursuant to 10 CFR 20.1405. These alternate criteria are expected to be used only in very rare cases.

To date, the three NRC-licensed facilities (Shoreham, Fort St. Vrain, and Pathfinder) that have completed the decommissioning process have had their licenses terminated, allowing unrestricted use of the sites. License termination plans have been submitted for three other facilities. The LTPs describe plans for unrestricted use of the sites following license termination. No nuclear power licensees have indicated that they plan for restricted use of the site after license termination.

A proposed rule was issued on September 4, 2001 (66 FR 46230) for partial site release prior to license termination. Partial site release means release of part of a nuclear power reactor facility or site for unrestricted use prior to NRC approval of the LTP. The NRC proposes to add a new section to 10 CFR Part 50, separate from the existing rules for decommissioning and radiological criteria for license termination, that identifies the requirements and criteria necessary for partial site release. The proposed rule includes associated amendments to 10 CFR Part 2 and 10 CFR Part 20. The purpose of this rulemaking is to ensure that any remaining residual radioactive material from licensed activities on a portion the site released for unrestricted use will meet the radiological criteria for license termination.

Licensees will be required to submit information necessary to demonstrate the following:

- The release of radiologically impacted property complies with the radiological criteria for unrestricted use in 10 CFR 20.1402 (0.25 mSv/yr [25 mrem/yr] to the average member of the critical group and ALARA).

- The licensee will continue to comply with all other applicable regulatory requirements that may be affected by the release of property and changes to the site boundary. This would include, for example, requirements in 10 CFR Parts 20, 50, 72, and 100.

- Records of property-line changes and the radiological conditions of partial site releases are being maintained to ensure that the dose from residual material associated with these releases can be accounted for at the time of any subsequent partial releases and at the time of license termination.

The proposed rule provides additional flexibility to licensees who are releasing property that has never been radiologically impacted. While an amendment of the Part 50 operating license is required to release radiologically impacted property, the proposed rule offers the opportunity for a letter submittal for partial releases if the licensee can demonstrate that there is no reasonable potential for residual radioactivity from license activities.

2.3 References

10 CFR 2. Code of Federal Regulations, Title 10, *Energy*, Part 2, "Rules of practice for domestic licensing proceedings and issuance of orders."

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for protection against radiation."

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic licensing of production and utilization facilities."

10 CFR 61. Code of Federal Regulations, Title 10, *Energy*, Part 61, "Licensing requirements for land disposal of radioactive waste."

10 CFR 72. Code of Federal Regulations, Title 10, *Energy*, Part 72, "Licensing requirements for the independent storage of spent nuclear fuel high-level radioactive waste and reactor-related greater-than-Class-C waste."

10 CFR 100. Code of Federal Regulations, Title 10, *Energy*, Part 100, "Reactor site criteria."

61 FR 39278. "Decommissioning of Nuclear Power Reactors. Final Rule." *Federal Register*. July 29, 1996.

64 FR 39058. "Radiological Criteria for License Termination. Final Rule." *Federal Register*. July 21, 1997.

66 FR 46230. "Releasing Part of a Power Reactor Site or Facility for Unrestricted Use Before the NRC Approves the License Termination Plan. Proposed Rule." *Federal Register*. September 4, 2001.

U.S. Nuclear Regulatory Commission (NRC). 1988. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*. NUREG-0586, NRC, Washington, D.C.

3.0 Description of NRC Licensed Reactor Facilities and the Decommissioning Process

This chapter provides information on both the operating nuclear power plants and those being decommissioned. First, a general description of the nuclear power plants and sites is provided in Section 3.1 to help the reader understand the types of reactor facilities that will be decommissioned, the location of the radioactive material in these facilities, and the structures, systems, and components (SSCs) that will be referred to later in this document and that are important in the decommissioning process. Next, the methods that are commonly used during decommissioning are described in Section 3.2. Section 3.3 addresses the decommissioning experience of the currently decommissioning plant sites, their chosen method for decommissioning, and the activities that are being used to decommission the facilities.

There are currently 22 nuclear power reactors at 21 sites that are permanently shut down: 19 of these reactors are in various stages of decommissioning, and reactors at 3 sites have finished decommissioning and no longer maintain a license. The decommissioning efforts at these 22 plants equates to over 200 equivalent years of experience decommissioning commercial power reactors since the 1988 *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, NUREG-0586 (1988 GEIS; NRC 1988) was published. There are also currently 104 nuclear plants that have a license and are either operating or have not yet certified that they have permanently ceased power operations. Between 2006 and 2035, these 104 plants will either permanently cease operations or renew their licenses. Ultimately, they will all permanently cease operations and be decommissioned.

3.1 Plants, Sites, and Reactor Systems[(a)]

Between 1957 and 1996, the U.S. Nuclear Regulatory Commission (NRC) issued 126 operating licenses for commercial power reactor operation at 80 sites. The history of and experience with the 22 reactors that are being decommissioned currently or have completed decommissioning are addressed in Section 3.3. Because each of the remaining 104 operating plants will eventually enter the decommissioning process, their attributes and characteristics are included in this section to ensure that this Supplement is appropriate for future decommissioning plants. The material presented in this section is also provided as background information for the reader.

(a) Much of the information in this section was taken from NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NRC 1996) and from NUREG-1628, *Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Reactors* (NRC 2000a). This information has been supplemented and updated as appropriate to include all operating and currently decommissioning nuclear plants.

Nuclear power reactor facilities are located in 35 of the contiguous States, with none in Alaska or Hawaii. Thirty-nine sites contain two or three nuclear power reactors (units) per site. Of the 126 plants, 98 are located east of the Mississippi River with most of the nuclear capacity located in the northeast (New England States, New York, and Pennsylvania), the midwest (Illinois, Michigan, and Wisconsin) and the southeast (Virginia, North and South Carolina, Georgia, Florida, and Alabama).

Typically, nuclear power plants are sited in flat or rolling countryside, in wooded or agricultural areas away from urban areas. Most are located on or near rivers or lakes. Several plants are located in arid regions, and 19 plants are located along the seacoast on bays or inlets. More than 50 percent of the sites have 80-km (50-mile) population densities of less than 77 persons/km^2 (200 persons/mi^2) and over 80 percent have 80-km (50-mile) densities of less than 193 persons/km^2 (500 persons/mi^2). The most notable exception is the Indian Point Station, located within 80 km (50 mi) of New York City, which has a projected 1999 population density within 80 km (50 mi) of more than 770 persons/km^2 (2000 persons/mi^2). Indian Point has one permanently shutdown reactor and two operating reactors.

Site areas range from a minimum of 34 ha (84 ac) for the San Onofre Nuclear Generating
I Station, (a three unit site, with one permanently shutdown reactor) in California to 9700 ha
I (24,000 ac) for the Turkey Point Plant in Florida (two operating units). Almost 60 percent of plant sites cover from 200 to 800 ha (500 to 2000 ac). Larger land-use areas are associated with plant cooling systems that include reservoirs, artificial lakes, and buffer areas.

Appendix F contains summary tables for both permanently shutdown and currently operating nuclear power facilities showing location, reactor type, thermal power, site area, cooling system and cooling water source, and licensing dates.

3.1.1 Types of Nuclear Power Reactor Facilities

In the United States, nearly all reactors used for commercial power generation have been conventional (thermal) light water reactors (LWRs) that use water as a moderator and coolant. The two types of LWRs are pressurized water reactors (PWRs) and boiling water reactors (BWRs). Of the 123 LWRs, 80 are PWRs and 43 are BWRs. The three plants that are not LWRs are Fermi, Unit 1, which is a permanently shutdown fast breeder reactor (FBR), and Peach Bottom, Unit 1, and Fort St. Vrain, which are permanently shutdown high-temperature
I gas-cooled reactors (HTGRs). Fermi, Unit 1, is currently performing the decontamination and

dismantlement phase of SAFSTOR (see Section 3.2). Peach Bottom, Unit 1, is in long-term storage. Fort St. Vrain has had its license terminated following completion of decommissioning activities.

Brief descriptions of these different types of reactors are given below as background.

3.1.1.1 Pressurized Water Reactors

In PWRs, water is heated to a high temperature under pressure inside the reactor. The water is then pumped in the primary circulation loop to the steam generator. Within the steam generator, water in the secondary circulation loop is converted to steam that drives the turbines. The turbines turn the generator to produce electricity. The steam leaving the turbines is condensed by water in the tertiary loop and returned to the steam generator. The tertiary loop water flows either to cooling towers, where it is cooled by evaporation or discharged to a body of water such as a river, lake, or other heat sink. The tertiary loop is open to the atmosphere, but the primary and secondary cooling loops are not (see Figure 3-1).

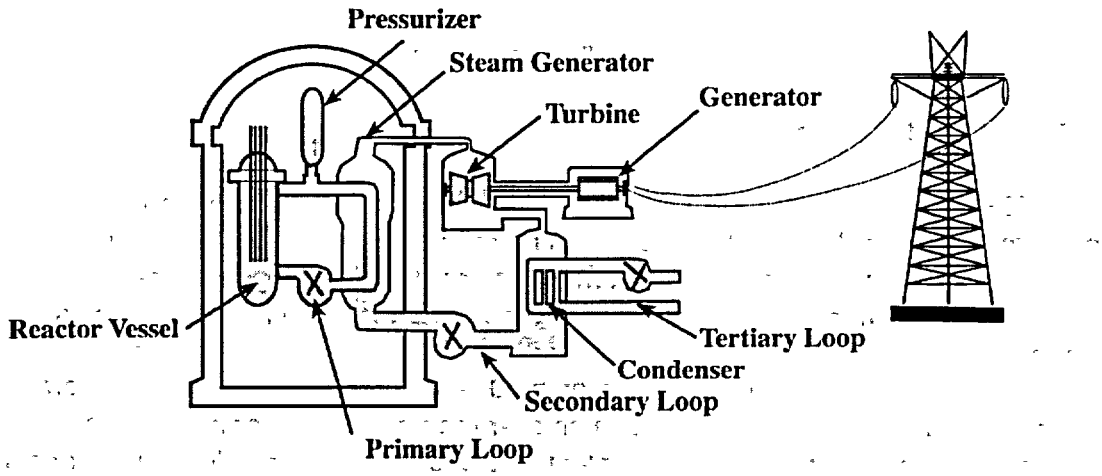

Figure 3-1. Pressurized Water Reactor

3.1.1.2 Boiling Water Reactors

The BWRs generate steam directly within the reactor vessel. The steam passes through moisture separators and steam dryers and then flows to the turbine. By generating steam directly in the reactor vessel, the power generation system contains only two heat transfer loops. The primary loop transports the steam from the reactor vessel directly to the turbine, which generates electricity. The secondary coolant loop removes excess heat from the primary

loop in the condenser. From the condenser the primary condensate proceeds into the feedwater stage and the secondary coolant loop removes the excess heat to the environment (see Figure 3-2).

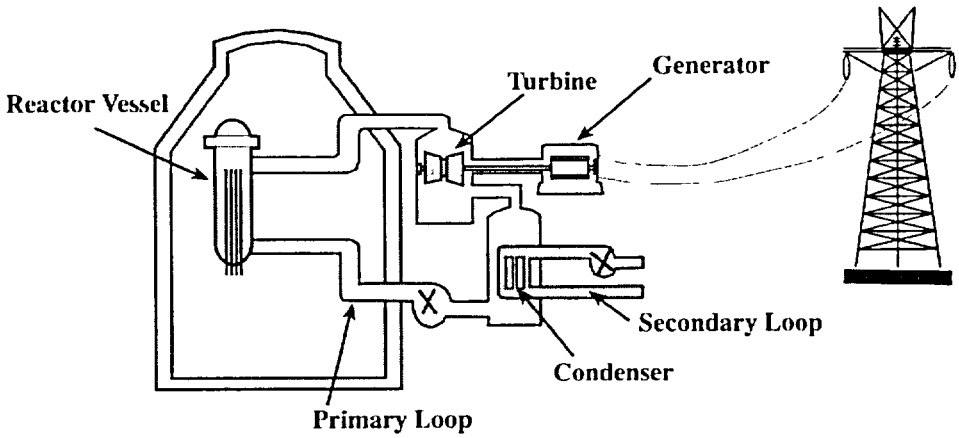

Figure 3-2. Boiling Water Reactor

3.1.1.3 Fast Breeder Reactors

In the FBR, such as Fermi, Unit 1, liquid sodium is used as the reactor coolant instead of water. The Fermi, Unit 1, FBR used the fissile isotope of uranium as fuel. During the chain reaction, while some neutrons are fissioning plutonium atoms and releasing heat energy, others are captured by uranium atoms, which are then converted into more plutonium atoms. Depending on design, a fast breeder can produce 1.4 new plutonium atoms for every one fissioned–enough to refuel another reactor in 10 years. Fast breeders also generally have a higher power density in the core (thus, a smaller reactor) and better heat transfer characteristics, which improves power-plant efficiency. The Fermi, Unit 1, reactor also utilized a steam cycle to generate electricity, similar to a PWR. However, the Fermi, Unit 1, reactor had two sodium loops. Primary-loop liquid sodium was circulated through the reactor core, where it absorbed the heat generated by the reactor, and then through a heat exchanger, where its heat was transferred to the second (intermediate) sodium loop. The intermediate-loop liquid sodium was then circulated through a steam generator. The steam produced in the steam generators was then circulated to the turbine generators to produce electricity.

At this time, there are no commercial FBRs operating or under construction in the United States. Fermi, Unit 1, is currently in SAFSTOR. The environmental impacts described in this Supplement for FBRs are applicable to Fermi, Unit 1.

3.1.1.4 High-Temperature Gas-Cooled Reactors

Commercial HTGRs, operated in the United States at Peach Bottom, Unit 1, and Fort St. Vrain, use helium gas instead of water (as in LWRs) to transfer the heat from the reactor core to produce steam. In HTGRs, the entire primary coolant system, including the reactor, the steam generators, and the helium circulators, is housed within a prestressed concrete or steel reactor vessel. The helium circulators pump the pressurized coolant through the core, where it absorbs the heat from the fission process. The helium then enters the steam generators, which transfer the heat to the secondary system. The secondary system is a steam cycle similar to that found in any modern fossil-fuel facility. Superheated steam is produced in the steam generators and routed to the turbine generator, which generates the electricity (Fuller 1988).

At this time, there are no HTGRs operating or under construction in the United States. Decommissioning at Fort St. Vrain is complete and the license is terminated, and Peach Bottom, Unit 1, is currently in SAFSTOR. The environmental impacts described in this Supplement for HTGRs are applicable to Peach Bottom, Unit 1.

3.1.2 Types of Structures Located at a Nuclear Power Facility

As discussed in Chapter 1, the definition of decommissioning includes the reduction of residual radioactivity to a level that permits release of the property and termination of the license. As a result, the decontamination and/or dismantlement of those SSCs that are radioactive are, by definition, included within the scope of this Supplement as part of decommissioning. If the structures must be decontaminated or parts of the structures removed to meet the requirements for the termination of the NRC license, those activities are also considered within scope as part of the decommissioning process. This includes removing nonradiological structures necessary to decontaminate another structure. Additionally, the impacts of dismantling all SSCs that were built or installed at the site to support power production are considered in this Supplement. This section discusses all the structures that will be referred to later in the document as background information for the reader.

Nuclear power plants generally contain similar facilities. They all contain a nuclear steam supply system, as described in Section 3.1.1 above. Additionally, there are a number of common SSCs necessary for plant operation. However, the layout of buildings and structures varies considerably among the sites. For example, control rooms may be located in the auxiliary building, in a separate control building, or in a radwaste and control building. Thus, the following list describes typical structures located on most sites.

- Containment or reactor building: The containment or reactor building in a PWR is a massive concrete or steel structure that houses the reactor vessel, reactor coolant piping and pumps, steam generators, pressurizer, pumps, and associated piping. The reactor building structure of a BWR generally includes a containment structure and a shield building. The containment is a massive concrete or steel structure that houses the reactor vessel, the reactor coolant piping and pumps, and the suppression pool. It is located inside a somewhat less substantive structure called the shield building. The shield building for a BWR also generally contains the spent fuel pool and the new fuel pool.

  The reactor building for both PWRs and BWRs is designed to withstand such disasters as hurricanes and earthquakes. The containment's ability to withstand such disasters and to contain the effects of accidents initiated by system failures are the principal protections against releasing radioactive material to the environment.

  The containment building for the FBR is a steel-domed structure that contains the upper end of the reactor vessel and the fuel-handling equipment. Below ground there is considerable concrete shielding.

  The HTGRs have two containment structures. Peach Bottom's inner containment structure is made of a steel pressure vessel and Fort St. Vrain's was made of prestressed concrete. This inner vessel houses the entire primary coolant system, the interconnecting ducts and plenums, the reactor core assembly, and the steam generator. The inner vessel is housed inside a second containment structure, which is designed to contain the entire primary coolant system helium under conditions postulated for the design basis accident.

- Fuel building: For PWRs, the fuel building has a fuel pool that is used for the storage and servicing of spent fuel and the preparation of new fuel for insertion into the reactor. This building is connected to the reactor building by a transfer tube or channel that is used to move new fuel into the reactor and to move spent fuel out of the reactor for storage.

- Turbine building: The turbine building houses the turbine generators, condenser, feedwater heaters, condensate and feedwater pumps, waste-heat rejection system, pumps, and equipment that supports those systems. Primary coolant is circulated through these systems in BWRs, thereby causing them to become slightly contaminated. Primary coolant is not circulated through the turbine building systems in PWRs. However, it is not unusual for portions of the turbine building to become mildly contaminated during power generation at PWRs.

- Auxiliary buildings: Auxiliary buildings house such support systems as the ventilation system, the emergency core cooling system, the laundry facilities, water treatment system, and waste treatment system. The auxiliary building may also contain the emergency diesel generators and, in some PWRs, the fuel storage facility. Often, the facility's control room is also located in the auxiliary building.

- Diesel generator building: Often, there is a separate building for housing the emergency diesel generators if they are not located in the auxiliary building. The emergency diesel generators do not become contaminated or activated.

- Pumphouses: Various pumphouses may be present onsite for circulating water, standby service water, or makeup water. Pumphouses that carry clean water do not require radiological decommissioning.

- Cooling towers: Cooling towers are structures that are designed to remove excess heat from the condenser without dumping the heat directly into water bodies, such as lakes or rivers. There are two principal types of cooling towers: mechanical draft towers and natural draft towers. Most nuclear plants that have once-through cooling do not have cooling towers associated with them (see the descriptions in Section 3.1.3). However, five facilities with once-through cooling also have cooling towers.

- Radwaste facilities: If the radwaste facilities are not contained in the auxiliary building, they may be located in a separate solid radwaste building. An interim radwaste storage facility may also be used.

- Ventilation stack: Many older nuclear power plants, particularly BWRs, have ventilation stacks to discharge gaseous waste effluents and ventilation air. These stacks can be 90 m (300 ft) tall or more and contain monitoring systems to ensure that radioactive gaseous discharges are below fixed release limits. Radioactive gaseous effluents are treated and processed prior to discharge out the stack.

The following structures may also be part of the nuclear reactor facility but are not evaluated in this Supplement.

- Independent spent fuel storage installations (ISFSI): An ISFSI is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. ISFSIs may be located at the site of a nuclear power plant or at another location. The most common design for an ISFSI, at this time, is a concrete pad with dry casks containing spent fuel bundles. ISFSIs are used by operating plants that require increased spent fuel storage capability because their spent fuel pools have reached

capacity. Decommissioning facilities also use ISFSIs. The first dry-storage installation was licensed by the NRC in 1986. As of August 21, 2002, there were 23 nuclear power facilities licensed to use dry storage: Surry, Oconee, H.B. Robinson, Calvert Cliffs, Fort St. Vrain, Palisades, Point Beach, Prairie Island, Davis-Besse, Susquehanna, Arkansas Nuclear One, North Anna, Trojan, Dresden, Hatch, McGuire, Oyster Creek, Peach Bottom, Yankee Rowe, Fitzpatrick, Rancho Seco, Maine Yankee, and U.S. Department of Energy (DOE [TMI-2 fuel debris]) at Idaho National Engineering and Environmental Laboratory.

An ISFSI can be constructed and operated and decommissioned either under the same license that is used for the operating or decommissioning facility called a general license under 10 CFR Part 50 or a specific license under 10 CFR Part 72 license. If a licensee chose to operate the ISFSI under a Part 50 license, it could, seek a site-specific 10 CFR Part 72 license for the ISFSI, thus allowing termination of the Part 50 license at the end of the decommissioning process. The NRC staff would also be required to conduct an environmental assessment of the licensee's request for a site-specific 10 CFR Part 72 license.

- Switchyard: A plant site also contains a large switchyard, where the electric voltage is stepped up and fed into the regional power distribution system. The switchyard is an integral part of the electric power transmission grid, and may remain on the site even after termination of the license.

- Administrative, training, and security buildings: Normally, the administrative, training, and security buildings are located outside the radiation protection zones, and no radiological hazards are present.

3.1.3 Description of Systems

After permanent cessation of operations and transfer of the fuel from the reactor vessel, licensees begin to shut down systems that are no longer operated in a decommissioning plant. However, specific systems will continue to be used during the different phases of the decommissioning process although in some cases in reduced roles. This section provides background information related to the systems, explains the differences between the systems' use during operations and during the decommissioning process, and explains how their continued operation could impact the environment during the decommissioning process. Lobner et al. (1990) provides more comprehensive descriptions of these systems in U.S. commercial LWRs. The systems described below are typical and may differ at specific facilities.

- Cooling and auxiliary water systems: The predominant water use at an operating nuclear power plant is for removing excess heat generated in the reactor by the condenser cooling system. The quantity of water that is used for condenser cooling in an operating plant is a function of several factors, including the capacity rating of the plant and the increase in cooling water temperature from the discharge to the intake. The cooling water system for the reactor is not operated after the facility has permanently ceased power operations and the fuel has been removed from the reactor vessel. Therefore, water use is greatly reduced when operations cease. However, systems are not immediately drained upon cessation of operation and are frequently left in place for a period of time to provide shielding to the workers.

  There are two major types of cooling systems for operating plants: once-through cooling and closed-cycle cooling.

  In a once-through cooling system, circulating water for condenser cooling is obtained from an adjacent body of water, such as a lake or river, passed through the condenser tubes, and returned at a higher temperature to the adjacent body of water. Flow through the condenser for a 1000-MW plant during operations is typically 45 to 65 m^3/s (700,000 to 1,000,000 gpm) (NRC 1996). The waste heat is dissipated to the atmosphere mainly by evaporation from the water body and, to a much smaller extent, by conduction, convection, and thermal radiation loss.

  In a closed-cycle system at an operating plant, the cooling water is recirculated through the condenser after the waste heat is removed by dissipation to the atmosphere, usually by circulating the water through large cooling towers constructed for that purpose. The average for makeup water withdrawals for a 1000-MW plant during operations is typically about 0.9 to 1.1 m^3/s (14,000 to 18,000 gpm). Recirculating cooling systems consist of either natural draft or mechanical draft cooling towers, cooling ponds, lakes, or canals. Because the predominant cooling mechanism associated with closed-cycle systems is evaporation, most of the water used for cooling is consumed and is not returned to the water source.

  In addition to removing heat from the reactor of an operating facility, cooling water is also provided to the service water system and to the auxiliary water system. These systems account for 1 to 15 percent of the water needed for the condenser cooling. The auxiliary water systems include emergency core cooling systems, the containment spray and cooling system, the emergency feedwater system, the component cooling water system, and the spent fuel pool water systems. Most of these systems would not be needed following permanent cessation of operations. However, some, such as the systems for the spent fuel pool cooling, will be used after the plant has shut down.

- Waste systems (gaseous, liquid, solid, and nonradioactive): The gaseous waste management system in an operating nuclear facility collects fission products, mainly noble gases, that accumulate in the primary coolant. It is designed to reduce the radioactive material in gaseous waste before discharge to meet the dose design objectives in 10 CFR Part 50, Appendix I. During decommissioning, the gaseous waste management system is used during the decontamination and dismantlement of certain tanks or pipes. It is also used during dismantlement to assist in the control of radioactive dust or loose contamination. In addition, high-efficiency particulate air (HEPA) filters are used to remove radioactive material on a localized basis. For example, when removing concrete with a power hammer or drill in the containment building, a temporary plastic tent equipped with a HEPA filter, prevents contaminated dust particles from entering the building. A second set of HEPA filters is located on the exhaust vent pathway for the building. The quantities of gaseous effluents released from operating plants and those in the decommissioning process are controlled by the administrative limits that are defined in the Offsite Dose Calculation Manual (ODCM) or similar document, which is specific for each plant. The limits in the ODCM are designed to provide reasonable assurance that radioactive material discharged in gaseous effluents are not in excess of the limits specified in 10 CFR Part 20, Appendix B, thereby limiting the exposure of a member of the public in an unrestricted area.

  The liquid radioactive waste system in operating nuclear power plants is used to collect and process liquid wastes collected from equipment leaks, valve and pump seal leaks, laundry wastes, personnel and equipment wastes, and steam generator blowdown (for PWRs), as well as building, laboratory, and floor drains. Each of these sources of liquid wastes receives varying degrees and types of treatment before storage, reuse, or discharge to the environment. During decommissioning, any radioactive liquids from operation of decommissioning activities in the facility will be processed and disposed of, thus necessitating the use of the liquid radioactive waste system. Some systems such as the laundry will likely still operate for a period of time, but others like the steam generator blowdown will not. Controls for limiting the release of radiological liquid effluents are described in the facility's ODCM. Controls are based on (1) concentrations of radioactive materials in liquid effluents and projected dose or (2) dose commitments to a member of the public. Concentrations of radioactive material that may be released in liquid effluents to unrestricted areas are limited to the concentration specified in 10 CFR Part 20, Appendix B, Table 2.

  Solid low-level waste (LLW) from nuclear power plants is generated by removal of radionuclides from liquid waste streams, filtration of airborne gaseous emissions, and removal of contaminated material. The major source of solid LLW during decommissioning is the decommissioning process itself. Removal of contamination involves the use of protective clothing and cleaning rags. Dismantlement results in concrete or metal that has

low levels of contamination or activation products. While the amount of liquid and gaseous radioactive waste generated is usually lower for decommissioning plants than for operating plants, the quantity of solid LLW being generated is significantly higher during decommissioning.

Solid waste is packaged in containers to meet the applicable requirements of 49 CFR Parts 171 through 177. Disposal and transportation are performed in accordance with the applicable requirements of 10 CFR Part 61 and 10 CFR Part 71, respectively.

Solid radioactive waste generated during either decommissioning or operations is usually shipped to a LLW processor or, in some cases, directly to a LLW disposal site. Volume reduction may occur both onsite and offsite. The most common onsite volume reduction techniques are high-pressure compacting in waste drums, dewatering and evaporating wet wastes, monitoring waste streams to segregate wastes, and sorting. Offsite waste management vendors compact wastes at ultra-high pressures, incinerate dry active waste, separate and incinerate oily and organic wastes, and asphalt-solidify resins and sludges before the waste is sent to the LLW site.

Nonradioactive wastes, including storm water system and sewage waste, are also generated during the decommissioning process. For example, use of hazardous oils or other chemicals in solvent cleaning and repair of equipment produces some nonradioactive wastes. Also, during decommissioning, additional quantities of nonradioactive waste (paint, asbestos) are generated or removed. Disposal of essentially all of the hazardous chemicals used at nuclear power plants is regulated by the Resource Conservation and Recovery Act (RCRA) of 1976 or by National Pollutant Discharge Elimination System (NPDES) permits, which are regulated by the U.S. Environmental Protection Agency (EPA) and administered by EPA, or if authorized, by the States to control the amount and types of pollutants that may be discharged from the plant.

Mixed waste is regulated under RCRA, the Atomic Energy Act, and NRC and is sent to a facility that is licensed to handle mixed waste.

- Miscellaneous mechanical systems: A variety of existing plant mechanical systems may continue to be used during plant decommissioning, including
  - the fire protection system
  - the heating, ventilation, and air conditioning (HVAC) system

- the fuel-handling system
- various cranes and hoists.

The use of these systems generally does not have a direct impact on the environment. For example, the HVAC system that is used inside a contaminated area would be exhausted to the gaseous waste management system.

- Instrumentation and control systems: While most instrumentation and control systems in the plant can be deactivated after permanent shutdown and defueling of the reactor, a few may continue to be used to support decommissioning operations, including:
  - the radiation monitoring system, which detects, measures, and records radiation levels during decommissioning operations and alerts plant staff of off-normal readings, and
  - the security system, which monitors the plant protected area to prevent uncontrolled access.

  In most cases, these systems are altered or reduced during the decommissioning process. The use of these systems during the decommissioning process does not impact the environment.

- Electrical systems: Numerous electrical systems may continue to be used during decommissioning operations. These include systems needed to provide uninterrupted power, lighting, and communication. In some cases, licensees have installed a new power distribution system, re-energizing only those loads that are necessary for continued use during decommissioning. In many facilities, the circuits that are being used are color-coded so that workers can easily identify the live circuits. Both of these practices are intended to prevent workers from cutting into a live wire during the decommissioning process.

- Spent fuel storage systems: Before beginning the decommissioning process, the licensee must certify to the NRC that it has permanently removed the fuel from the reactor vessel. The fuel is first moved into the spent fuel pool, which is a specially designed water-filled basin. Even after the nuclear reactor is shut down, the fuel continues to generate decay heat from the radioactive decay of fission products. The rate at which the decay heat is generated decreases the longer the reactor has been shut down. Therefore, the longer the time from last criticality, the less heat the spent fuel gives off. Storing the spent fuel in a pool of water provides an adequate heat sink for the removal of heat from the irradiated fuel. In addition, the fuel is located far enough under water that the radiation emanating from the fuel is shielded by the water, thus protecting workers from the radiation. After the

fuel has cooled adequately, it can be stored in an ISFSI in air-cooled dry casks. Typically, transfer of spent fuel to an ISFSI occurs after the fuel has cooled for 5 years.

After removal of the fuel to the spent fuel pool, it is common for the licensee to reduce the security area at the facility to a "nuclear island" that focuses primarily on the storage area for the spent fuel. This allows the spent fuel to be protected and the security system to cover only the storage location for the spent fuel.

At this time, there are no facilities for permanent disposal of high-level radioactive wastes (HLW). The Nuclear Waste Policy Act of 1982 defined the goals and structure of a program for permanent, deep geologic repositories for HLW and unreprocessed spent fuel. Under this Act, the DOE is responsible for developing permanent disposal capacity for the spent fuel and other high-level nuclear wastes. At the present time, DOE, as directed by Congress, is investigating a site in Yucca Mountain, Nevada, for a possible disposal facility. A HLW repository would be built and operated by DOE and licensed by the NRC.

The Commission believes (10 CFR 51.23(a)) there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st Century and that, within 30 years beyond the licensed life of operation for any reactor, sufficient repository capacity will be available to dispose of the reactor's HLW and spent fuel generated up to that time.

Until a HLW repository is available or some interim central waste storage facility is approved and licensed, licensees generally store the fuel onsite, either in dry storage (ISFSI) or in wet storage in a spent fuel pool. Licensees are prohibited from shipping spent fuel from one reactor spent fuel pool to another without NRC approval by license amendment.

The Commission has independently, in a separate proceeding (the Waste Confidence Proceeding), made a finding that there is

> reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations (54 FR 39767).

The Commission has committed to review this finding at least every 10 years. In its most recent review, the Commission concluded that experience and developments since 1990 were not such that a comprehensive review of the Waste Confidence Decision was necessary at this time (64 FR 68005). Accordingly, the Commission reaffirmed its findings

of insignificant environmental impacts cited above. This finding is codified in the Commission's regulations at 10 CFR 51.23(a). The staff relies on the Waste Confidence Rule, but for completeness has elected to include in this Supplement information related to the storage and maintenance of fuel in a spent fuel pool.

- Transportation systems: There are four broad classes of shipments to and from operating nuclear power plants: (1) routinely generated LLW transported from plants to disposal facilities, (2) routine LLW shipped to offsite facilities for volume reduction, (3) nuclear fuel shipments from fuel-fabrication facilities to plants for loading into reactors, and (4) spent fuel shipments to other nuclear power plants with available storage space (an infrequent occurrence that is usually limited to plants owned by the same utility).

  The transportation of radioactive materials is regulated jointly at the Federal level by the U.S. Department of Transportation (DOT) and the NRC. The responsibilities of the two agencies are delineated in a Memorandum of Understanding (see 44 FR 38690). Most LLW is shipped in packages authorized by the DOT. Some packages for larger quantities of LLW require NRC certification. The LLW packages can be loaded onto trucks, trains, barges, or other ships for shipment to the LLW disposal site. In general, the areas regulated by the agencies are as follows:

  - DOT – Regulates shippers and carriers of radioactive material and the conditions of transport, including routing, tiedowns, radiological controls, vehicle requirements, hazard communication, handling, storage, emergency response information, and employee training. DOT regulations are located in the Code of Federal Regulations, Title 49, "Transportation."

  - NRC – Regulates users of radioactive material and the design, construction, use, and maintenance of shipping containers used for larger quantities of radioactive material and fissile material such as uranium. NRC regulations are located in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

  Title 10 CFR 71.47 states that under normal transportation conditions, each package of radioactive materials must be designed and prepared for shipment such that the radiation level does not exceed 2 mSv/h (200 mrem/h) at any point on the external surface of the package and 0.1 mSv/h (10 mrem/h) at any point 1 m (3.3 ft) from the packaging surface. This type of shipment is called a nonexclusive use shipment. If the package exceeds the limits specified for nonexclusive use shipments, it must be transported by exclusive use shipment only. The radiation limits for exclusive use packages are the following:

- At any point on the package surface: 2 mSv/h (200 mrem/h). For closed transport vehicle only: 10 mSv/h (1000 mrem/h)
- At 2 m (6.6 ft) from lateral surfaces of vehicle: 0.1 mSv/h (10 mrem/h)
- At all external surfaces of the vehicle: 2 mSv/h (200 mrem/h)
- In the occupied area of the vehicle: 0.02 mSv/h (2 mrem/h), with certain exceptions.

For more information regarding waste packaging and radioactive transportation regulations, see 10 CFR Part 71.

The frequency of waste shipments increases sharply during the decommissioning period. In some cases, such as the shipment of large components (e.g., steam generators, reactor vessels, or pressurizers), the waste packaging is unique compared to most shipments during operations. However, the licensee is still required to meet the regulations discussed above, unless the NRC approves an exemption after a thorough analysis of the licensee's proposal.

3.1.4 Formation and Location of Radioactive Contamination and Activation in an Operating Plant

During reactor operation, a large inventory of radioactive fission products builds up within the fuel. Virtually all of the fission products are contained within the fuel pellets. The fuel pellets are enclosed in hollow metal rods, which are hermetically sealed to prevent further release of fission products. Occasionally fuel rods develop small leaks, allowing a small fraction of the fission products to contaminate the reactor coolant. The radioactive contamination in the reactor coolant is the source of gaseous, liquid, and solid radioactive wastes generated at LWRs during operation. Most of the contamination in the reactor coolant system is from the activation of corrosion products and not from leaking fuel.

There are two sources of radioactive material: contamination and activation. Contaminated materials are unintentionally transported through the facility by workers, equipment, and, to some degree, air movement. Although many precautions are taken to prevent the movement of contaminated material in a nuclear facility and to clean up any contaminated materials that may be found, it is likely that contamination will occur in the reactor building, around the spent fuel pool, and around specific SSCs in the auxiliary building and other buildings and equipment in the area near the reactor. The areas known to contain contamination are labeled by the licensee, who routinely checks for contamination and removes as much as possible during operations. Radioactive contamination may be deposited from the air or dissolved in water and subsequently deposited onto material such as concrete. Radioactive contamination is generally

located on or near the surface of materials such as metals, high-density concrete, or painted walls. It can travel farther into unpainted surfaces or lower-density concrete. Radioactive contamination can usually be removed from surface areas by washing, scrubbing, spraying, or, in extreme cases, by physically removing the outer layers of the surface material.

Activation products are also formed during reactor operation. Activation products are radioactive materials created when stable substances are bombarded by neutrons. Concrete and steel surrounding the core of the reactor are the most common types of activated products. Activation products cannot be removed by the processes used to remove contamination. Activation products are incorporated into the molecular structure of the material and cannot be wiped off or removed. The entire structure (or portions) that have been activated must be removed and treated as radioactive waste. Activated metal and concrete contain the single largest inventory of radionuclides with the exception of the spent fuel, in facilities that are being decommissioned. The radioactive decay of activation products, both of structures as well as corrosion products, is the main source of radiation exposure to plant personnel.

The spent fuel contains the largest amount of radioactive material at a permanently shutdown facility followed by the reactor vessel, internals, and bioshield. Systems containing smaller amounts of radioactive material include the steam generator, pressurizer, piping of the primary system and other systems, piping, as well as the radwaste systems. Minor contamination is found in the secondary systems and miscellaneous piping.

3.2 Decommissioning Options

This Supplement evaluates the environmental impacts of three decommissioning options or combinations of the options. These options, first identified in the 1988 Generic Environmental Impact Statement (GEIS) using the acronyms DECON, SAFSTOR, and ENTOMB, are defined as follows:

DECON: The equipment, structures, and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.

SAFSTOR: The facility is placed in a safe, stable condition and maintained in that state (safe storage) until it is subsequently decontaminated and dismantled to levels that permit license termination. The determination of SAFSTOR includes those activities necessary for the final decontamination and dismantlement of the facility. During SAFSTOR, a facility is left intact, but the fuel has been removed from the reactor vessel, and radioactive liquids have been drained from systems and components and then processed. Radioactive decay

occurs during the SAFSTOR period, thus reducing the quantity of contaminated and radioactive material that must be disposed of during decontamination and dismantlement. The definition of SAFSTOR also includes the decontamination and dismantlement of the facility at the end of the storage period.

ENTOMB: Radioactive SSCs are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

The choice of decommissioning option is left entirely to the licensee, provided that it can be performed according to the NRC's regulations. This choice is communicated to the NRC and the public in the post-shutdown decommissioning activities report (PSDAR). In addition, the licensee may choose to combine the DECON and SAFSTOR options. For example, after power operations cease at a facility, a licensee could use a short storage period for planning purposes, followed by removal of large components (such as the steam generators, pressurizer, and reactor vessel internals), place the facility in storage for 30 years, and eventually finish the decontamination and dismantlement process.

Although the selection of the decommissioning option is up to the licensee, the NRC requires the licensee to re-evaluate its selection if the option (1) could not be completed as described, (2) could not be completed within 60 years of the permanent cessation of plant operations, (3) included activities that would endanger the health and safety of the public by being outside of the NRC's health and safety regulations, or (4) would result in a significant impact to the environment.

To date, most utilities have used DECON or SAFSTOR to decommission reactors. Several sites have performed some incremental decontamination and dismantlement during the storage period of SAFSTOR, a combination of SAFSTOR and DECON. A site using DECON may have a short period of time (1 to 4 years) when the facility is in SAFSTOR. Several licensees continue to conduct limited decommissioning activities during a SAFSTOR period as personnel, money, or other factors become available. This process of occasionally conducting active decontamination and dismantlement is referred to as incremental DECON. No utilities have used the ENTOMB option for a commercial nuclear power reactor.

The following sections provide a general overview of each decommissioning option.

3.2.1 DECON

The DECON decommissioning option involves removing or decontaminating equipment, structures, and portions of the facility and site that contain radioactive contaminants to a level that permits termination of the license, as defined in Regulatory Guide 1.184 (NRC 2000a).

There are several advantages to using the DECON option of decommissioning. One is that the facility license is quickly terminated so that the facility and site become available for other purposes. By beginning the decontamination and dismantlement process soon after permanent cessation of operation, the available work force can be maintained and is highly knowledgeable about the facility. The availability of facilities willing to accept LLW may also be a factor in the licensee's decision to pursue the DECON option. Currently, the estimated cost of decommissioning a site using DECON is less than SAFSTOR due primarily to price escalation in the disposal of LLW. Because most activities that occur during DECON also occur during SAFSTOR, the price for decommissioning at a later date is greater because of the cost of storage and inflation (NRC 2000c). DECON also eliminates the need for long-term security, maintenance, and surveillance of the facility (excluding the onsite storage of spent fuel), which is required for the other decommissioning options.

The major disadvantages of DECON are the higher worker dose and significant initial expenditures. Also, compared to SAFSTOR, DECON requires a larger potential commitment of disposal site space (NRC 2000c).

The general activities that may occur during DECON are listed below (NRC 2000d):

- draining (and potentially flushing) of some contaminated systems and removal of resins from ion exchangers
- setup activities such as establishing monitoring stations or designing and fabricating special shielding and contamination-control envelopes to facilitate decommissioning activities
- reduction of site-security area (setup of new security monitoring stations)
- modification of the control room or establishing an alternate control room
- site surveys
- decontamination of radioactive components, including use of chemical decontamination techniques

- removal of reactor vessel and internals
- removal of other large components, including major radioactive components
- removal of the balance of the primary system (charging system, boron control system, etc.)
- general activities related to removing other significant radioactive components
- decontamination and/or dismantlement of structures or buildings
- temporary onsite storage of components
- shipment and processing of LLW, including compaction or incineration of the waste
- removal of the spent fuel and Greater-than-Class-C (GTCC) Waste to an ISFSI
- removal of hazardous radioactive (mixed) wastes
- changes in management and staffing.

3.2.2 SAFSTOR

The SAFSTOR decommissioning option involves placing the facility in a safe, stable condition and maintaining that state for a period of time, followed by subsequent decontamination and dismantlement to levels that permit license termination. During the storage period of SAFSTOR, the facility is left intact. The fuel has been removed from the reactor vessel and radioactive liquids have been drained from systems and components and processed. Radioactive decay occurs during the storage period, reducing the quantity of contaminated and radioactive material that must be disposed of during decontamination and dismantlement.

There are several advantages to using the SAFSTOR option of decommissioning. A substantial reduction in radioactive material as a result of radioactive decay during the storage period reduces worker and public doses below those of the DECON alternative. Since there is potentially less radioactive waste, less waste-disposal space is required. Moreover, the costs immediately following permanent cessation of operations are lower than costs during the first years of DECON because of reduced amounts of activity and a smaller work force (NRC 2000c).

However, because of the time gap between cessation of operations and decommissioning activities, SAFSTOR can result in a shortage of personnel familiar with the facility at the time of dismantlement and decontamination. During the prolonged period of storage, the plant requires continued maintenance, security, and surveillance. Also, uncertainties regarding the availability and cost of LLW sites in the future could mean higher costs for decontamination and dismantlement (NRC 2000c).

Activities that typically occur during the preparation and storage stages of the SAFSTOR process are described below (NRC 2000d).

<u>During preparation</u>:

- draining (and potential flushing) of some systems and removal of resins from ion exchangers
- spent fuel pool cooling systems reconfiguration
- decontamination of highly contaminated and high dose areas as necessary
- performance of a radiological assessment as a baseline before storage
- removal of LLW that is ready to be shipped
- shipment and processing or storage of the fuel and GTCC waste
- de-energizing or deactivating systems and equipment
- reconfiguration of ventilation systems, fire protection systems, and spent fuel pool cooling system for use during storage
- establishment of inspection and monitoring plans for use during storage
- maintenance of any systems critical to final dismantlement during storage
- changes in management and staffing.

<u>During storage</u>:

- performance of preventative and corrective maintenance on plant systems that will be operating and/or functional during storage

- maintenance to preserve structural integrity
- maintenance of security systems
- maintenance of radiation effluent and environmental monitoring programs
- processing of any radwaste generated (usually small amounts).

Following the storage period, the facility is decontaminated and dismantled to radiological levels that allow termination of the license. Activities during this period of time will be the same activities that occur for DECON.

3.2.3 ENTOMB

The ENTOMB decommissioning method was defined in the Supplementary Information to the 1988 Decommissioning Rule (53 FR 24018) as the option in which radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombed structure is appropriately maintained and surveillance is continued until the radioactivity decays to a level permitting unrestricted release of the property (NRC 1988).

Currently, 10 CFR 50.82 (a)(3) requires that decommissioning be completed within 60 years of permanent cessation of operations, and completion of decommissioning beyond 60 years be approved by the NRC only when necessary to protect public health and safety. The factors that could be considered by the Commission in evaluating an option that provides for the completion of decommissioning beyond 60 years of permanent cessation of operation include unavailability of waste disposal capacity and site-specific factors affecting the licensee's capability to carry out decommissioning, including the presence of other nuclear facilities at the site.

The current regulations, pertaining to the decommissioning of nuclear reactors promulgated in 1988, are also structured to favor decommissioning options that result in unrestricted release of the site. As noted in the supplementary information for the June 27, 1988, final rule, the ENTOMB option was not specifically precluded because it was recognized that it might be an allowable option for protecting public health and safety.

The 1997 Rule for Radiological Criteria for License Termination (64 FR 39058) established criteria (10 CFR Part 20, Subpart E) that allow for both restricted and unrestricted release of property. Under a restricted release, the dose to the average member of the critical group must not exceed 0.25 mSv/yr (25 mrem/yr) total effective dose equivalent (TEDE) and must be as low as reasonably achievable (ALARA) with the restrictions in place. If the restrictions were no longer in effect, the dose due to residual radioactivity could not exceed 1 mSv/yr (100 mrem/yr)

(or 5 mSv/yr [500 rem/yr], if additional conditions are met) TEDE and must be ALARA. These caps were chosen to provide a safety net in the highly unlikely event that the restrictions failed.

In the Staff Requirements Memorandum on the ENTOMB option, dated July 20, 2000 (NRC 2000b), the Commission directed that

> [T]he staff closely coordinate this rulemaking effort for this rulemaking with the ongoing efforts to update the generic environmental impact statement for the decommissioning of power reactors. The staff should include the entombment option in the GEIS recognizing that not all entombment proposals can be forecast but that the GEIS would provide a bounding analysis. The staff should also address the issue of entombing Greater Than Class C waste for this category of waste.

On September 18, 2001, the Commission approved the staff's rulemaking plan (see Section 2.2.2) for potential development of a rule to allow entombment as a decommissioning option for power reactors. NRC published an Advance Notice of Proposed Rulemaking (ANPR) on October 16, 2001 (66 FR 52551) seeking stakeholder input on three proposed regulatory options and whether entombment was a viable decommissioning alternative. The ANPR comment period closed on December 31, 2001. NRC received 19 comments from: six States; eight licensees; the Nuclear Energy Institute (NEI); the U.S. Environmental Protection Agency (EPA); the Conference of Radiation Control Program Directors' E-24 Committee on Decommissioning and Decontamination (CRCPD E-24 Committee); the Southeast Compact Commission (SCC); and a private individual.

Generally, the eight utilities and NEI stated that they would have entombment available as a decommissioning option; however, none unequivocally committed to using entombment for their decommissioning process. Some Agreement State commenters endorsed the 10 CFR Part 20 dose limits, with one State adding that a time limit to reach the dose rates should be considered. Although one State advocated extending the decommissioning period beyond 60 years, most were silent on the decommissioning regulations in 10 CFR Part 50. The staff notes that there was no consensus on a preferred option. NRC staff has considered the comments received and has prepared a paper transmitting the staff's recommendations to the Commission. As of the date of this publication the Commission has not acted on the staff's recommendations.

The assessment of impacts associated with the ENTOMB option presented in this GEIS is independent of a prospective rulemaking before the Commission. The staff is making the assumption that environmental issues arising from any rulemaking effort will be addressed in the rulemaking and its supporting environmental documentation. These issues may include: (1) the long-term onsite retention of radioactive materials, including those that may be classified

as GTCC, (2) issues related to long-term NRC oversight and monitoring requirements, (3) durability of institutional controls and site-engineered barriers, and (4) site-specific requirements.

The purpose of the entombment process is to isolate the entombed radioactive waste so that the reactor facility can be released and the license terminated. Therefore, prior to entombment, (1) an accurate characterization of the radioactive materials that are to remain is needed, and (2) the adequacy of the entombment configuration to isolate the entombed radioactive waste must be determined. Because of the requirement in the regulation to complete decommissioning within 60 years, no licensee has proposed the use of ENTOMB as the preferred decommissioning option for any of the nuclear power reactors currently undergoing decommissioning. The staff can envision a large number of entombment scenarios arranged along a continuum, differing primarily on the amount of decontamination and dismantlement done prior to the actual entombment.

The staff evaluated the impacts associated with the entombment options by developing two scenarios that have been designated ENTOMB1 and ENTOMB2. These two scenarios were developed specifically to envelope a wide range of potential options by describing two possible extreme cases of entombment. ENTOMB1 assumes significant decontamination and dismantlement and removal of all contamination and activation involving long-lived radioactive isotopes prior to entombment. ENTOMB2 assumes significantly less decontamination and dismantlement, significantly more engineered barriers, and the retention onsite of long-lived radioactive isotopes. Both options assume that the spent fuel would be removed from the facility and either transported to a permanent HLW repository or placed in an onsite ISFSI. Licensees choosing ENTOMB will adapt the entombment option to fit their specific site requirements.

ENTOMB1 is envisioned by the staff to begin the decommissioning process in a manner similar to the DECON option. The reactor would be defueled and the fuel initially placed into the spent fuel pool for some period prior to disposal at a licensed HLW repository or placed in an onsite ISFSI. Any decommissioning activity would be preceded by an accurate radiological characterization of SSCs throughout the facility. Active decommissioning would begin with draining and decontamination of SSCs throughout the facility with the goal of isolating and fixing contamination. SSCs would either be decontaminated or removed and either shipped to a LLW burial site or placed inside the reactor containment building. Offsite disposal of resins and considerable amounts of contaminated material would occur. There would likely be a chemical decontamination of the primary system. The reactor pressure vessel (RPV) and reactor internals would be removed, either intact or after sectioning, and disposed of offsite.

Any other SSCs that have long-lived activation products would be removed. Interim dry storage of the vessel, vessel internals, and any other SSCs containing long-lived activation products could occur onsite until a final disposal site for this waste (predominately GTCC waste) is identified. Steam generators and the pressurizer, depending on whether or not the components are contaminated with long-lived radioisotopes, would either be removed and disposed of offsite or retained inside the reactor containment. The spent fuel pool would be drained and decontaminated. The reactor building or containment would then be filled with SSCs

contaminated with relatively short-lived isotopes from the balance of the facility. Material would be placed in the building in a manner that would minimize the spread of any contamination (i.e., dry, contamination fixed, isolated). Engineered barriers would be put in place to deny access and eliminate the possibility of the release of any contamination to the environment. The reactor building or containment would be sealed and made weather tight.

The license termination monitoring program would be submitted and the site would be characterized. A partial site release would be completed for almost all of the site and the balance of the plant. The staff makes no assumptions as to when the license would be terminated and whether it would be terminated under the restricted or unrestricted provisions of 10 CFR Part 20, Subpart E. These decisions would likely be addressed as part of the staff's rulemaking effort related to entombment, explained above. The staff does assume that there would be a monitoring program period as long as 20 to 30 years to demonstrate that there was isolation of the contamination and adequate permanence of the structure.

The general activities that would occur during ENTOMB1 are listed below:

- planning and preparation activities
- draining (and potentially flushing) of contaminated systems and removal of resins from ion exchangers
- reduction of site-security area (optional)
- deactivation of support systems
- decontamination of radioactive components, including use of chemical decontamination techniques
- removal of the reactor vessel and internals
- removal of other large components, including major radioactive components

- removal of fuel from the spent fuel pool to an ISFSI
- dismantlement of remaining radioactively contaminated structures and placement of the dismantled structures in the reactor building
- installation of engineered barriers and other controls to prevent inadvertent intrusion and dispersion of contamination outside of the entombed structure
- filling of the void spaces in the previous reactor building structure with grout (concrete).

ENTOMB2 is also envisioned by the staff to begin the decommissioning process in a manner similar to the DECON option. The reactor would be defueled and the fuel initially placed into the spent fuel pool for some period prior to disposal at a licensed HLW repository or placed in an onsite ISFSI. Any decommissioning activity would be preceded by an accurate radiological characterization of SSCs throughout the facility. Active decommissioning would begin with the draining and decontamination of SSCs throughout the facility with the goal of isolating and fixing contamination. The spent fuel pool would be drained and decontaminated. SSCs would either be decontaminated or removed and either shipped to a LLW burial site or placed inside the reactor containment building (PWR) or the reactor building (BWR). Disposal offsite of resins would occur. The primary system would be drained, the RPV filled with contaminated material, all penetrations sealed, the RPV head reinstalled, and the reactor vessel filled with low-density concrete. Reactor internals would remain in place. Emphasis would be placed on draining and drying all systems and components and fixing contamination to prevent movement, either by air or liquid means. The steam generators and pressurizer would be laid up dry and remain in place. The reactor building or containment would then be filled with contaminated SSCs from the balance of the facility. Material would be placed in the building in a manner that would minimize the spread of any contamination (i.e., dry, contamination fixed, isolated).

Engineered barriers would be put in place to deny access and eliminate the possibility of the release of any contamination to the environment. The ceiling of the containment or reactor building, in the case of BWRs, may be lowered to near the refueling floor and to the top of the pressurizer for PWRs. The cavity of the remaining structure would be filled with a low-density concrete. The resulting structure would be sealed and made weather tight and covered with an engineered cap designed to deny access, and prevent the intrusion of water or the release of radioactive contamination to the environment.

The license termination monitoring program would be submitted and the site would be characterized. A partial site release would be completed for almost all of the site and the balance of the plant. The license would be likely terminated under the restricted release

provisions of 10 CFR Part 20, Subpart E, after a site-monitoring program that demonstrates the isolation of the contamination and the permanence of the structure. Monitoring could be as long as 100 years.

The general activities that would occur during ENTOMB2 are listed below:

- planning and preparation activities
- draining (and potentially flushing) of contaminated systems and removal of resins from ion exchangers
- deactivation of support systems
- removal of fuel from the spent fuel pool to an ISFSI
- dismantlement of all radioactively contaminated structures (other than the reactor building) and placement of the dismantled structures in the reactor building
- potentially lowering of the ceiling of the reactor building to near the refueling floor (in BWRs) or near the top of the pressurizer (in PWRs)
- installation of engineered barriers and other controls to prevent inadvertent intrusion and dispersion of contamination outside of the entombed structure
- filling of the cavity of the reactor building structure with low-density concrete
- placement of an engineered cap over the entombed structure to further isolate the structure from the environment.

The advantages of both ENTOMB options are reduced public exposure to radiation due to significantly less transportation of radioactive waste to an LLW disposal site and corresponding reduced cost of LLW disposal. An additional advantage of ENTOMB2 is related to the significant reduction in the amount of work activity, and thus a significant reduction in occupational exposures, as compared to the DECON or SAFSTOR decommissioning options.

3.3 Summary of Plants That Have Permanently Ceased Operations

Twenty-two of the commercial nuclear reactors licensed by the NRC have permanently shut down and have had their licenses terminated or are currently being decommissioned. This section presents the significant characteristics of these plants, the decommissioning options being used by each plant, and each plant's decommissioning activities.

3.3.1 Plant Sites

An overview of the shutdown plants can be found in Table 3-1, which includes 22 units shut down between 1963 and 1997. Table 3-2 summarizes important characteristics of the shutdown plants. The thermal power capabilities of the reactors ranged from 23 to 3411 MW(t). The reactors operated from just a few days (Shoreham) to 33 years (Big Rock Point). Since 1987, an average of one plant per year has been shut down.

Three of the 22 plants (Fort St. Vrain, Shoreham, and Pathfinder) have completed decommissioning and have had their 10 CFR Part 50 licenses terminated. Two of these three (Fort St. Vrain and Shoreham) used the DECON process for decommissioning. One facility, Shoreham, operated less than three full power days before being shut down and decommissioned so there was relatively little contamination. Another facility, Pathfinder, was placed in SAFSTOR and subsequently decommissioned. Eleven of the plants shut down prematurely. Three Mile Island, Unit 2, ceased power operations as a result of a severe accident. Three Mile Island, Unit 2, has been placed in a monitored storage mode until Unit 1 permanently ceases operation, at which time both units are to be decommissioned.

Eleven of the permanently shutdown plants were part of the U.S. Atomic Energy Commission's (AEC's) Demonstrations Program, including Big Rock Point; Dresden, Unit 1; Fermi, Unit 1; GE-VBWR; Humboldt Bay, Unit 3; Indian Point, Unit 1; La Crosse; Pathfinder; Peach Bottom, Unit 1; Yankee Rowe; and Saxton. These plants were prototype designs that were jointly funded by the AEC and commercial utilities. One of the plants, Pathfinder, has completed decommissioning and had its license terminated.

The most recent of the Demonstration Program reactors to shut down was Big Rock Point, which operated for 33 years and permanently shut down in 1997.

Table 3-1. Summary of Shutdown Plant Information

Types and Number of Shutdown Reactors	
BWR	8
PWR	11
HTGR	2
FBR	1
Decommissioning Option	
SAFSTOR	14
DECON	7
Accident cleanup followed by storage	1
Fuel Location	
Fuel onsite in pool	13
No fuel onsite[a]	8
Fuel onsite in ISFSI	1
Plan to move fuel to an ISFSI between 2000 and 2005	9

(a) Includes Three Mile Island, Unit 2, which has approximately 900 kg of fuel remaining onsite due to the accident.

Eight of the decommissioned or decommissioning plants are located in the northeast (or mid-Atlantic states), six in the west, six in the midwest, and one in the east. The majority of the shutdown plants (13) are situated on freshwater or impoundments, five others are in coastal or estuarine environments, and three others are on the Great Lakes.

3.3.2 Description of Decommissioning Options Selected

Seven decommissioned units are located on multi-unit sites in which the remaining units continue to operate and one multi-unit site shut down both units permanently. All eight of these licensees chose SAFSTOR as the decommissioning option. In most cases, SAFSTOR was chosen so that all units on a site could be decommissioned simultaneously. For various reasons, however, most shutdown units have done some decontamination and dismantlement.

The reasons cited by licensees for choosing DECON have included the availability of LLW capacity, availability of staff familiar with the plant, available funding, the licensee's intent to use the land for other purposes, influence by State or local government to complete decommissioning, or a combination of other reasons.

A number of the plants have combined the DECON and SAFSTOR process by either entering shorter SAFSTOR periods or by doing an incremental DECON, allowing the plant to use resources and "decommission as they go." Sites have combined the options, usually to achieve

economic advantages. For example, one site decided to shorten the SAFSTOR period and begin incremental dismantlement out of concern over future availability of a waste site and future costs of disposal. One site that prematurely shut down had a short SAFSTOR period to allow short-lived radioactive materials to decay and to conduct more detailed planning. Safety is another reason for combining the two options. Because of seismic safety concerns, one site undertook a major dismantling project to remove a 76-m (250-ft) concrete vent stack after it had been in SAFSTOR for 10 years.

The licensee determines the physical condition of the site after the decommissioning process. Some licensees intend to restore the site to "greenfield" status at the end of decommissioning, while others may install a non-nuclear facility. The NRC's regulatory authority is only over that portion of the facility that is contaminated. Some licensees will leave structures standing at the time of license termination, and others will not. While undergoing the decommissioning process, some licensees have opted for partial site release to decrease the size of the site area.

3.3.3 Decommissioning Process

The processes of decommissioning a power reactor facility for the SAFSTOR and DECON options can be divided into four stages, as shown in Figure 3-3. Figure 3-4 identifies the comparable stages that could be postulated for the two ENTOMB options. The order of each step and the duration of each stage vary, depending on plant-specific characteristics, such as location, operating history, reactor vendor, and licensee. The staff considered the differences in timing and choice of activities in evaluating the environmental impacts of decommissioning based on the experiences of currently decommissioning facilities.

Stage 1 in Figures 3-3 and 3-4 includes the licensee's initial preparations to shut down the plant and begin decommissioning. This stage is primarily administrative. Stage 1 typically lasts 1½ to 2½ years, regardless of the decommissioning option chosen. The main activities during the planning and preparation stage are determining the decommissioning option, making changes to the organization structure (layoffs, hiring experienced decommissioning contractors, etc.), and initiating licensing-basis changes.

The planning and preparation activities of Stage 1 vary, depending on when the licensee decides to cease operation. If the end of service is planned, the licensee may make plans for the decommissioning process and may even submit the PSDAR in advance of shutdown. This allows the plant to start major decommissioning activities immediately following the certification of permanent shutdown and the removal of the fuel (see Chapter 2, "Background Information

Related to Decommissioning Regulations," for a discussion of major decommissioning activities). If the end of service is unplanned, the licensee will probably not be ready to start decommissioning activities immediately following the certification of permanent shutdown and removal of fuel. Therefore, the order and duration of the activities in Stage 1 might vary compared to a planned shutdown. For most plants, the organizational changes will include a reduction in the number of staff as well as implementation of an employee-retention program to encourage the needed staff to stay on. However, one site actually had to increase staffing levels at the time of the permanent cessation of operation to start the DECON process. Initial plant characterization will be made during the planning activities and will continue throughout the decommissioning process. Because these activities are mostly planning, administrative, and organizational in nature, there is little potential for onsite or offsite impacts from these activities and only small amounts of decommissioning-related LLW generated.

Stage 2 in Figures 3-3 and 3-4 involves the transition of the plant from reactor operation to decommissioning. Stage 2 will last from about ½ to 1½ years for plants in SAFSTOR, DECON, and ENTOMB. All plants will have to transfer fuel out of the reactor and into the spent fuel pool. Isolation and stabilization of all unnecessary SSCs are also conducted during this stage.

Licensing-basis changes will continue during this stage, and the licensee may request an exemption from offsite emergency preparedness requirements.

For DECON and SAFSTOR, there are a number of activities during Stage 2 that the plant can either choose not to perform or can perform at a later date. Chemical decontamination of the primary system and creation of a nuclear island are the two main activities that several decommissioning sites have undertaken. Chemical decontamination is optional for ENTOMB1 and would not likely occur for ENTOMB2. Support systems no longer necessary to reactor operation may also be removed for all four options. Likewise, additional support systems needed for decommissioning activities may be installed at this stage for DECON, SAFSTOR, and ENTOMB1. Changes to electrical systems are common during Stage 2.

Chemical decontamination of the primary system has been performed at several facilities, resulting in a reduction of total person-rem during decommissioning activities. One facility evaluated conducted a system decontamination, aiming at significant reduced dose to workers and reduced cost, by reducing both the amount and level of contamination from disposal of contaminated piping. This chemical decontamination was performed following the removal of the steam generators, pressurizer, and reactor coolant pump motors, as well as most of the

Table 3-2. Permanently Shutdown Plants

Nuclear Plant	Reactor Type	Thermal Power	Shutdown Date [a]	Decommissioning Option[b]	Location	Fuel Status and License Termination Date
Plants Currently in Decommissioning Process						
Big Rock Point	BWR	240 MW	08/30/97	DECON	Michigan	Fuel in pool
Dresden, Unit 1	BWR	700 MW	10/31/78	SAFSTOR	Illinois	Fuel in ISFSI
Fermi, Unit 1	FBR	200 MW	09/22/72	SAFSTOR[c]	Michigan	No fuel onsite
GE-VBWR	BWR	50 MW	12/09/63	SAFSTOR	California	No fuel onsite
Haddam Neck	PWR	1825 MW	07/22/96	DECON	Connecticut	Fuel in pool
Humboldt Bay, Unit 3	BWR	200 MW	07/02/76	SAFSTOR[c]	California	Fuel in pool
Indian Point, Unit 1	PWR	615 MW	10/31/74	SAFSTOR	New York	Fuel in pool
La Crosse	BWR	165 MW	04/30/87	SAFSTOR	Wisconsin	Fuel in pool
Maine Yankee	PWR	2700 MW	12/06/96	DECON	Maine	Fuel in pool[d]
Millstone, Unit 1	BWR	2011 MW	11/04/95	SAFSTOR	Connecticut	Fuel in pool
Peach Bottom, Unit 1	HTGR	115 MW	10/31/74	SAFSTOR	Pennsylvania	No fuel onsite
Rancho Seco	PWR	2772 MW	06/07/89	SAFSTOR[c]	California	Fuel in ISFSI/Partial DECON proposed in 1997
San Onofre, Unit 1	PWR	1347 MW	11/30/92	SAFSTOR[c]	California	Fuel in pool
Saxton	PWR	28 MW	05/01/72	SAFSTOR[c]	Pennsylvania	No fuel onsite/Currently in DECON
Three Mile Island, Unit 2	PWR	2772 MW	03/28/79	Accident cleanup followed by storage	Pennsylvania	Approx 900 kg fuel onsite/ Post-defueling monitored storage
Trojan	PWR	3411 MW	11/09/92	DECON	Oregon	Fuel in pool
Yankee Rowe	PWR	600 MW	10/01/91	DECON	Massachusetts	Fuel in pool[d]
Zion, Unit 1	PWR	3250 MW	02/21/97	SAFSTOR	Illinois	Fuel in pool
Zion, Unit 2	PWR	3250 MW	09/19/96	SAFSTOR	Illinois	Fuel in pool
Terminated Licenses						
Fort St. Vrain	HTGR	842 MW	08/18/89	DECON	Colorado	Fuel in ISFSI/License terminated in 1997
Pathfinder	BWR	190 MW	09/16/67	SAFSTOR	South Dakota	No fuel onsite/License terminated in 1992
Shoreham	BWR	2436 MW	06/28/89	DECON	New York	No fuel onsite/License terminated in 1995

(a) The shutdown date corresponds to the date of the last criticality.
(b) The option shown in the table for each plant is the option that has been officially provided to NRC. Plants in DECON may have had a short (1 to 4 yr) SAFSTOR period. Likewise, plants in SAFSTOR may have performed some DECON activities or may have transitioned from the storage phase into the decontamination and dismantlement phase of SAFSTOR.
(c) These plants have recently performed or are currently performing the decontamination and dismantlement phase of SAFSTOR.
(d) Licensee is in process of transferring fuel to dry storage in onsite ISFSI.

auxiliary piping. At a second facility evaluated, a chemical decontamination was considered necessary to keep doses within previously issued EAs. The chemical decontamination was performed early in the decommissioning process to allow dismantling to proceed unimpeded. Other plants, both operating and permanently shutdown, have also performed chemical decontamination.

Some plants have also created nuclear islands, which reduce the scope of the required safeguards and security systems to only the fuel storage facilities and isolate the spent fuel so decontamination and dismantlement can proceed on the balance of the facility without the potential for affecting the spent fuel. Creating a nuclear island may involve installing an electrical power supply at the spent fuel pool, installing or modifying chemistry controls, designing and constructing a new heat removal system, and moving or installing new security-related equipment. For plants going into SAFSTOR, creation of a nuclear island is primarily a cost savings, but for plants in active decontamination and dismantlement, work activities may be done more conveniently when workers are not constrained by security requirements. ENTOMB2 would not benefit from the "nuclear island" concept.

Environmental impacts may vary at each site, depending on the activities and the timing of the activities performed. Examples of impacts include activities such as chemical decontamination, which result in the use of small quantities of water and produce LLW as well as some liquid effluents that would not be released unless they are below the limits allowed by the regulations in 10 CFR Part 20. Smaller amounts of waste will likely be generated during the creation of a nuclear island or the rewiring of a facility.

Stage 3 in Figure 3-3 involves decontamination and dismantlement of the plant for DECON, SAFSTOR, and ENTOMB1. For ENTOMB2, Stage 3 involves dismantlement of all radioactively contaminated SSCs external to the reactor building and placement of these SSCs in the reactor building, followed by lowering the ceiling to the D-rings (PWRs) or refueling floor (BWRs). For both ENTOMB options, it includes installation of concrete and engineered barriers and development of the license termination monitoring program. For those sites that have a SAFSTOR period, Stage 3 includes the storage time. The decontamination and dismantlement activities performed for SAFSTOR can occur before, after, or during the storage period. For the SAFSTOR period, Stage 3 can be from just a few years to about 54 years. For a site going straight through the DECON option, the time for Stage 3 would be expected to take between 3½ and 10 years. For either ENTOMB option Stage 3 would be expected to take 2 to 4 years

The greatest variability in the decommissioning process is seen in Stage 3 and is related to dismantlement. Every plant that has completed decommissioning or has started dismantlement has performed the activities in different ways and at different times during the decommissioning

process. Two examples of large-component removal are at Rancho Seco and Trojan. Rancho Seco has started its dismantlement on the secondary side, removing the moisture separators, diesel generators, steam piping, and related components. Dismantlement of the equipment in the auxiliary building was also initiated. Plans for large-component removal are still in process. The primary issues related to decisions on large-component removal are how to transport the components. Because there are no convenient waterways for transport, the large components from Rancho Seco will have to be shipped by both road and rail, which will require segmentation or cutting up the larger components. Trojan took a different approach to dismantlement, based on the ability to ship by barge and the availability of disposal at Hanford. Trojan removed its four steam generators and pressurizer, pumped grout into them, and shipped them by barge for burial at Hanford. Following that activity, the reactor vessel and internals were removed whole, filled with grout, welded closed, and shipped. For Trojan, removing and shipping these large components as whole units saved millions of dollars and significantly reduced dose to workers.

Stage 4 of decommissioning is license termination. Activities for this stage, which are similar for all options, include final site characterization, final radiation survey submission of final license termination plan, and final site survey. The ENTOMB options would include both a partial site release and a site monitoring program.

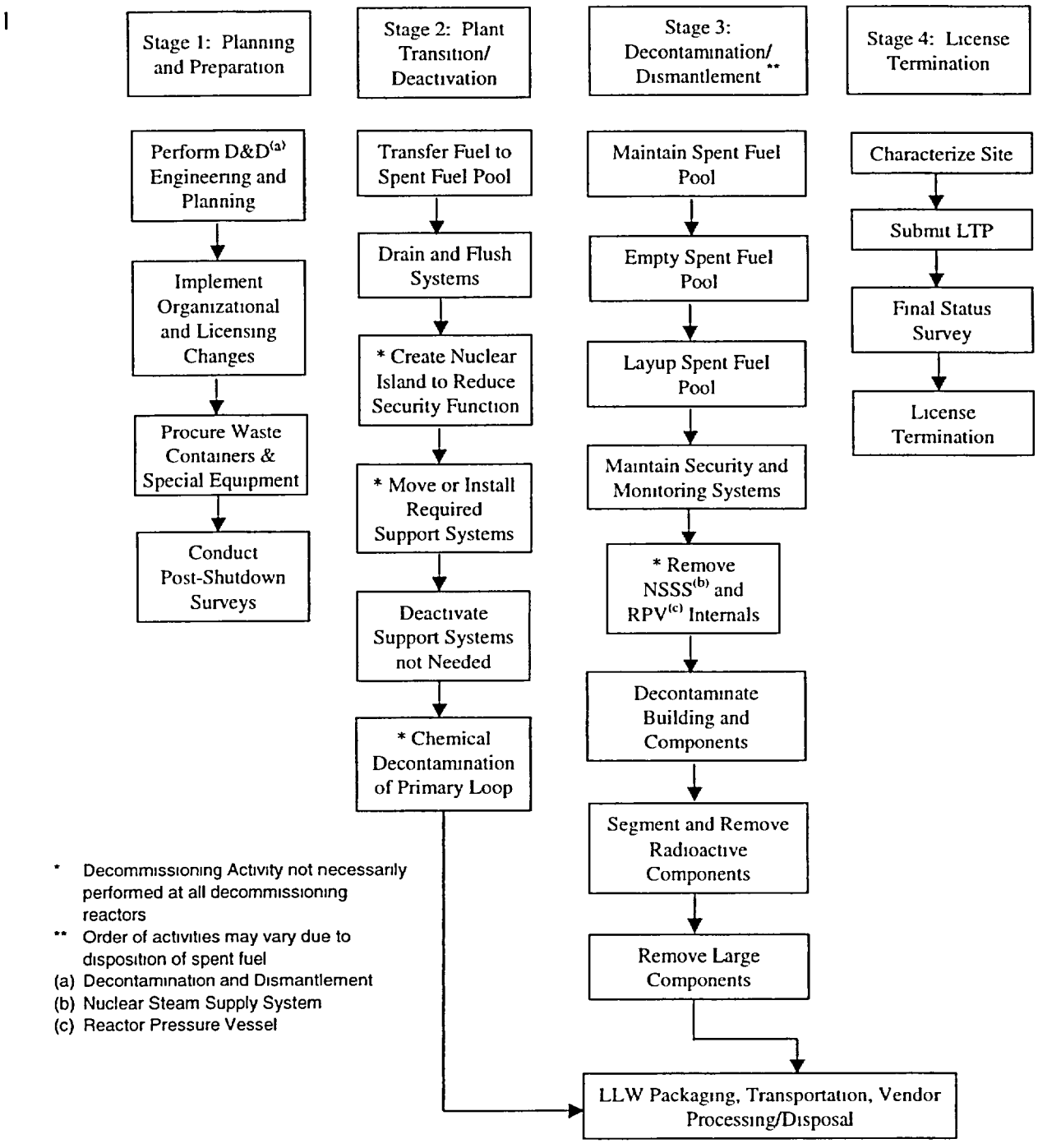

Figure 3-3. Reactor Decommissioning Process - DECON or SAFSTOR

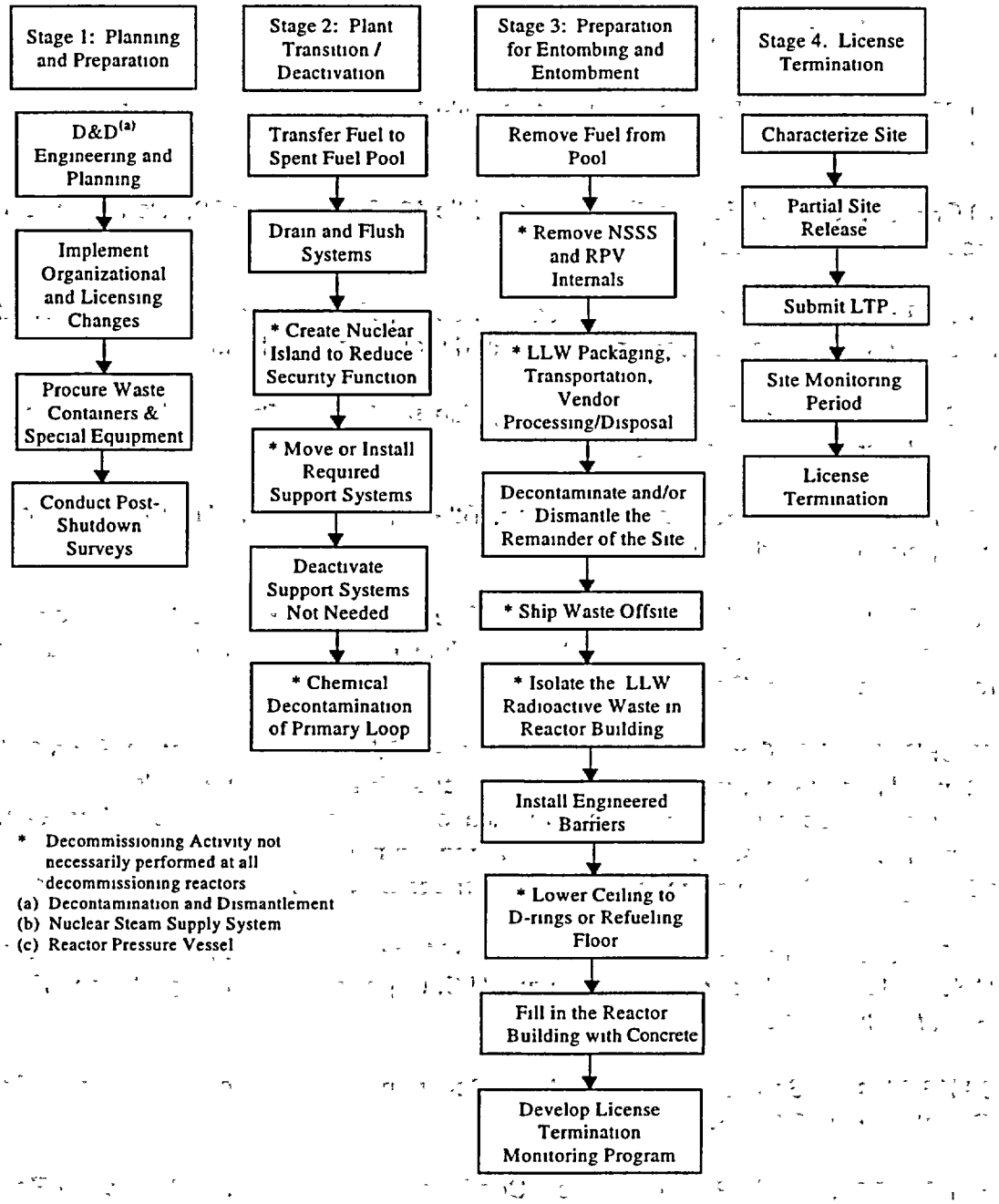

Figure 3-4. Reactor Decommissioning Process - ENTOMB

3.4 References

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4.0 Environmental Impacts of Decommissioning Permanently Shutdown Nuclear Power Reactors

This section discusses the environmental impacts of decommissioning permanently shutdown nuclear power reactor facilities. Section 4.1 defines the terms used to describe environmental impacts of decommissioning activities. Section 4.2 briefly describes the process that was used to identify the environmental impacts of the decommissioning activities. The environmental impacts, including the staff's conclusions, are discussed in Section 4.3.

4.1 Definition of Environmental Impact Standards

This Supplement provides a measure of (1) the significance and severity of potential environmental impacts and (2) the applicability of these decommissioning impacts to a variety of facilities, both permanently shutdown and operating. The significance of each environmental impact is described as SMALL, MODERATE, or LARGE. The applicability of these impacts to a class of plants or site characteristics is categorized as either generic or site-specific. The following sections define the significance and applicability terms used in the Chapter 4 analyses.

4.1.1 Terms of Significance of Impacts

For decommissioning, the staff is using a standard of significance derived from the Council on Environmental Quality (CEQ) terminology for "significantly"[(a)] (40 CFR 1508.27, which considers "context" and "intensity"). The NRC has defined three significance levels: SMALL, MODERATE, and LARGE.

SMALL – Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in this Supplement, the NRC has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.

(a) The National Environmental Policy Act of 1969 (NEPA) requires consideration of both *context* and *intensity* when determining the significance of an environmental impact. **Context** means that the significance of an action must be analyzed in several contexts, such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. **Intensity** refers to the severity of the impact and depends on many different factors, such as the unique characteristics of the site and the degree to which the proposed action affects public health or safety or may establish a precedent.

MODERATE – Environmental impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE – Environmental impacts are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The discussion of each environmental issue in this Supplement includes an explanation of how the significance level was determined. In determining the significance level, the staff assumed that ongoing mitigation measures would continue (including those mitigation measures implemented during plant construction and/or operation) during decommissioning, as appropriate. Additionally, the staff has assumed that a licensee will obtain all relevant permits and appropriate consultations, will continue to comply with the conditions of those permits or consultations, and will use appropriate best management practices (BMPs) to minimize impacts of decommissioning activities. Benefits of additional mitigation measures during or after decommissioning are not considered in determining significance levels.

The cumulative impacts of all activities were assessed. Cumulative impacts are incremental impacts of the decommissioning activity when added to other past, present, and reasonably foreseeable future actions at the licensed site.

4.1.2 Terms of Applicability of Impacts

In addition to determining the significance of environmental impacts, this Supplement includes a discussion of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Each environmental issue is assigned to one of two categories:

- Generic – For the issue, the analysis reported in this Supplement presents the following:

  (a) Environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues to plants of a specific size, a specific location, or having a specific type of cooling system or site characteristics, and

  (b) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts, and

  (c) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

- Site-specific – For the issue, the analysis reported in this Supplement has shown that one or more of the generic criteria was not met. Therefore, additional plant-specific review is required. An example of a site-specific issue is threatened and endangered species.

For many issues, similar activities may be performed either on the plant site or offsite. In several cases, the conclusions as to generic or site-specific are different for these locations. In this Supplement, the term "operational areas" are the areas within the protected area fences, the intake and discharge structures, the cooling system, and other site structures, and the associated paved, graveled, and maintained landscaped areas. The operational area is defined as the portion of the plant site where most or all of the site activities occur, such as reactor operation, materials and equipment storage, parking, substation operation, facility service and maintenance, etc.

4.2 Evaluation Process

This section briefly describes the process that the staff used to determine the environmental impacts from decommissioning nuclear power facilities. For a detailed description of this process, see Appendix E, "Evaluation Process for Identifying the Environmental Impacts of Decommissioning Activities." Figure 4-1 is a flowchart showing the evaluation process. Figure 4-1 identifies activities that occur during decommissioning and shows whether the activities affect any of the identified environmental issues. The environmental issues analyzed by the staff are the following: onsite/offsite land use, water use, water quality, air quality, aquatic ecology, terrestrial ecology, threatened and endangered species, radiological, radiological accidents, occupational issues, cost, socioeconomics, environmental justice, cultural impacts, aesthetic issues, noise, transportation, and irretrievable resources. To analyze each issue, the staff used the data obtained from previous studies and environmental reviews, information obtained during site visits and provided by the plants undergoing decommissioning, and information from currently operating nuclear power facilities. The staff's assessment includes an assessment of cumulative impacts. For discussions of cumulative impacts, the NRC used the terminology defined in 40 CFR 1508.7. "Cumulative impact is the impact on the environment, which results from the incremental impact of the action (in the case of this Supplement, that is decommissioning activities) when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The staff examined the cumulative impacts of decommissioning activities and other past, present, and reasonably foreseeable future activities at the licensed sites.

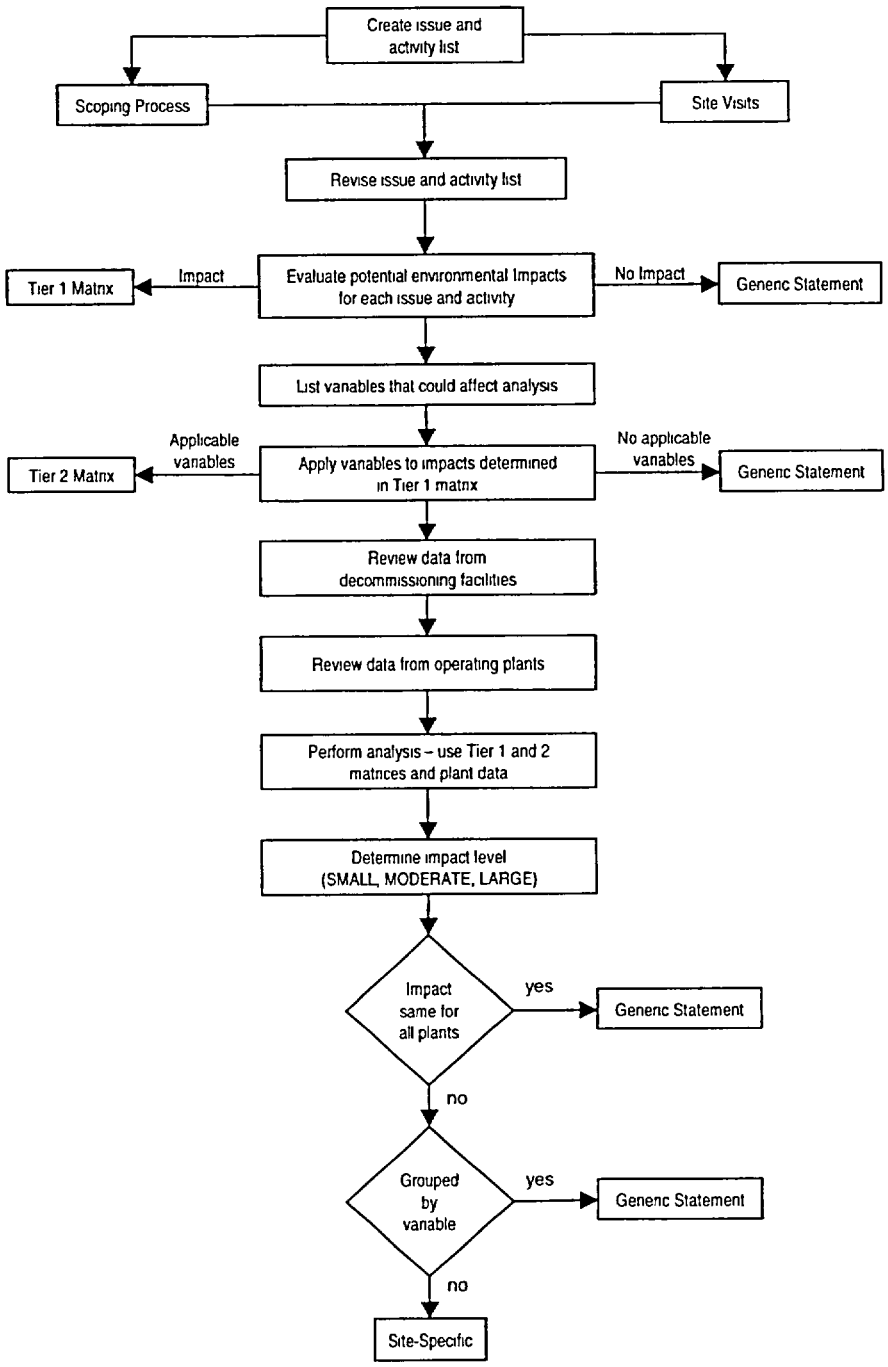

Figure 4-1. Environmental Impact Evaluation Process

Previous or anticipated decommissioning activities at the fast breeder reactor (FBR) or high-temperature gas-cooled reactor (HTGR) have not and are not expected to result in impacts that are different from those found at other nuclear reactor facilities.

After analyzing each issue, the staff determined the nature of the impact (site-specific or generic) and the significance level of the environmental impact (SMALL, MODERATE, or LARGE). This evaluation resulted in a range of impacts for each issue that may be used for comparison by licensees that are or will be decommissioning their facilities.

4.3 Environmental Impacts from Nuclear Power Facility Decommissioning

The following sections are organized by issue and discuss environmental impacts. Each section has four parts:

(1) Regulations – Identifies statutes, regulations, or limits relevant to the issue.

(2) Potential impacts from decommissioning activities - Discusses possible impacts related to the issue and defines, where appropriate, the terms detectable and destabilizing for the issue.

(3) Evaluation – Describes analysis and professional judgement used to estimate whether an activity or group of activities is likely to make a noticeable impact on the environment, considering the available data. If an impact is likely, existing and additional mitigation measures that can be taken to avoid the impact are evaluated. If an impact cannot be avoided, a determination is made as to whether the impact is likely to destabilize the resource.

(4) Conclusion – Provides the staff's conclusion on significance (SMALL, MODERATE, LARGE) and applicability (generic or site-specific) of impacts to the issue.

The conclusions from this chapter are summarized in two tables in Appendix H. Table H-1 provides a list of decommissioning activities that have been determined to have no environmental impacts. These activities can be performed by licensees without further analysis. Table H-2 provides a comprehensive summary of the decommissioning activities and associated environmental issues that have been determined by the staff to have potential environmental impacts. Providing they fall within the range of the impacts identified, these activities can be performed with no further analysis by the licensee.

4.3.1 Onsite/Offsite Land Use

Nuclear power facilities are large physical entities, of which 20 to 40 ha (50 to 100 ac) may actually be disturbed during plant construction. Other land commitments can amount to many thousands of hectares for transmission line rights-of-way (ROWs) and cooling lakes. Farming and other types of agricultural land use occur on some nuclear reactor facility sites. Some utilities have designated portions of their sites for land uses such as recreation, management of natural areas, and wildlife conservation.

4.3.1.1 Regulations

Nuclear power facilities that began initial operation after the promulgation of the National Environmental Policy Act of 1969 (NEPA; 42 USC 4321 to 4347) or the Endangered Species Act of 1973 (ESA; 16 USC 1531 to 1544) were sited and are operated in compliance with these statutes. Any modifications to the facilities after the effective dates of these acts and others (see Appendix L-2) must be in compliance with the requirements of these statutes. The ESA applies to both terrestrial and aquatic biota. The individual States may also have requirements regarding threatened and endangered species; the State-listed species may vary from those on the Federal lists. In addition, activities such as decommissioning must take into account and avoid disturbance of historic and archeological sites, and American Indian grave sites. (Native American Graves Protection and Repatriation Act of 1990; 25 USC 3001 et seq.)

4.3.1.2 Potential Impacts of Decommissioning Activities on Land Use

Temporary changes in onsite land use could occur at a nuclear reactor facility site during decommissioning. Temporary changes may include addition or expansion of staging and laydown areas or construction of temporary buildings and parking areas. These temporary changes in onsite land use do not change the fundamental purpose or use of the reactor site. The major activities that may influence onsite land use are removal of large components, such as the reactor vessel and steam generators, structure dismantlement, and low-level waste (LLW) packaging and storage. Table E-3 in Appendix E describes the activities that occur during decommissioning that influence offsite and onsite land use.

The need for land during decommissioning is affected by the site layout. Most sites have sufficient area existing within the previously disturbed area (whether during construction or operation of the site) and, therefore, no additional land needs to be disturbed. The major activities projected to occur for decommissioning that are expected to temporarily require land include activities such as staging of equipment and removal of large components. In addition, the large number of temporary workers needed to accomplish the major decommissioning

activities may require that temporary facilities be installed for onsite parking, training, site security access, office space, change areas, fabrication shops, mockups, and related needs.

Some activities, such as widening and rebuilding access roads or creating or expanding gravel pits for building roads, may occur offsite. The experience of plants that are being decommissioned has not included any needs for additional land offsite.

Changes to land use are considered detectable if changes in the area's general land-use pattern result. The change would be destabilizing if large-scale new development and major changes in the land-use pattern occur. For example, a new local access route through rural land to the plant would represent a detectable, but not destabilizing, change in many localities.

4.3.1.3 Evaluation

Nuclear power facility site areas range from 34 ha (84 ac) for the San Onofre Nuclear Generating Station in California to 9,700 ha (24,000 ac) for the Turkey Point Plant in Florida. According to NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NRC 1996), of the operating reactors, 29 site areas range from 200 to 400 ha (500 to 1000 ac), with an additional 13 sites ranging from 400 to 800 ha (1000 to 2000 ac). Thus, almost 60 percent of the plant sites encompass 200 to 800 ha (500 to 2000 ac). Larger land-use areas are associated with plant cooling systems that include reservoirs, artificial lakes, and buffer areas.

The nuclear reactor facilities being decommissioned are predominantly on the smaller sites, primarily because the older, smaller reactors have already permanently ceased operation. Only 6 out of 21 sites (29 percent) were between 400 and 800 ha (100 to 2000 ac); 6 (29 percent) were larger than 800 ha (2000 ac); and the rest (43 percent) were smaller than 400 ha (1000 ac) (see also Appendix F).

Almost all of the sites undergoing active decommissioning are utilizing areas used during construction. Land requirements for decommissioning activities appear to be well within the range of land requirements for activities during major outages that occur in the course of normal operations. There does not appear to be any significant differences in land use between plants using SAFSTOR or DECON options. There is no experience with either ENTOMB option with commercial power reactors in the United States, although there is some entombment experience with former U.S. Department of Energy (DOE) scientific and nuclear materials production reactors. Because of the potential need for large amounts of concrete and aggregate for ENTOMB2, it is possible that a concrete batch plant might be set up onsite. There might not be adequate room within the operational area at some of the sites for such a

facility, but it is likely that the impact of such a disturbance would be temporary and minor. Smaller amounts of concrete and aggregate would likely be required for the ENTOMB1 option.

Many of the facilities currently being decommissioned are relatively small reactors and located on small areas of land. However, a comparison of the land-use needs shows that many activities require the same amount of land for reactors whether the reactor size is small or large. It does not appear that land use will be significantly greater for future decommissioning at remaining sites. Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in onsite or offsite land-use impacts that are different from those found at other nuclear reactor facilities. There has been limited experience with multi-unit sites. Multiple-plant sites that are being decommissioned may be able to economize on space by reusing laydown areas.

Large-component removal is similar in its land requirements to major component replacement activities, such as steam generator replacement and refurbishment activities. Based on previous experience with steam generator replacement at a pressurized water reactor (PWR), it was estimated in NUREG-1437 that ~1 to 4 ha (~2.5 to 10 ac) of land may be needed to accommodate laydown, staging, handling, temporary storage, personnel processing, mockup and training, and related needs (NRC 1996). The impacts of steam generator or other major component removal during decommissioning should be similar or less. Generally, this land has been previously disturbed during the construction of the facility. Once the major decommissioning activities are completed, this land could be returned to its previous uses.

Based on current information collected at sites using the DECON and SAFSTOR options, decommissioning activities that affect offsite land use are not expected unless major upgrades to transportation links are required. It may be necessary to establish or re-establish road, rail, or water transportation links into the site for the purpose of bringing in equipment (especially large equipment), removing large components, and shipping offsite certain chemicals, waste concrete and metal, or other materials created, contaminated, or used in the decontamination and dismantlement processes. In such cases, offsite land-use impacts may be detectable or destabilizing. Additional attention to transportation routing and to the organization of activities to minimize the need for transportation re-establishment or upgrade may be able to reduce the impacts to undetectable levels. The ENTOMB options may require additional land offsite for a concrete batch plant, but in most cases the land use for this activity will be temporary, though detectable.

4.3.1.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on land use, including comments received on the draft of Supplement 1 of NUREG-0586. For

facilities having only onsite land-use changes as a result of large component removal, structure dismantlement, and LLW packaging and storage, the impacts on land use are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that the potential impacts to land use onsite are SMALL. The staff has considered mitigation and concludes that no additional measures are likely to be sufficiently beneficial to be warranted.

If changes in land use beyond the site boundary are anticipated, the impacts may or may not be detectable or destabilizing, depending on the site-specific conditions, and cannot be predicted generically. Therefore, the staff has concluded that if new land uses beyond the site boundary are anticipated, the magnitude of the potential impact may be SMALL, MODERATE, or LARGE, depending on the nature, size, and permanence of the disturbance to existing land use and must be determined through a site-specific analysis.

4.3.2 Water Use

Nuclear reactor facilities are usually located near or adjacent to significant water bodies (aquifers, rivers, lakes, etc.) that are important to the region. Operating nuclear reactor facilities use water from multiple sources. For example, water from an adjacent lake might provide cooling water, whereas potable water may come from groundwater wells located onsite. Reactor cooling is the greatest use of water at an operating reactor. Other uses include waste treatment, potable water, process water, and site maintenance.

4.3.2.1 Regulations

Water use at nuclear reactor facilities is regulated by State- and locally-issued permits. Most States require permits for surface water or groundwater withdrawals.

4.3.2.2 Potential Impacts of Decommissioning Activities on Water Use

Cessation of plant operations will result in a significant decrease in water consumption because reactor cooling is no longer required. Although water will still be required for spent fuel cooling, this demand will decrease as the fuel ages. Dewatering systems may remain active during decommissioning of a nuclear facility to control the water pathway for the release of radioactive material. Table E-3 in Appendix E lists decommissioning activities that may influence water use. These activities include fuel removal, staffing changes, large component removal, decontamination and dismantlement (using high-pressure water sprays), structure dismantlement, and entombment.

Impacts to water resources of decommissioning activities would be considered detectable if such activities result in a significant change in water supply reliability. The reliability of water supplies is impacted by a variety of factors, such as natural climatic variability and the reliability of the regional and local water-supply infrastructures. For example, an additional incremental drawdown attributable to a groundwater well at a decommissioning site may be measurable at an offsite well. However, this does not necessarily constitute a detectable change in the reliability of the water supply. It would be detectable if the offsite well is unable to withdraw its permitted volumes as a result of this increased drawdown. The impacts of decommissioning activities are considered destabilizing if they result in a permanent and/or significant loss of water supply reliability. For instance, heavy pumping of an aquifer that results in subsidence may cause a permanent loss of aquifer capacity. Another example of a destabilizing impact is a change in site drainage or stream-channel changes that would result in a detectable and significant change in the probability of flooding.

4.3.2.3 Evaluation

In general, the impact of nuclear reactor facilities on water resources dramatically decreases after plants cease operation. The flow through the condenser of an operating plant can range from 3 to 78 m^3/s (49,000 to 1,200,000 gpm) (NRC 1996), depending upon the size of plant. This operational demand for cooling and makeup water is largely eliminated after the facility permanently ceases operation. As the plant staff decreases, the demand for potable water also generally decreases. However, in a few cases staffing levels have temporarily increased above levels that were common for routine operations. For these short periods of time, commonly during the early stages of decontamination and dismantlement activities, there may be a slight increase in demand for potable water.

Most of the impacts to water resources likely to occur during decommissioning of a nuclear facility are also typical of the impacts that would occur during decommissioning or construction of any large industrial facility. For example, providing water for dust abatement is a concern for any large construction project, as is potable water usage. However, the quantities of water required are trivial compared to the quantity used during operations. There are some activities affecting water resources and decommissioning nuclear facilities that are different from other industrial non-nuclear activities. The demand for water for spent fuel maintenance (approximately 200 to 2000 L [50 to 500 gal.] of water per day, depending on the size and location of the pool) and wet decontamination methods (such as a full flush of the primary system or hydrolasing embedded piping in place), although not large, are unique to nuclear facilities. One facility reported using approximately 9500 to 11,000 L (2500 to 3000 gal.) of water per day for spent fuel pool spray-cooling during the summer months. Additionally, water in some of the systems or piping may continue to be used during decontamination and dismantlement to

provide shielding from radiation for workers who are dismantling structures, systems, and components (SSCs) in the vicinity. For example, 912,000 L (240,000 gal.) of water was used at one site to fill the reactor cavity in preparation for the segmentation of the reactor vessel.

Common engineering practices, such as water reuse, are used to limit water use impacts at most construction or industrial sites. However, use of some of these practices may be limited by radiological exposure considerations at decommissioning sites.

Water use at decommissioning nuclear reactor facilities is significantly smaller than water use during operation. The water use will be greater in facilities that are undergoing decontamination and dismantlement than those that are in the storage phase. During ENTOMB, water will be required as the concrete for entombment is mixed. Greater amounts of water will be needed for the ENTOMB2 option than for ENTOMB1. However, in both cases, this process would be of short duration and would not consume quantities of water in excess of those used in the construction of large buildings.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in water use impact that is different from those found at other nuclear reactor facilities.

4.3.2.4 Conclusions

The staff considered available information on the potential impacts of decommissioning on water use, including information received on the draft of Supplement 1 of NUREG-0586. This information indicates that the impacts of decommissioning on water use are neither detectable nor destabilizing. Therefore, the staff makes a generic conclusion that the potential impacts to water use are SMALL. The staff has considered mitigation and concludes that no additional measures are likely to be sufficiently beneficial to be warranted.

4.3.3 Water Quality

There are quality standards for drinking water, protection of aquatic and terrestrial habitats, and release of potential pollutants to surface and groundwater environs. Nuclear reactor facilities are usually located above aquifers or adjacent to important sources of water. Intended and accidental releases of potential pollutants may impact the quality of these waters. This section considers water quality impacts of nonradioactive material for both surface water and groundwater during the decommissioning process. Impacts from releases of radioactive material in liquid effluents are discussed in Section 4.3.8, "Radiological."

4.3.3.1 Regulations

Intentional releases of nonradioactive discharges to surface waters are regulated through the National Pollutant Discharge Elimination System (NPDES; Section 402 of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act [CWA] [33 USC 1251 to 1387]) to protect water quality. Congress has delegated the responsibility for NPDES implementation to the U.S. Environmental Protection Agency (EPA). When the EPA determines that State programs are equivalent to the Federal NPDES program, the NPDES permitting process is delegated to the State. Generally, discharge limits specified by the NPDES permit are revisited every 5 years. Ongoing monitoring programs may be required as part of an NPDES permit.

The Resource Conservation and Recovery Act of 1976 (RCRA; 42 USC 6901 et seq.) addresses the need to investigate and clean up contamination in the event of the release of nonradioactive hazardous material not covered within the limits of the NPDES permit. As with the NPDES permitting process, Congress has delegated the responsibility for RCRA implementation to the EPA. Because NPDES permits regulate only intentional discharges to surface water, any accidental releases of nonradioactive hazardous materials that may impair water quality (surface water or groundwater) are regulated through the RCRA process. RCRA requires responsible parties to clean up environmental contaminants regardless of the time of their release. The degree of investigation and subsequent corrective action necessary to protect human health and the environment vary significantly among facilities. When the EPA determines that State programs are equivalent to the Federal RCRA program, the corrective action program is delegated to the State.

Based on an October 1978 decision by the Atomic Safety and Licensing Board, (TVA 1978a, TVA 1978b), NRC authority does not extend to matters within the jurisdiction of the EPA. More specifically, the NRC authority is limited for those matters expressly assigned to the EPA by the Federal Water Pollution Control Act Amendments of 1972. This decision would also apply to decommissioning nuclear reactor facilities.

4.3.3.2 Potential Impacts of Decommissioning Activities on Water Quality

Table E-3 in Appendix E shows the activities during decommissioning that may affect water quality. These major activities include fuel removal, stabilization, decontamination and dismantlement, and structure dismantlement. Separate assessments of potential impacts were performed for surface water and groundwater. Surface waters are most likely to be impacted either by stormwater runoff or by releases of substances during decommissioning activities.

Because water quality and water supply are interdependent, changes in water quality must be considered simultaneously with changes in water supply. For example, reduced groundwater pumping may result in a rise in the water table, providing a new pathway for contaminants currently in the subsurface. Changes in the landscape (terrain and vegetation) during decommissioning can alter the hydrologic pattern of recharge and surface-water runoff. The convergence of surface water over unvegetated soils may result in accelerated erosion and the delivery of sediment to important downstream habitat.

Impacts to water quality of decommissioning activities would be considered detectable if such activities result in a significant change in water-supply reliability. For example, stormwater erosion at a facility undergoing decommissioning may result in a measurable increase in suspended sediment in an adjacent stream or disposal of concrete onsite could alter local water chemistry of the groundwater. However, this does not constitute a detectable change in the reliability of the water supply unless the incremental change in sediment concentration precludes permitted or environmental uses. The impacts of decommissioning activities would be considered to be destabilizing on water quality if they result in a permanent or significant loss of water-supply reliability. For instance, significant increases in erosion might result in a permanent loss of benthic habitat for certain fish species.

4.3.3.3 Evaluation

Both the decommissioning activities themselves and the order in which the activities are performed control the impacts to water quality. The same activities performed in a different order can have a significantly different impact on water quality. The time between activities may also be important in assessing impacts. Delaying activities during SAFSTOR may exacerbate water-quality issues. For example, the aging of structures may create new pathways for groundwater to enter contaminated subgrade structures. This would be less of an issue for entombment of a facility, where the plant's contaminated SSCs are encased in concrete and maintained as a solid structure isolated from the environment.

Stormwater runoff and erosion control are issues faced at many industrial sites, and it is expected that after application of common BMPs, any changes in surface-water quality will be nondetectable and nondestabilizing.

All commercial nuclear power facilities have NPDES permits that regulate intentional releases of hazardous materials. Historically, unintentional releases of hazardous substances have been an infrequent occurrence at decommissioning facilities. Because the focus of decommissioning is the ultimate cleanup of the facility, considerable attention is placed on minimizing spills. Except for a few substances such as hydrocarbons (diesel fuel), such hazardous spills are

localized, quickly detected, and relatively easy to remediate. Relevant regulations are listed in Appendix L. Some of the groundwater parameters measured in the license termination plan (LTP) might also be indicators of a heretofore undetected nonradiological subsurface plume. If such indications were observed, further characterization and corrective actions would be dictated by the relevant regulations discussed in Appendix L and permits, if appropriate.

Certain decommissioning activities or options may result in changes in local water chemistry. For example, if licensees dismantle structures by demolition and disposal of the concrete rubble on the site, then there is a potential that the hydration of concrete could cause an increase in alkalinity of groundwater. The pH of interstitial (pore) water very close to the concrete rubble would remain above 10.5 for several hundred thousand years (Krupa and Serne 1988). However, as the leachate migrates away from the demolition debris, it is reasonable to expect the leachate pH to be rapidly reduced (within meters) to natural conditions due to the large buffering capacity of soils. While the leachate's pH may not be a water-quality concern, such leachate may affect the transport properties of radioactive and nonradioactive chemicals (notably metals) in the subsurface although this transport would not be detectable offsite. Surface spreading of the demolition debris over large areas may provide adequate opportunity for soils to buffer the pH to background. Because the nonradiological impacts would be nondetectable, they are considered to be generic for all sites. However, concentrated disposal of demolition debris, either within or outside of existing below-grade structures, would require below-grade compliance with RCRA guidelines. The radiological aspects of onsite disposal of slightly contaminated material would require a site-specific analysis and would be addressed at the time the LTP is submitted.

Current or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in water-quality impacts that are different from those found at other nuclear reactor facilities.

4.3.3.4 Conclusions

The staff considered available information on the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater, including comments received on the draft of Supplement 1 of NUREG-0586. This information indicates that for all facilities the impacts of decommissioning on water quality will be neither detectable nor destabilizing. Therefore, the staff makes a generic conclusion that for all facilities, the impacts on nonradioactive aspects of water quality are SMALL. The staff has considered mitigation and concludes that no additional measures are likely to be sufficiently beneficial to be warranted.

4.3.4 Air Quality

Decommissioning activities have the potential to adversely impact air quality. The activities may be direct, such as demolition of buildings, or indirect, such as transportation of decommissioning workers to and from the site. This section discusses the nonradiological impacts of decommissioning on air quality. Radiological impacts on air quality are addressed in Section 4.3.8, "Radiological."

4.3.4.1 Regulations

The purpose of the Clean Air Act (CAA) as amended (42 USC 7401 et seq.) is to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the CAA, as amended, requires that each Federal agency, such as NRC, with jurisdiction over any property or facility that might result in the discharge of air pollutants, comply with "all Federal, state, interstate, and local requirements" with regard to the control and abatement of air pollution. Pursuant to the Act, the EPA established National Ambient Air Quality Standards to protect public health, with an adequate margin of safety, from known or anticipated adverse effects of regulated pollutants (42 USC 7409). Hazardous air pollutants and radionuclides are regulated separately (42 USC 7412).

EPA's regulations are found in Title 40 of the Code of Federal Regulations. The National Primary and Secondary Ambient Air Quality Standards are found in 40 CFR Part 50. The standards related to particulate matter (40 CFR 51.06 and 40 CFR 51.07) are particularly relevant to decommissioning activities. Other regulations that may cover decommissioning activities are found in 40 CFR Part 61, which deals with hazardous air pollutants such as asbestos, chlorofluorocarbons, and radionuclides; 40 CFR Part 81, which deals with designation of areas for air-quality planning purposes; and 40 CFR Part 82, which deals with protection of stratospheric ozone.

In addition, State and local agencies have developed and enforce a variety of air-quality regulations. These regulations require permits for emission sources, limit emission rates, and set maximum atmospheric concentrations for pollutants. Finally, different regulations apply to indoor air quality and worker safety.

4.3.4.2 Potential Impacts of Decommissioning Activities on Air Quality

Table E-3 in Appendix E shows activities that may have an effect on air quality. These include organizational changes, stabilization, storage preparation for SAFSTOR, decontamination and dismantlement, structural dismantlement, entombment, and transportation. The potentially adverse impacts identified include (1) degradation of air quality caused by emissions (e.g., NO_x, CO, and hydrocarbons) from internal combustion engines, (2) increased particle loading of the atmosphere caused by the movement of vehicles and equipment, demolition of structures, dismantlement of systems, and operation of concrete batch plants, and (3) alteration of other characteristics of the atmosphere (e.g., the ozone layer) by releases of gases used in plant systems (e.g., in fire suppression or refrigeration).

Air-quality impacts of emissions from internal combustion engines and changes in atmospheric particle loading can be assessed by comparison with standards set in air-quality regulations. These potential impacts are considered detectable if a decommissioning activity is likely to cause a measurable increase in the concentration of one or more regulated air pollutants that can be directly attributed to the activity. The impact is considered to be destabilizing if the impact is detectable and causes a change in the attainment status of the region. Air-quality impacts of the releases of other gases can be assessed by comparison with the magnitude of potential releases during decommissioning with the magnitude of releases of the same or similar gases from other sources.

4.3.4.3 Evaluation

Decommissioning activities that have the potential to have a nonradiological impact on air quality include:

- worker transportation to and from the site
- dismantling of systems and removing of equipment
- movement and open storage of material onsite
- demolition of buildings and structures
- shipment of material and debris to offsite locations, and
- operation of concrete batch plants.

These activities typically take place over a period of years from the time the facility ceases operation until the decommissioning is complete and the license is terminated. The magnitude and the timing of the potential impacts of each activity will vary from plant to plant, depending on the decommissioning options selected by the licensee and the status of facilities and structures at the time of license termination.

Worker transportation: Air-quality impacts of transportation of workers to and from the site are caused by emissions from the vehicles and by fugitive dust from traffic on paved and unpaved roads. Consequently, the impacts can be estimated directly from the size of the work force. Experience with decommissioning indicates that for most sites the onsite work force tends to decrease from the time that plants cease operation until decommissioning is complete. There are occasional increases during specific decontamination and dismantlement activities. However, the work force during decommissioning is smaller than the construction work force and the work force during refueling outages, and almost always smaller than the work force during facility operation.

Assuming that neither the mix of vehicles used for worker transportation nor the vehicle occupancy is different during decommissioning than during plant construction or operation, emissions from vehicles and fugitive dust associated with traffic is expected to decrease during the decommissioning period. These decreases are expected to improve air quality rather than degrade it. Consequently, the change in air quality associated with changes in worker transportation during decommissioning should not be detectable or destabilizing at any site.

Dismantling systems and removing equipment: Air-quality impacts of dismantling systems and removing equipment may be caused by the generation and release of particulate matter associated with the physical activities of dismantling and by the release of gases from the systems (for example, refrigeration systems and fire-protection systems).

The predominant potential effluent from system dismantling and removal of equipment will be particulate matter and fugitive dust. This material will generally be released in and remain within buildings and other structures because most decommissioning activities associated with dismantling systems and removing equipment will be conducted inside the containment, auxiliary, and fuel-handling buildings. These buildings have systems to minimize airborne contamination, such as whole-building air filtration. Filtration systems control the release of particulate matter to the environment. These systems, which are typically maintained and periodically operated during decommissioning, reduce the impact of airborne particulate material. Where filtration systems are not in place to control particulate releases, temporary systems can be established, as needed. Special air-ventilation pathways may be established before the start of a SAFSTOR period to ensure that air ventilates from the building through

high efficiency particulate air (HEPA) filters. It is unlikely that particulate matter released to the environment as a result of system dismantlement and equipment removal will be sufficient to be detectable offsite. Special precautions are required for worker protection where hazardous materials such as asbestos may become airborne, as discussed in Section 4.3.10, "Occupational Issues."

Various systems associated with reactors contain gases that are of environmental concern. For example, some gases used in refrigeration systems and fire-suppression systems have been identified as ozone-depleting compounds. Venting of these gases to the atmosphere is prohibited by law. Standard methods exist to purge systems with these gases and limit releases to the environment to insignificant quantities. Other fire suppression and refrigeration systems may contain greenhouse gases. The quantities of these gases at a nuclear plant are generally small in comparison with the quantities of greenhouse gases released hourly by a fossil-fuel combustion plant used for heating or power generation. The impacts of ozone-depleting and greenhouse gases are global rather than local. Therefore, it is unlikely that releases of ozone-depleting or greenhouse gases during decommissioning of any nuclear power plant will be detectable or destabilize the environment.

Movement and open storage of material onsite: Movement of equipment and open storage of materials onsite during decommissioning are similar to activities during construction or demolition of an industrial facility. The air-quality impacts of the movement of equipment and open storage of materials onsite are primarily associated with fugitive dust. Movement of equipment outside of the buildings may generate fugitive dust. Movement of equipment may also alter the size distribution of particles on the ground, making the particles more susceptible to suspension by the wind. Mitigation measures will be taken to minimize dust to comply with local air-quality regulations. Common mitigation measures include watering and other soil stabilization measures, such as spraying sealants on the area and seeding. Therefore, it is unlikely that the movement of equipment and open storage of materials will be detectable or destabilize regional air quality.

Demolition of buildings and structures: Once decontamination has been completed, the demolition of buildings and other structures at a nuclear power plant is similar to demolition of buildings and structures at industrial facilities. Demolition of buildings and major structures may cause a temporary increase in fugitive dust from the site. Fugitive dust from demolition of buildings and structures will involve large particles that will settle to the ground quickly. Demolition will generally be limited to a small number of short-duration events. Mitigation measures will be used to minimize dust. Therefore, it is unlikely that the fugitive dust from demolition of buildings and structures will be detectable or destabilize air quality.

If residual contamination is present at the time of demolition, then the demolition of buildings and structures must be conducted using techniques that keep releases of contaminated material within regulatory limits. For purposes of assessing radiological impacts, impacts are of small significance if doses and releases do not exceed limits established by the Commission's regulations.

Shipment of material and debris to offsite locations: Dismantled equipment, material, and debris from decommissioning are typically removed from the site as decommissioning progresses. The number of shipments required during the decommissioning period depends on the method of transportation and the decommissioning option chosen. Although the number of shipments may be relatively large, the decommissioning period extends over several years. As a result, the number of shipments per day is small. Current experience is that there is an average of less than one shipment per day of LLW from the plant (see Section 4.3.17, "Transportation"). Therefore, it is unlikely that the emissions from a shipment or a small number of shipments per day would be detectable or destabilize local or regional air quality at any nuclear power plant undergoing decommissioning.

Operation of a concrete batch plant: The ENTOMB options will require a large amount of concrete and aggregate. Unloading, movement, and dispensing of the materials that make concrete result in fugitive dust in the vicinity of concrete batch plants. Most of the dust is associated with unloading dry cement at the concrete batch plant and loading mixers or trucks. This dust tends to consist of large particles that settle out of the air quickly. As a result, dust associated with concrete batch plant operations is likely to be localized near the concrete batch plant. There will also be emissions from heavy equipment at concrete batch plants and vehicles used to transport concrete from the concrete batch plant to the entombment site. The likely impacts of these emissions will be smaller than those from dust.

There are a number of mitigation measures that can be used to control dust. Dust control measures commonly used at concrete batch plants include enclosure of dumping and unloading areas and conveyors, use of filters, and use of water sprays. There would be no significant difference between a concrete batch plant used in the ENTOMB option and a batch plant used for any other major construction activity. Therefore, the staff considers it unlikely that the environmental impacts of operation of a concrete batch plant for a plant undergoing entombment would be detectable or destabilize air quality.

In summary, the most likely impact of decommissioning on air quality is degradation of air quality by fugitive dust. Fugitive dust during decommissioning should be less than during plant construction because the size of the disturbed areas is smaller, the period of activity is shorter, and paved roadways may exist. Use of BMP, such as seeding and wetting, can be used to

minimize fugitive dust. During demolition activities, some particulate matter in the form of fugitive dust may be released into the atmosphere, but much of this fugitive dust consists of large particles that settle quickly. To date, licensees decommissioning nuclear reactor facilities have taken appropriate and reasonable control measures to minimize fugitive dust. No anticipated new methods of conducting decommissioning and no peculiarities of operating plant sites are anticipated to affect this pattern.

The selection of the decommissioning option (DECON, SAFSTOR, ENTOMB1, or ENTOMB2) is more likely to affect the timing of air-quality impacts than the magnitude of the impacts. Immediate decontamination and dismantlement of the facility (DECON) results in impacts earlier than the SAFSTOR option, in which most decommissioning activities are postponed to permit residual activity in the plant to decay. ENTOMB1 and ENTOMB2 may include the dismantlement of structures outside of containment and, thus, could result in air-quality impacts related to fugitive dust that would be the same as or greater than during DECON.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in air-quality impacts that are different from those found at other nuclear facilities.

4.3.4.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on air quality, including comments received on the draft of Supplement 1 of NUREG-0586. This information indicates that the impacts of decommissioning on air quality are neither detectable nor destabilizing. Therefore, the staff makes the generic conclusion that the impacts on air quality are SMALL. The staff has considered mitigation and concludes that current and commonly used measures are sufficient and no additional measures are likely to be sufficiently beneficial to be warranted.

4.3.5 Aquatic Ecology

Aquatic ecology issues incorporate all of the plants, animals, and species assemblages in the rivers, streams, oceans, estuaries, or any other aquatic environments near a nuclear power facility. Aquatic ecology also includes the interaction of those organisms with each other and the environment.

4.3.5.1 Regulations

Federal laws that are included within a NEPA evaluation of aquatic ecology issues include the CWA, the ESA of 1973, the Fish and Wildlife Coordination Act (16 USC 661 to 667c), and NEPA. Although some biota may be affected by a number of decommissioning activities, full consideration is usually reserved for the more important aquatic resources, which may be either individual species or habitat-level resources. Some activities, such as removal of in-stream or shoreline structures, may require permits from other agencies.

4.3.5.2 Potential Impacts of Decommissioning Activities on Aquatic Ecological Resources

Table E-3 in Appendix E identifies decontamination and dismantlement and structural dismantlement as activities that may affect aquatic ecology. Aquatic ecological resources may be impacted during the decommissioning process via either the direct or the indirect disturbance of plant or animal communities near the plant site. Direct impacts can result from activities such as the removal of shoreline or in-water structures (i.e., the intake or discharge facilities), the active dredging of a stream, river, or ocean bottom, or the filling of a stream or bay while indirect impacts may result from effects such as runoff. During decommissioning, aquatic environs at the plant site may be disturbed for the construction of support facilities, such as to build a dock for barges or to bridge a stream or aquatic area. Additionally, aquatic environs away from the plant site may be disturbed to upgrade or install new transportation systems (e.g., a new rail line to support large component removal) or to install or modify transmission lines. In most cases, aquatic disturbances will result in relatively short-term impacts and the aquatic environs will either recover naturally or impacts can be mitigated. Minor impacts to aquatic resources could result from sediment runoff generation due to ground disturbance and surface erosion and runoff. Impacts may occur if shoreline or in-water structures, such as the intake or discharge facilities and pipes, are removed. These impacts will typically be temporary and will not be detectable nor will they destabilize important attributes of the resource. It is important that shoreline or in-water structure removal is managed in a manner that does not result in the establishment of nonindigenous or noxious plants and animals to the exclusion of native species.

If decommissioning does not include removal of shoreline or in-water structures, very little aquatic habitat is expected to be disturbed during decommissioning. Thus, practically all aquatic habitat that was used during regular plant operations or, at a minimum, was not previously disturbed during construction of the site will not be impacted. If all activities are confined to the plant operational areas, impacts are expected to be minor and would primarily result from increased sediment from physical alterations of the site. If no disturbances occur

beyond the regular operational areas of the site, it is expected that the impact to aquatic resources will be nondetectable, nondestabilizing, and easily mitigated.

In some cases, the aquatic habitats that were originally disturbed during the construction of the site will continue to be of low habitat quality at the time of site decommissioning, even beyond the normal operations boundaries. However, important resources could either develop on the site or colonize the area disturbed by the construction. If a decommissioning activity results in the "removal" of species from an area (e.g., if a commercial or recreational fishery is no longer possible), this may be detectable. Reworking the ground surface during construction could alter the surface-drainage patterns such that wetlands on the original construction site may no longer support an aquatic community. If this is an important local or regional resource, it may be considered destabilizing.

4.3.5.3 Evaluation

The primary factors that must be considered in evaluating the potential for adverse impacts in areas previously disturbed by construction include the quantity of habitat to be disturbed, the length of time since initial disturbance, and the successional patterns of the aquatic communities (especially nuisance species). Most of the important aquatic ecological resources are not likely to occur on most plant sites. If they do occur, the decommissioning activities can probably be planned to avoid or minimize detectable and destabilizing effects.

Two decommissioning activities may result in impacts to the aquatic environment: removal of structures from the shoreline or in-water environment and removal of contaminated soil from the site (the latter applies only if the soil is in or near an aquatic environment).

Additionally, dredging and modification of barge loading facilities may result in impacts to aquatic ecological resources. Periodic permitted, maintenance dredging of the barge unloading facility is not expected to result in long term detectable or destabilizing impacts to the aquatic environment. Impacts to the aquatic resources would be within the bounds of the generic assessment. However, a significant expansion of the barge unloading facility necessary to accommodate, for example, a large shipping package such as a reactor vessel would require a site specific assessment. The environmental assessment may be performed by the U.S. Corps of Engineers as part of the review to permit the enlargement of the barge unloading facility.

In most cases, the aquatic environment required to support the decommissioning process is relatively small and is normally a very small portion of the overall plant site. Usually, the areas disturbed or utilized to support decommissioning are within the boundaries of the site operational areas and typically are immediately adjacent to the reactor, auxiliary, and control

buildings. Discharge permits to the aquatic environment for operation are almost always greater than planned or realized during decommissioning. In almost all cases examined, licensees expect to restrict activities to previously disturbed areas and operate within the limits of operational permits.

The potential for adverse impacts are likely to be nondetectable or nondestabilizing regardless of the decommissioning option selected. The activity most likely to result in impacts to aquatic environments is specific to removal of shoreline or in-water structures. The decision to conduct these activities would not be dependent on the decommissioning option. The only option where shoreline or in-water structure removal appears to be guaranteed is for those plants where return to a "Greenfield" is desired or required.

When there is a decommissioning activity outside the operational area, the significance of the potential impacts are more difficult to define and will depend on site-specific considerations. The primary factors that need to be considered include the total acreage of habitat to be disturbed, and the overall importance of the plant or animal species or communities to be disturbed. If important resources may be affected by the decommissioning activities, the impacts may be detectable and destabilizing.

Current or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in aquatic ecology impacts that are different from those found at other nuclear reactor facilities.

4.3.5.4 Conclusion

The staff has considered available information on the potential impacts of removing facility structures or contaminated soil from or near the aquatic environment on the aquatic ecological resources, including comments received on the draft of Supplement 1 of NUREG-0586. For facilities where disturbance of lands beyond the operational areas is not anticipated, the impacts on aquatic ecology are not detectable or destabilizing. The staff believes that activities within operational areas including the removal of shoreline or in-water structures, will have minimal impact on aquatic resources provided all applicable BMPs are employed and required permits are obtained. Therefore, the staff makes a generic conclusion that for such activities, the potential impacts to aquatic ecology are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

If disturbance beyond the operational areas is anticipated, the impacts may or may not be detectable or destabilizing, depending on site-specific conditions and cannot be predicted

generically. Therefore, the staff concludes that if disturbance beyond the operational areas is anticipated, the potential impacts may be SMALL, MODERATE, or LARGE, and must be determined through site-specific analysis.

4.3.6 Terrestrial Ecology

Terrestrial ecology considers all of the plants, animals, and species assemblages in the vicinity of the nuclear power facility as well as the interaction of those organisms with each other and the environment. Evaluations of impacts to terrestrial ecology are usually directed at important habitats and species, including plants and animals that are important to industry, recreational activities, the area ecosystems, and those protected by endangered species regulations and legislation. Federally listed threatened and endangered species, and designated critical habitat for such species, are addressed in a separate section of this Supplement (Section 4.3.7). There are also many species identified by State agencies as endangered or threatened, and potential impacts to such species should be evaluated and mitigated, as appropriate. Important habitat resources include (but are not limited to) wetlands, riparian areas, resting or nesting areas for large numbers of waterfowl, rookeries, communal roost sites, strutting or breeding grounds for gallinaceous birds, calving grounds, and areas containing rare plant communities. Some States have programs to formally designate priority or rare habitat community types.

4.3.6.1 Regulations

Federal statutes that are directly applicable in a NEPA evaluation of terrestrial ecology issues include the ESA of 1973, the Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712), and portions of other statutes, such as the wetlands provisions of the CWA (see Section 4.3.5.1, "Regulations").

The MBTA was initially enacted in 1918 to implement the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Specifically, the Act established a Federal prohibition, unless otherwise regulated, to pursue, hunt, take, capture, or kill any bird included in the terms of the convention, or any part, nest, or egg of any such bird. The MBTA was amended in 1936 to include species included in a similar convention between the United States and Mexico, in 1974 to include species included in a convention between the United States and Japan, and in 1978 in a treaty between the United States and the Soviet Union. Executive Order 13186 (2001) further defined the responsibilities of Federal agencies, such as the NRC, to ensure the protection of migratory birds and to consider potential impacts to migratory birds during the preparation of NEPA documents.

4.3.6.2 Potential Impacts of Decommissioning Activities on Terrestrial Ecological Resources

Table E-3 in Appendix E identifies stabilization, large-component removal, structure dismantlement, and decontamination and dismantlement as activities that may affect terrestrial ecology. Terrestrial ecological resources may be impacted during the decommissioning process via direct or indirect disturbance of native plant or animal communities in the vicinity of the plant site. Direct impacts can result from activities such as the clearing of native vegetation or filling of a wetland. Indirect impacts may result from effects such as erosional runoff, dust, or noise. During decommissioning, land at the site may be disturbed for the construction of laydown yards, stockpiles, and support facilities. Additionally, land away from the plant site may be disturbed to upgrade or install new transportation or utility systems. For example, building a new rail line may be necessary to support large-component removal. Installing or altering existing transmission lines could also have an effect on the terrestrial environment. In most cases, land disturbances will result in relatively short-term impacts and the land will either recover naturally or will be landscaped appropriately for an alternative use after completion of decommissioning.

Minor impacts to terrestrial resources could result from dust generation due to ground disturbance and traffic, noise from dismantlement of facilities and heavy equipment traffic, surface erosion and runoff, and migratory bird collisions with crane booms or other construction equipment. Most of these minor, indirect impacts are temporary and will not be significant issues after the completion of decommissioning. The effects of such impacts can also be minimized using standard BMPs.

Impacts to terrestrial resources are considered to be detectable if they result in changes to local species populations or plant or animal communities beyond the typical levels of natural variability (i.e., normal year-to-year variations). The impacts are considered to be destabilizing if they result in the extirpation of important species or result in long-term changes in ecological functions (such as flow of energy), species richness, diversity, or proportion of invasive species.

4.3.6.3 Evaluation

At most commercial nuclear facilities, there is a relatively distinct operational area where most or all site activities occur (e.g., materials and equipment storage, parking, substation operation, facility service and maintenance, etc.). This operational area usually includes all areas within the protected area fence, the intake, discharge, cooling, and other associated structures, as well as adjacent paved, graveled, and maintained landscaped areas. The operational area may include the entire area disturbed during facility construction, but is often considerably smaller.

Terrestrial habitats disturbed during the construction of the site will often continue to be of low habitat quality during plant operation and decommissioning. However, sensitive habitats can develop on the site or rare species can colonize the area disturbed during construction. This is especially true if the site has been in SAFSTOR for several decades. For example, reworking the ground surface during construction may have altered the surface-drainage patterns such that wetlands develop on the original construction site. Trees could grow to the point where they become usable as roosting or nesting sites for eagles, osprey, or wading birds. These habitats may be inhabited by sensitive species at the time of decommissioning. Rare species have colonized portions of the site at several operating commercial nuclear power plants.

In most cases, the amount of land required to support the decommissioning process is relatively small and is a small portion of the overall plant site. Usually, the areas disturbed or utilized to support decommissioning are within the operational areas of the site and typically are within the protected area. Usually, there is sufficient room within the operational areas to function as temporary storage, laydown, and staging sites. In most cases, management, engineering, and administrative staff would have been assigned space in existing support or administration buildings. In some cases, the licensees have installed trailers or temporary buildings to house engineering and administrative staff or to otherwise support decommissioning. Most licensees expect to restrict decommissioning activities to highly disturbed operational areas but a few expect to use lands beyond the operational areas, as defined above. The licensees typically anticipate utilizing an area of between 0.4 ha (1 ac) to approximately 10.5 ha (26 ac) to support the decommissioning process. One facility (Big Rock Point) required a new transmission line ROW to provide electrical power to the plant site during decommissioning (this line will also provide power to the onsite independent spent fuel storage installation [ISFSI] after decommissioning is completed). However, construction of a new transmission line ROW is probably an unusual situation. It is expected that some sites will require the reconstruction or installation of new transportation links, such as railroad spurs, road upgrades, or barge slips. Activities conducted within the operational areas are not expected to have a detectable impact on important terrestrial resources. Activities conducted outside the operational areas may have detectable impacts, depending on the magnitude and type of activity and the resources potentially affected.

None of the decommissioning options have a greater likelihood of resulting in detectable or destabilizing impacts to terrestrial resources. The selection of the decommissioning option is more likely to affect the timing of the impact on ecological resources than it is the magnitude of the impacts. DECON may require slightly more land area to support a larger number of simultaneous activities. The ENTOMB2 option would probably have the least likelihood of adverse impacts onsite because some large components may be left in place, reducing the land requirements needed for large construction equipment, waste storage, and barge or rail loading

areas. However, impacts of ENTOMB2 could be larger if additional land disturbance is required to install a concrete batch plant and associated material stockpiles. The potential impacts of SAFSTOR may be smaller than DECON, depending on the time over which activities are performed. If decontamination and dismantlement occur slowly over many years (incremental DECON), the same storage and staging areas can be reused for sequential activities. If many activities are performed over a short time period at the end of the SAFSTOR period, the impacts may be as large as those for DECON. The activity of demolition of construction material should not have significant nonradiological impacts beyond other decommissioning activities except for potential short-term noise and dust effects.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in impacts on terrestrial ecology that are different from those found at other nuclear facilities.

4.3.6.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning activities on terrestrial resources, including comments received on the draft of Supplement 1 of NUREG-0586. For facilities where habitat disturbance is limited to operational areas, the impacts on terrestrial ecology are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that for such facilities the potential impacts to terrestrial ecology are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

If habitat disturbance beyond the operational areas is anticipated, the impacts may or may not be detectable or destabilizing, depending on site-specific conditions and cannot be predicted generically. Therefore, the staff concludes that if disturbance beyond the operational areas is anticipated, the potential impacts may be SMALL, MODERATE, or LARGE and must be determined through site-specific analysis.

4.3.7 Threatened and Endangered Species

Plants and animals protected under the ESA of 1973 may be present at or near all commercial nuclear power facilities (Sackschewsky 1997). At operating plants, the most common potential impacts to endangered aquatic species are effects related to the operation of the cooling water system via impingement, entrainment, or occasional temperature or chemical effects. Because the cooling system is not used at a plant undergoing decommissioning, it is anticipated that the potential impacts of decommissioning on threatened or endangered aquatic species will normally be no greater than and likely far less than the potential impacts of plant operations.

For terrestrial species that are threatened or endangered, the most common potential impacts for operating plants are from transmission ROW maintenance activities. Most transmission lines beyond the switchyard are expected to remain energized, even after a commercial nuclear power facility closes operation, and the ROW maintenance activities are expected to continue. Therefore, the potential impacts of decommissioning on terrestrial species will normally be no greater than the potential impacts of plant operations.

4.3.7.1 Regulations

The ESA is the Federal statute that is directly applicable in a NEPA evaluation of threatened and endangered species issues. The ESA is intended to protect plant and animal species that are threatened with extinction and to provide a means to conserve the ecosystems on which they rely. Under the ESA, the U.S. Fish and Wildlife Service (USFWS) is responsible for all terrestrial and freshwater organisms. Marine and anadromous fish species are the responsibility of the National Marine Fisheries Service (NMFS). The ESA prohibits the taking of listed species and the destruction of designated critical habitat for listed species. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct (16 USC 1532). The ESA applies to Federal agencies as well as individuals. However, in general, the prohibitions against take in respect to listed plant species are only applicable to Federal agencies or to individuals on Federal lands.

Section 7 of the ESA provides a means for Federal agencies to consult with USFWS and NMFS concerning impacts to endangered species resulting from Federal actions. Although USFWS and NMFS are the administering agencies, it is the responsibility of the action agency to determine the potential impacts of a proposed action (including licensing actions) on endangered or threatened species via the preparation of a biological assessment. If the consultation process results in a determination that there may be adverse impacts to listed species, Section 10 of the ESA provides a means for permitted takes that are incidental to otherwise legal activities.

4.3.7.2 Potential Impacts of Decommissioning Activities on Threatened and Endangered Species

Table E-3 in Appendix E indicates that stabilization, large-component removal, structural dismantlement, and decontamination and dismantlement are activities that may affect threatened or endangered species. Such species may be impacted during the decommissioning process either through direct take (kill, maim, or unable to reproduce) or via disturbances of native plant or animal communities near the plant site that the species relies on for food or

shelter. Additionally, an extended period of SAFSTOR may allow the establishment of onsite populations of protected species that may be adversely affected by facility decontamination and dismantlement at the end of the storage period.

The greatest potential for impact to protected species is associated with physical alteration or dismantlement of the facilities, landscape, or aquatic environment. Impacts can result from activities such as the removal of near-shore or in-water structures (e.g., the intake or discharge facilities); the active dredging of a stream, river, or ocean bottom; the filling of a stream, bay, or wetland; or the clearing of native vegetation. Indirect impacts may result from runoff, sedimentation, dust generation, or noise disturbance. The aquatic environment at a plant site may be disturbed for the construction of support facilities to allow barges to dock or to bridge a stream or other aquatic area. Additionally, terrestrial and aquatic environments away from the plant site may be disturbed to upgrade or install new transportation or utility systems. For example, a new rail line may be necessary to support large component removal. Installing or altering transmission lines could also affect the terrestrial and aquatic environment. In most cases, disturbances will result in relatively short-term impacts and the environment and local populations will either recover naturally or impacts can be mitigated using standard BMPs. An important exception may occur if near-shore or in-water structure removal or land surface disturbances result in the establishment of nonindigenous or noxious plants and animals to the exclusion of threatened or endangered species.

Impacts to endangered or threatened species are considered detectable if there are changes (attributable to the facility) in the species behavior or in the local population size that are greater than normal year-to-year variation. Impacts would be considered destabilizing if they result in direct mortality or major behavior changes (such as abandonment of most suitable habitat areas in the plant vicinity) or if they otherwise jeopardize the local population.

4.3.7.3 Evaluation

Usually, very little land will be disturbed during decommissioning that was not used during regular plant operations or previously disturbed during construction of the facility. If all activities are confined to site operational areas (i.e., within protected area fences, intake, discharge, cooling, and other associated structures, and adjacent paved, graveled, and maintained landscaped areas), the impacts to terrestrial threatened or endangered species are expected to be minor and nondetectable. Any impacts that did occur would primarily result from increased noise and dust generation from physical alterations of the plant site and from increased truck

traffic to and from the site. If no disturbances occur beyond the operational areas of the site, it is expected that the impact to threatened or endangered terrestrial species will be relatively small, temporary, and mitigable. The impacts of activities beyond the operational areas would depend on the activity, the species potentially affected, and the mitigation options available.

Unless there are major structural changes in the aquatic environment, the potential for adverse impacts to aquatic threatened or endangered species is expected to be minimal and nondetectable. Impacts to aquatic threatened or endangered species resulting from runoff/sedimentation or chemical inputs during decommissioning will be significantly less than the potential entrainment and impingement impacts that were present when the plant was operating because of the drastically reduced water use.

The different decommissioning options will probably not differ significantly in potential impacts to threatened or endangered species, except in those cases where the plant is held in SAFSTOR for extended periods. In those cases, there is a greater potential for rare species to colonize areas that may subsequently be disturbed during the decommissioning process.

The likelihood of impacts to threatened and endangered species is related to their presence or absence. This issue requires consultation with appropriate agencies to determine whether threatened or endangered species are present and whether they would be adversely affected. Consultation under Section 7 of the ESA must be initiated to determine if protected species are near the plant. If species are identified, an assessment of the potential impacts of decommissioning must be determined. Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in impacts on threatened and endangered species that are different from those found at other nuclear facilities.

4.3.7.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on threatened and endangered species, including comments received on the draft of Supplement 1 of NUREG-0586. Based on this information, the staff has considered that the adverse impacts and associated significance of the impacts must be determined on a site-specific basis.

The ESA imposes two basic requirements on the NRC. First, the ESA requires the NRC to ensure that any action authorized, funded, or carried out by NRC is not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction or impairment of any critical habitat for such species. Second, the NRC is required to consult with the Secretary of the Interior (for freshwater and terrestrial species through the USFWS) or the Secretary of Commerce (for marine and some anadromous fish through the NMFS) to

determine if any listed species may be affected by an action. This consultation may be formal or informal, depending on the nature of the action, the species potentially affected, and the level of impacts to those species.

Acknowledging the site- and species-specific nature of threatened and endangered species and the special obligations imposed on the NRC by the ESA, the staff has concluded that the potential impacts to threatened and endangered species may be SMALL, MODERATE, or LARGE, and is not a generic issue. Informal consultation will be initiated by the NRC staff with the appropriate service after the licensee announces permanent cessation of operations. It is expected that any formal or informal consultation will be completed prior to the licensee beginning major decommissioning activities, which can occur 90 days after the submission of the post-shutdown decommissioning activities report (PSDAR). At that time, it will be determined whether such species could be affected by decommissioning activities and whether formal consultation will be required to address the impacts. Each State should also be consulted about its own procedure for considering impacts to State-listed species.

4.3.8 Radiological

The NRC considers radiological doses to workers and members of the public when evaluating the potential consequences of decommissioning activities. Radioactive materials are present in the reactor and support facilities after operations cease and the fuel has been removed from the reactor core. Exposure to these radioactive materials during decommissioning may have consequences for workers. Members of the public may also potentially be exposed to radioactive materials that are released to the environment during the decommissioning process. All decommissioning activities were assessed to determine their potential for radiation exposures that may result in health effects to workers and the public. This section considers the impacts to workers and the public during decommissioning activities performed up to the time of the termination of the license. Any potential radiological impacts following license termination are not considered in this Supplement. Such impacts are covered by the *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*, NUREG-1496 (NRC 1997).

4.3.8.1 Regulations

Decommissioning reactors in the United States continue to be licensed by the NRC and must comply with NRC regulations and conditions specified in the license. The regulatory standards for radiation exposure to workers and members of the public are found in 10 CFR Part 20 (see detailed discussion in Appendix G). Title 10 CFR Part 20 requires that the sum of the external and internal doses (total effective dose equivalent, or TEDE) for a member of the public may

not exceed 1 mSv/yr (0.1 rem/yr). Compliance is demonstrated by measurement or calculation, to show (1) that the highest dose to an individual member of the public from sources under the licensee's control does not exceed the limit or (2) that the annual average concentrations of radioactive material released in gaseous and liquid effluents do not exceed the levels specified in 10 CFR Part 20, Appendix B, Table 2, at the unrestricted area boundary. In addition, the dose from external sources in an unrestricted area should not exceed 0.02 mSv (0.002 rem) in any given hour or 0.5 mSv (0.05 rem) in 1 yr. Occupational doses are limited to a maximum of 0.05 Sv (5 rem) TEDE per year, with separate limits for dose to various tissues and organs.

Potential radiological impacts following license termination are not covered in this Supplement. Specific radiological criteria for license termination were added as Subpart E of 10 CFR Part 20 in 1997, and the basis for public health and safety considerations is discussed in NUREG-1496 (NRC 1997). These criteria limit the dose to members of the public to 0.25 mSv/yr (25 mrem/yr) from all pathways following unrestricted release of a property. In cases where unrestricted release is not feasible, the licensee must provide for institutional controls that would limit the dose to members of the public to 0.25 mSv/yr (25 mrem/yr) during the control period and to 1 mSv/yr (100 mrem/yr) after the end of institutional controls. These criteria will largely determine the types and extent of activities undertaken during the decommissioning process to reduce the radionuclide inventory remaining onsite.

Power reactor licensees are required to meet the requirements in 10 CFR 50.36a for effluent releases after permanent cessation of operations. Licensees are also required to keep releases of radioactive materials to unrestricted areas at levels as low as reasonably achievable (ALARA).

In addition to NRC limits on effluent releases, nuclear power facility releases to the environment must comply with EPA standards in 40 CFR Part 190, "Environmental radiation protection standards for nuclear power operations." These standards specify limits on the annual dose equivalent from normal operations of uranium fuel-cycle facilities (except mining, waste disposal operations, transportation, and reuse of recovered special nuclear and by-product materials). Radon and its decay products are excluded from these standards.

The NRC has not established standards for radiological exposures to biota other than humans on the basis that limits established for the maximally exposed members of the public would provide adequate protection for other species. In contrast to the regulatory approach applied to human exposures, the fate of individual nonhuman organisms is of less concern than the maintenance of the endemic population (NCRP 1991). Because of the relatively lower

sensitivity of nonhuman species to radiation, and the lack of evidence that nonhuman populations or ecosystems would experience detrimental effects at radiation levels found in the environment around nuclear power facilities, these effects are not evaluated in detail for the purposes of this Supplement.

4.3.8.2 Potential Radiological Impacts of Decommissioning Activities

As indicated in Table E-3 in Appendix E, all decommissioning activities have potential radiological concerns. Radiological impacts during decommissioning include offsite dose to members of the public and occupational dose to the work force at the facility. For this Supplement, public and occupational radiation exposures from decommissioning activities have been evaluated on the basis of information derived from recent decommissioning experience. Effluent releases anticipated during decommissioning were estimated from experiences in recent decommissioning activities from both PWRs and boiling water reactors (BWRs).

Many activities that take place during decommissioning are generally similar to those that occur during normal operations and maintenance activities. Those activities include decontamination of piping and surfaces in order to reduce the dose to nearby workers. Removal of piping or other components, such as pumps and valves, and even large components, such as heat exchangers, is performed in operating facilities during maintenance outages. However, some of the activities, such as removal of the reactor vessel or demolition of facilities, would be unique to the decommissioning process. Those activities would have the potential to result in exposures to workers who are close to contaminated structures or components, and to provide pathways for release of radioactive materials to the environment that are not present during normal operation.

4.3.8.3 Evaluation

At the cessation of plant operations, there are areas of the plant structures where residual radiation exceeds the radiation standards for license termination set forth in 10 CFR Part 20, Subpart E. One of the goals of decommissioning is to reduce this residual radiation to levels that would permit license termination. Most of the decommissioning activities listed in Table E-3 in Appendix E have the potential for radiological impacts. The staff expects that all of the activities that have potential radiological impacts will be conducted following approved procedures to keep doses ALARA and well within regulatory limits. Radiological impacts are considered to be undetectable and nondestabilizing, in the NEPA sense, if doses remain within regulatory limits.

For this Supplement, information gained from experience in decommissioning facilities has been used to evaluate radiological dose to workers and members of the public. Occupational

doses, radionuclide emissions, and doses to members of the public during decommissioning were compared to those experienced during periods of routine operation at the same facilities or at similar facilities. They were also compared to estimates presented in the 1988 GEIS (NUREG-0586 [NRC 1988]). This comparison was intended to demonstrate that the radiological consequences actually experienced at facilities undergoing decommissioning were bounded either by the site's EIS for normal operations or by the 1988 GEIS. The data were also used to determine whether it was appropriate to update the estimates for these impacts as presented in the 1988 GEIS.

In estimating the health effects resulting from both offsite and occupational radiation exposures as a result of decommissioning of nuclear power facilities, the staff used the risk coefficients per unit dose recommended by the International Commission on Radiological Protection (ICRP) (1991) for stochastic health effects such as development of cancer or genetic effects. The coefficients consider the most recent radiobiological and epidemiological information available and are consistent with those used by the United Nations Scientific Committee on the Effects of Atomic Radiation. The coefficients used in this Supplement are the same as those published by ICRP (1991) in connection with a revision of its recommendations for public and occupational dose limits. Excess hereditary effects are listed separately because radiation-induced effects of this type have not been observed in any human population, as opposed to excess malignancies that have been identified among populations receiving instantaneous and near-uniform exposures in excess of 0.1 Sv (10 rem). Regulatory limits for radiation exposure to specific organs and tissues are set at levels that would prevent development of nonstochastic effects. Therefore, nonstochastic effects, such as development of radiation-induced cataracts, would not be expected in any individual whose exposure remains within the regulatory limits.

Occupational Dose: As part of the occupational dose analysis, data were collected for annual occupational doses, doses by activity, and total dose from decommissioning, when that information was available. Because many of the facilities that provided information have not completed the decommissioning process, the data included in this analysis is from both actual operating data and from projections for specific activities. Routine occupational doses as reported to the NRC were used to compare collective worker doses during normal operations to those experienced during decommissioning. Projections for specific activities were also used to determine which were the greatest contributors to the cumulative occupational doses over the entire decommissioning period.

The data used for this evaluation are presented in Appendix G. Average occupational doses during the 5 years of normal operations preceding shutdown ranged from about 1.5 to 5 person-Sv (150 to 500 person-rem) per year for each reactor. The average annual collective doses during the years following shutdown were generally lower, ranging from less than 0.1 to

1.8 person-Sv (10 to 180 person-rem), although specific years during the most active decommissioning period may have produced collective worker doses comparable to, or greater than, those typically experienced during normal operation. Average annual doses to individual workers are also generally lower during decommissioning than during normal operation.

Table 4-1 compares cumulative occupational dose estimates from the 1988 GEIS (NRC 1988) to estimates for plants that are currently in the decommissioning process. The types of activities included in these estimates may vary between plants. For example, some estimates include doses from transportation or from activities related to spent fuel management, which are not considered part of the decommissioning process, as defined in the scope of this document. In general, estimates for currently decommissioning plants fell within the range of estimates in the 1988 GEIS, and in some cases were substantially lower than the Supplement 1 estimates for the corresponding type of reactor and decommissioning option.

The estimated cumulative doses for the entire decommissioning process ranged from about 3.5 to 16 person-Sv (350 to 1600 person-rem) for the facilities that provided data. Estimated doses for the reference facilities discussed in the 1988 GEIS ranged from 3 to 19 person-Sv (300 to 1900 person-rem). Because the range of cumulative occupational doses reported by reactors undergoing decommissioning was similar to the range of estimates for reference plants presented in the 1988 GEIS, it was not considered necessary to update the estimates in the previous document at this time.

Activities that resulted in the largest doses during decommissioning included removal of large components, such as the reactor vessel and steam generators. Dismantling the internal structures within the containment building was the activity producing the largest overall doses. Transportation and management of spent fuel each accounted for less than 10 percent of the total. Appendix G provides a more in-depth review of the exposures recorded and anticipated for various activities.

One of the major decommissioning activities that is not performed during routine operation or refurbishment is removal of the reactor vessel. Industry experiences from this activity were reviewed to estimate worker exposure and the amount of radioactive material removed (see Appendix H). As each utility performed this major activity, experiences were shared within the industry and the lessons learned have been used to reduce collective dose to workers and improve the process. Collective worker dose at these sites ranged from 0.14 to 1.8 person-Sv (14 to 180 person-rem). The dismantlement of radioactive structures for the ENTOMB2 option would involve placement of contaminated SSCs in the reactor or containment building.

Facilities could use a demolition process for dismantlement of uncontaminated or slightly contaminated structures; there is a potential for this activity to occur during the dismantlement phases of SAFSTOR, DECON, or ENTOMB1 options. The demolition debris could be disposed of onsite if nonradiologically contaminated. If the debris is radiologically contaminated, it could be sent to a LLW site (except for the ENTOMB1 option, where it would be disposed of in the reactor or containment building structure). However, in cases where the remaining activity was low enough that the licensee could meet the criteria in 10 CFR Part 20, Subpart E, and other regulations, the demolition debris could potentially be disposed onsite for either the DECON or SAFSTOR options. This process has been termed "Rubblization" (see Section 1.3). Rubblization would require a site-specific analysis. The site-specific analysis would be conducted at the time the LTP is submitted for the site. Occupational doses during the activity of crushing the material would be similar to those for dismantlement of the facility in preparation for demolition and offsite disposal. The occupational doses would need to meet the regulatory standards in 10 CFR Part 20. Disposal of the radiologically contaminated demolition debris onsite would also have to meet the radiological criteria for license termination given in 10 CFR Part 20, Subpart E.

Occupational doses to individual workers during decommissioning activities are estimated to average approximately 5 percent of the regulatory dose limits in 10 CFR Part 20, and to be similar to, or lower than, the doses experienced by workers in operating facilities. The average increase in fatal individual cancer risk to a worker during decommissioning, about 8×10^{-5} per year of employment, is less than 2 percent of the lifetime accumulation of occupational risk of premature death of 4.8×10^{-3}. Because the ALARA program continues to reduce occupational doses, no additional mitigation program is warranted.

Public Dose: This section addresses the impacts on members of the public from radiation doses caused by decommissioning activities, including doses from effluents as well as from direct radiation. To determine the relative significance of the estimated public dose for decommissioning, the staff compared dose projections for decommissioning with the historical (baseline) doses experienced at PWRs and BWRs during normal operations. The dose estimates were based on reports evaluating effluent releases during decommissioning efforts and are shown in Appendix G. Levels of radionuclide emissions from facilities undergoing decommissioning decreased because the major sources generating emissions in gaseous and liquid effluents are absent in facilities that have been shut down. However, decommissioning facilities continued to report low levels of radionuclide emissions that resulted from the residual radioactive materials remaining in the facilities. The doses to members of the public from these emissions were also very low. Collective doses to members of the public within 80 km (50 mi) were lower than 0.01 person-Sv (1 person-rem) per year at all decommissioning facilities for

Table 4-1. Comparison of Occupational Dose Estimates from NUREG-0586 (NRC 1988) to those for Decommissioning Reactors

Reactor Type/ Decommissioning Option	1988 GEIS Estimates - Cumulative Occupational Dose, person-Sv (person-rem)	Range of Estimates for Decommissioning Plants - Cumulative Occupational Dose, person-Sv (person-rem)[a]
Boiling Water Reactors		
DECON	18.74 (1874)	7 - 16 (700 - 1600)
SAFSTOR	3.26 - 8.34 (326 - 834)	3.5 (350)
ENTOMB	15.43 - 16.72 (1543 - 1672)	–
Pressurized Water Reactors		
DECON	12.15 (1215)	5.6 - 10 (560 - 1000)
SAFSTOR	3.08 - 6.694 (308 - 664)	4.8 - 11 (480 - 1100)[b]
ENTOMB	9.16 - 10.21 (916 - 1021)	–
Other Reactors (HTGR; FBR)	–[c]	4.3 (430)

(a) These data are based on information provided by plants that are undergoing or have completed the decommissioning process. For facilities that have been completely decommissioned, they represent actual doses accumulated during the decommissioning period For facilities that are still undergoing decommissioning, they represent a combination of actual doses accumulated during activities that have been completed and projected doses for future activities.

(b) The plant reporting a dose estimate of 1100 person-rem is designated as having elected the SAFSTOR option; however, the period between shutdown and active decommissioning was shorter than the minimum 10-year SAFSTOR period that was evaluated in the 1988 GEIS. Therefore, it may be more appropriate to compare the estimated dose for that facility to the 1988 GEIS estimates for the DECON option.

(c) The 1988 GEIS did not provide dose estimates for reactors other than reference light water reactors. Therefore, there are no previous estimates with which to compare the doses for decommissioning the HTGRs and FBR, which are somewhat unique in the commercial nuclear power industry. The dose estimates are expected to be consistent with PWRs and BWRs

which data were available, and, in most cases, they were comparable to or lower than the doses from operating facilities. Doses to a maximally exposed individual were less than 0.01 mSv/yr (1 mrem/yr) at both operating and decommissioning facilities, which is well within the regulatory standards in 10 CFR Part 20 and Part 50.

Offsite doses to the public attributable to decommissioning have been examined for both the maximally exposed individual and the collective doses to the population within 80 km (50 mi) of the plants. To date, effluents and doses during periods of major decommissioning have not differed substantially from those experienced during normal operation. Consequently, direct

exposure and effluents in gaseous and liquid discharges are not expected to result in maximum individual doses exceeding the design objectives of Appendix I to 10 CFR Part 50, the dose and effluent concentration limits in 10 CFR Part 20, or the limits established by EPA in 40 CFR Part 190. Both the average individual dose and the 80-km (50-mi) radius collective doses are expected to remain at least 1000 times lower than the dose from natural background radiation. It should also be noted that the estimated increased risk of fatal cancer to an average member of the public is much less than 1×10^{-6}. Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in occupational or public doses that are different from those found at other nuclear facilities.

4.3.8.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential radiological impacts of decommissioning. This information indicates that the radiological impacts of decommissioning will remain within regulatory limits. Therefore, the staff makes the generic conclusion that the radiological impacts of decommissioning activities are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

The staff also determined that the issue of the long-term radiological aspects of Rubblization or onsite disposal of slightly contaminated material could not be evaluated generically and would require a site-specific analysis. The site-specific analysis would be conducted at the time the LTP for the site is submitted.

4.3.9 Radiological Accidents

As indicated in the Introduction to this Supplement, the staff relies on the Waste Confidence Rule for determining the acceptability of environmental impacts from the storage and maintenance of fuel in the spent fuel pool. The Rule states, in part, that there is, "reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant impact for at least 30 yrs beyond the licensed life for operation...of that reactor at its spent fuel storage basin" (54 FR 39767).[a] However, for the purpose of public information, the staff has elected to include a discussion of potential accidents related to the spent fuel pool in this Supplement.

(a) The Commission reaffirmed this finding of insignificant environmental impacts in 1999 (64 FR 68005). This finding is codified in the Commission's regulations in 10 CFR 51.23(a).

The likelihood of a large offsite radiological release that impacts public health and safety from a facility that has permanently ceased operation is considerably lower than the likelihood of a release from an operating reactor that impacts public health and safety. This is because the potential accidents associated with reactor operation are no longer relevant after the reactor fuel has been removed.

Radiological accidents considered in licensing nuclear power plants are classified as design basis accidents (DBAs) and severe (beyond design basis) accidents. DBAs are those accidents that both the licensee and the NRC staff evaluate to ensure that the plant can withstand normal and abnormal transients and a broad spectrum of postulated accidents without undue hazard to the health and safety of the public. Severe accidents are those that are beyond the design basis of the plant. They are more severe than DBAs because they may result in substantial damage to the fuel, whether or not there are serious offsite consequences. For the most part, DBAs focus on reactor operation and are not applicable to plants undergoing decommissioning. The only DBAs or severe accidents (beyond design basis) applicable to a decommissioning plant are those involving the spent fuel pool. These postulated accidents are not expected to occur during the life of the plant, but are evaluated to establish the design basis for the preventive and mitigative safety systems of the spent fuel storage facility.

4.3.9.1 Regulations

Regulations governing accidents that must be addressed by nuclear power facilities, both operating and shutdown, are found in 10 CFR Part 50 and 10 CFR Part 100. The environmental impacts of DBAs, including those associated with the spent fuel pool, are evaluated during the initial licensing process. The ability of the plant to withstand these accidents is demonstrated to be acceptable before issuance of the operating license. The results of these evaluations are found in license documentation, such as the staff's safety evaluation report, the final environmental statement (FES), and in the licensee's Final Safety Analysis Report (FSAR) or equivalent. The consequences for these events are evaluated for the hypothetical maximally exposed individual. The licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant.

In addition, Appendix E to 10 CFR Part 50 requires each licensee to develop emergency plans and implementing procedures to protect health and safety in the event of an accident. These plans and procedures are maintained up to date during the period of operation of the plant and until such time afer the cessation of plant operations that the NRC grants relief from the emergency planning requirements.

4.3.9.2 Potential for Radiological Accidents as a Result of Decommissioning Activities

Table E-3 in Appendix E indicates that fuel removal, organizational changes, stabilization, chemical decontamination, large component removal, decontamination and dismantlement, system dismantlement, entombment, and transportation are activities that may lead to radiological accidents. Many activities that occur during decommissioning are similar to activities, such as decontamination and equipment removal that commonly take place during maintenance outages at operating plants. However, during decommissioning such activities may be more extensive than similar activities during the period of reactor operations. Consequently, potential accidents associated with these activities may have a higher probability during decommissioning than when the plant is operating. Accidents that occur during these activities may result in injury and local contamination; they are not likely to result in contamination offsite. This section addresses worker injuries from radiological accidents. Injuries from other causes are addressed in Section 4.3.10,"Occupational Issues."

Once the reactor fuel has been moved to the spent fuel pool, the only DBAs contained in the plant's FSAR that are applicable are those associated with the spent fuel pool. These accidents are generally related to fuel handling or dropping heavy objects into the spent fuel pool. As long as the integrity of the spent fuel pool and its supporting systems is maintained, the potential impacts of accidents are bounded by the impacts of those for the spent fuel pool DBAs.

After permanent shutdown of the reactor, the only severe accident of concern is one where the fuel in the spent fuel pool becomes uncovered and results in a zircaloy fire. In this regard, the staff recently conducted a study of spent fuel pool accident risk at decommissioning nuclear power facilities to support development of a risk-informed technical basis for reviewing exemption requests and a regulatory framework for integrated rulemaking (NRC 2001b). As part of its effort to develop generic, risk-informed requirements for decommissioning, the staff determined the frequency of beyond-design-basis spent fuel pool accidents. The event initiators included:

- seismic events (earthquakes)aircraft crashes
- aircraft crashes
- tornadoes and high winds

- impact of a dropped heavy load (such as a fuel cask), resulting in pool drainage or compression or buckling of stored assemblies.

Those spent fuel pool accident sequences that resulted in the spent fuel being uncovered were assumed to culminate in a zirconium fire. The consequences of a zirconium fire event are likely to be severe. The staff's study performed some bounding-consequences analyses.

The impacts of accidents where onsite and offsite doses remain below those allowable for the workers or the public are considered to be undetectable. Accidents that are likely to be undetectable include temporary loss of services, certain decontamination-related accidents, such as liquid spills or leaks during in situ decontamination, and, in some cases, the temporary loss of offsite power or compressed air. The impacts of accidents that could result in offsite doses that exceed EPA's protective action guides (PAGs) (EPA 1991) are considered to be destabilizing. The only accidents that are likely to have destabilizing impacts are those that involve pool drainage that leads to a zirconium fire.

4.3.9.3 Evaluation

The information in this section is based on reviews of existing information from licensees' documents analyzing accidents from decommissioning activities and from a technical review of spent fuel pool accident risk at decommissioning nuclear power facilities. The review of spent fuel pool accidents at decommissioning reactors was performed to support development of a risk-informed technical basis for reviewing emergency plan exemption requests and a regulatory framework for integrated rulemaking (NRC 2001b). Further detail on the sources of information that were used to develop the analysis is given in Appendix I. Because the sources of information included the FBR and the HTGR, the results given in this section are applicable for these facilities.

The accidents and malfunctions covered by licensing documents can be divided into five main categories:

- Fuel-related accidents: These include maintenance and storage of fuel in the spent fuel pool and the movement of fuel into the pool, which could result in fuel rod drops, heavy load drops, and loss of water.

- Other radiological- (nonfuel)-related accidents: These include onsite accidents related to decontamination or dismantlement activities (e.g., material-handling accidents or accidental cutting of contaminated piping) or storage activities (e.g., fires or ruptures of liquid waste tanks).

- External events: These include aircraft crashes, floods, tornadoes and extreme winds, earthquakes, volcanic activity, forest fires, lightening storms, freezing, and sabotage.

- Offsite events: These consist solely of transportation accidents that occur offsite (transportation accidents are discussed in Section 4.3.17).

- Hazardous (nonradiological) chemical-related accidents: These have the potential for injury to the offsite public, either directly from the accident or as a result of further actions initiated by the accident.

A detailed list of the types of accidents that could occur in each of these five categories is given in Appendix I. Appendix I also contains a table showing the estimated dose consequences of accidents during the decommissioning period that were reported in various licensing-basis documents. The highest doses result from postulated fuel-related accidents and radioactive-material-related accidents. Information obtained from licensing-basis documents for the fuel-related accidents showed that the highest offsite doses were from the cask or heavy load-handling accidents, the accidents that assumed a 100 percent fuel failure, and the spent fuel-handling accidents. The postulated accident with the greatest estimated offsite dose was a spent resin-handling accident that had a calculated offsite dose consequence accident of 0.0096 Sv (0.96-rem) TEDE.

The likelihood of an accident as well as its consequence are activity-dependent. Accidents related to dropping fuel elements occur only when the fuel is being moved. Accidents related to dismantlement activities would occur only during the decontamination and dismantlement process and not during a storage period or after a facility has been entombed. External events, however, could occur during any activity or decommissioning option. Table I-5 in Appendix I compares the types of accidents with the different activities that are performed during SAFSTOR, ENTOMB, and DECON.

The staff has reviewed activities associated with decommissioning and determined that many decommissioning activities not involving spent fuel that are likely to result in radiological accidents are similar to activities conducted during the period of reactor operations. The radiological releases from potential accidents associated with these activities may be detectable. However, work procedures are designed to minimize both the likelihood of an accident and the consequences of an accident, should one occur, and emergency plans and procedures will remain in place to protect health and safety while the possibility of significant radiological accidents exists.

In addition to the licensing-basis documents reviewed, the staff's report, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants* (NRC 2001b), provides an analysis of the consequences of the spent fuel pool accident risk and includes a limited analysis of the offsite consequences of a severe spent fuel pool accident. These analyses showed that the consequences of a spent fuel accident could be comparable to those for a severe reactor accident. As part of its effort to develop generic, risk-informed requirements for decommissioning, the staff performed analysis of the offsite radiological consequences of beyond-design-basis spent fuel pool accidents using fission product inventories at 30 and 90 days and 2, 5, and 10 years. The results of the study indicate that the risk at spent fuel pools is low and well within the Commission's Quantitative Health Objectives. The risk is low because of the very low likelihood of a zirconium fire even though the consequences from a zirconium fire could be serious.

The Commission has considered the storage of spent fuel and has concluded in the Waste Confidence Rule in 10 CFR 51.23 that "... spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation...." The staff has reviewed the potential accidents associated with spent fuel storage during decommissioning, the likelihood of the accidents, and the potential consequences of the accidents. Emergency plans and procedures will remain in place to protect health and safety while the possibility of significant radiological accidents associated with spent fuel exists.

4.3.9.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, concerning the potential impacts of non-spent-fuel-related radiological accidents resulting from decommissioning. This information indicates, that with the mitigation procedures in place, the impacts of radiological accidents are neither detectable nor destabilizing. Therefore, the staff makes the generic conclusion that the impacts of non-spent-fuel-related radiological accidents are SMALL. The staff has considered mitigation and concludes that no additional measures are likely to be sufficiently beneficial to be warranted.

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential impacts of spent-fuel-related radiological accidents resulting from decommissioning. The staff affirms the conclusions in the Waste Confidence Rule and concludes that the impacts of spent fuel storage are SMALL. The staff concludes that additional mitigation measures are not likely to be sufficiently beneficial to be warranted.

4.3.10 Occupational Issues

Occupational issues are related to human heath and safety. The discussion here includes physical, chemical, ergonomic, and biological hazards. This discussion does not include radiological impacts, which are discussed in Section 4.3.8.

4.3.10.1 Regulations

The Occupational Safety and Health Act of 1970 (29 USC 651 et seq.) was enacted to safeguard the health of the worker. Regulations implementing the act are found in Title 29 ("Labor") of the Code of Federal Regulations, Subtitle B, "Regulations Relating to Labor." Subpart A of 29 CFR Part 1910 adopts, by reference, occupational safety and health standards which have been found to be national consensus standards or established Federal standards. Standards adopted in 29 CFR 1910.6 include, among others, standards of the American National Standards Institute, the American Society for Testing and Materials, the American Welding Society, the National Fire Protection Association, the National Institute for Occupational Safety and Health, the Society of Automotive Engineers, and Underwriters Laboratories. Specific safety and health regulations for Construction are included in 29 CFR Part 1926. These regulations are administered by the Occupational Safety and Health Administration (OSHA).

States may also develop and enforce State standards for occupational safety and health. However, State agencies may not assert jurisdiction over any occupational safety or health issue with respect to which a Federal standard has been issued under Section 6 of the Occupational Safety and Health Act unless the State has a plan for the development and enforcement of State standards. State plans for development and enforcement of State standards are covered by 29 CFR Part 1902. Approved State plans for enforcement of State standards are listed in 29 CFR Part 1952. These plans identify the State agency responsible for development and enforcement of the State standards.

4.3.10.2 Potential Impacts of Decommissioning Activities on Occupational Issues

Table E-3 in Appendix E indicates that nearly all decommissioning activities may impact occupational issues. Typical hazards of concern can be grouped into the following categories: physical, chemical, ergonomic, biological, and radiological (Plog 1988). Radiological hazards are discussed in Section 4.3.8, and other hazards are discussed in this section in the context of decommissioning activities.

The impacts of decommissioning activities on occupational issues are considered detectable if the accident or injury rate during decommissioning exceeds average U.S. industrial accident rates. The impacts of decommissioning activities on occupational issues are considered destabilizing if the accident or injury rate during decommissioning becomes sufficiently large that decommissioning activities must be halted to address worker safety and the decommissioning schedule is threatened.

4.3.10.3 Evaluation

Typically, any significant operation, such as decommissioning, will have an environment, safety and health (ES&H) plan that serves as the guidebook for anticipating and preventing any injury or harm occurring to the worker while working on that particular job. This plan addresses all the major occupational hazards and is used to ensure that OSHA, State, and other local standards are met. The site-specific ES&H plan for a decommissioning activity should be referred to for detailed information regarding specific worker health and safety information; the occupational hazards described in this Supplement should not be used for ensuring the protection of an individual worker health and safety.

Physical hazards: During the decommissioning process, the major sources of physical occupational hazards involve the operation and use of construction and transportation equipment. Vehicles, grinders, saws, pneumatic drills, compressors, and torches are some of the more common equipment that can cause injury if improperly used. Heavy loads, which are often moved about by cranes and loaders, must be controlled to avoid injury. The majority of these hazards will be part of dismantlement. Workplace designs and controls should be the first line of defense when preventing workplace injuries. Hard hats and other personal protective equipment (PPE) are also important interventions and can serve as a secondary protective measure should workplace controls fail.

Many activities during decommissioning, for example, the use of cutting torches, have the potential to initiate fires. These activities, which are common during construction and demolition, should be identified in advance. It is expected that precautions will be taken to minimize the likelihood of fires and that suitable measures will be available for dealing with fires should they occur.

Table 4-2. Predicted Noise Ranges from Significant Construction Equipment (EPA 1971)

Equipment	Levels in dBA at 15 m (50 ft)
Trucks	82-95
Front loader	73-86
Cranes (derrick)	86-89
Pneumatic impact equipment	83-88
Jackhammers	81-98
Pumps	68-72
Generators	71-83
Compressors	75-87
Back hoe	73-95
Tractor	77-98
Scraper/grader	80-93

Noise is also a physical hazard that will be significant during decommissioning. The majority of noise will come from equipment such as rivet busters, grinders, and fans. Table 4-2 lists the typical A-weighted sound levels (decibel [dBA] levels) of standard construction equipment without the use of noise control devices or other noise-reducing design features. Although workplace controls and designs are the best methods for reducing noise, PPE (e.g., earplugs) can also be used to protect against hearing loss. If workers need to use PPE, their ability to communicate effectively is reduced and safety may be compromised.

Temperature is a physical hazard that will vary, depending on the decommissioning location and the amount of indoor versus outdoor activity. Heat and cold stress should be considered in any decommissioning plans. Normal core temperatures are 37.6°C (99.6°F) or 37°C (98.6°F) as measured by mouth. Fluctuations in core temperatures of 1.1°C (2°F) below or 1.7°C (3°F) above the normal impair performance markedly. If this range is exceeded, health hazards, e.g., hypothermia or heatstroke, exist (Plog 1988).

Physical hazards are prevalent at all the decommissioning sites. The loudest dBA noise hazard at one plant was the fan noise of 107 dBA (see Section 4.3.16, "Noise"). One facility undergoing decommissioning provided information on the number of safety occurrences (minor and injuries), accident prevention notices, PPE violations, near misses, and OSHA reportables. Many PPE violations appear to be repeat offenders. Most of the injuries and incidents noted occur in the construction area. The maximum yearly number of incidents and injuries (37) appeared in 1998 with a high number of PPE violations (53) also occurring during this reporting year. Typically, no lost work time is attributed to injuries or incidents.

Electrical hazards are a significant concern during decommissioning. During stabilization, licensees often rewire the site to eliminate unneeded electrical circuits or repower certain operations from outside. For SAFSTOR, monitoring equipment may need to be installed and some systems will need to be de-energized. All of these activities, plus various other activities (operating cranes near power lines, digging near buried cables, etc.), pose electrical threats to workers. Proper precautions should be taken to avoid injury.

Chemical hazards: Inhalation and dermal contact with chemicals are serious worker health hazards. Ingestion is typically not a voluntary route of exposure but accidental ingestions (pipetting with mouth, siphoning gasoline, etc.) have been known to occur at the job site. Solvents and particulates are the two contaminants of greatest concern. Some of the key chemicals of concern found in building materials, paints, light bulbs, light fixtures, switches, electrical components, and high-voltage cables include asbestos, lead, polychlorobiphenyls (PCBs), and mercury. Other chemicals that have been found during decommissioning activities include low levels of potassium, sodium chromate, and nickel found in the suppression chamber. Also, quartz and cristobalite silica were detected during concrete demolition. Fumes, often including lead and arsenic, and smoke from flame cutting and welding are significant sources of chemical exposure during decommissioning.

Decommissioning involves many activities that expose workers to chemical hazards:

- chemical decontamination of the primary loop
- removal of reactor components
- decontamination of the piping walls
- removal of contaminated soil
- removal of radioactive structures

- removal of hydrocarbon fuel from storage
- removal of hazardous coatings
- removal of asbestos
- removal of chemical-containing systems, such as demineralizers and acid- and caustic-containing tanks
- removal of sodium and NaK residue.

Proper planning, workplace design, and engineering controls should be supplemented with PPE and appropriate administrative solutions to ensure adequate worker protection from not only chemical hazards but all hazards.

Chemical hazards at one facility undergoing decommissioning included lead and arsenic vapors, created from torch cutting and using the plasma arc, and quartz and cristobalite particulates, created from chipping and hammering. At the facility, air sample summary logs indicate a few exposures that exceeded OSHA's permissible exposure limit (PEL). Arsenic (PEL = 0.01 mg/m^3) levels exceeded the PEL four times during the sampling period. The highest arsenic reading was 0.03 mg/m^3 when using the torch and grinder to cut a hole during one activity. The same activity reported the only lead (PEL = 0.05 mg/m^3) reading above PEL at 1.5 mg/m^3. Quartz (PEL = 0.1 mg/m^3) and cristobalite (PEL = 0.05 mg/m^3) particulates greatly exceeded the PELs when using the chipping hammer (817.84 and 1.5 mg/m^3, respectively). The drill and chipping hammer also created too much quartz dust (9.2 mg/m^3).

Ergonomic hazards: The physiological and psychological demands of decommissioning work create ergonomic hazards in the workplace. Discomfort and fatigue are two indicators of ergonomic stress that can lead to decreased performance, decreased safety, and increased chance of injury (Plog 1988). The typical sources of ergonomic stress during decommissioning activities include mechanical vibrations, lifting, and static work. Workplace designs, work shifts, and breaks should be planned accordingly to avoid ergonomic stress.

Biological hazards: Biological hazards include any virus, bacteria, fungus, parasite, or living organism that can cause a disease in human beings (Plog 1988). Typical sanitation practices can help avoid the obvious vectors for disease. Having clean, potable drinking water, marking nonpotable water, and providing cleansing areas are the most important elements of a sanitation system.

Given that many nuclear reactor facilities undergoing decommissioning are old, there is an increased chance that workers will be exposed to molds and other biological organisms that grow in and on the buildings. Molds and fungus, when inhaled, can cause minor to serious pulmonary problems. Dermal contact could cause rash and/or irritation. A thorough inspection of the facility should be conducted and proper cleansing and PPE should be used when biological agents are identified.

In general, human health risks for most decommissioning options are expected to be dominated by occupational injuries to workers engaged in activities such as construction, maintenance, and excavation. Historically, actual injury and fatality rates at nuclear reactor facilities have been lower than the average U.S. industrial rates. Occupational injury and fatality risks are reduced by strict adherence to NRC and OSHA safety standards, practices, and procedures. Appropriate State and local statutes must also be considered when assessing the occupational hazards and health risks for any decommissioning activity. The staff assumes strict adherence to NRC, OSHA, and State safety standards, practices, and procedures during decommissioning.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in occupational hazard issues that are different from those found at other nuclear reactor facilities.

4.3.10.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential impacts of decommissioning activities on occupational issues. This information indicates that the impacts on occupational issues are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that for all plants, the potential impacts on occupational issues are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

4.3.11 Cost

A decommissioning cost assessment is not a NEPA requirement. However, an accurate decommissioning cost estimate is necessary for a safe and timely plant decommissioning. Therefore, this Supplement includes a decommissioning cost evaluation, but the cost is not evaluated using the environmental significance levels nor identified as a generic or site-specific issue.

4.3.11.1 Regulations

The regulatory procedure for decommissioning a nuclear power facility is set out principally in NRC regulations in 10 CFR 50.75, 50.82, 51.53, and 51.95. The regulations to ensure the safe and timely decommissioning of nuclear power facilities and the availability of decommissioning funds were originally established by the NRC in 1988. These regulations, principally 10 CFR 50.75, specify the minimum amount of funds that a LWR licensee must have to demonstrate reasonable assurance of sufficient funds for decommissioning. The minimum decommissioning funds required by the NRC reflect only the efforts necessary to achieve termination of the 10 CFR Part 50 license. Costs associated with other activities related to facility deactivation and site closure, including operation of the spent fuel storage pool, construction, operation, and decommissioning of an ISFSI, demolition of uncontaminated or decontaminated structures that meet release criteria, and site restoration activities after sufficient residual radioactivity has been removed to meet NRC license termination requirements are not included in the minimum decommissioning fund requirement.

The regulations in 10 CFR 50.75 also require that licensees submit, at least once every 2 years, a report on the status of its decommissioning fund, including specifying the amount of funds accumulated, and a schedule for accumulating the remainder to be collected. This report is to be submitted annually for plants that are within 5 years of the end of licensed operations. 10 CFR 50.75 (f)(i) also requires that each power reactor licensee shall report the status of its decommissioning trust fund annually if the facility has already closed (before the end of its licensed life).

In addition to the financial assurance requirements for decommissioning in 10 CFR 50.75, other requirements in 10 CFR 50.75 and 50.82 specify requirements for submitting cost estimates for decommissioning to the NRC:

- 10 CFR 50.75(f)(2) requires that a licensee shall, at or about 5 years prior to the projected end of operations, submit a preliminary decommissioning cost estimate.
- 10 CFR 50.82(a)(4)(i) requires a licensee to provide an estimate of expected costs for the activities being proposed in the PSDAR.
- 10 CFR 50 82(a)(8)(iii) requires a licensee to provide a site-specific decommissioning cost estimate within 2 years following permanent cessation of operations.
- 10 CFR 50.82(a)(9)(ii)(F) requires a licensee to provide an updated site-specific estimate of remaining decommissioning costs as part of its LTP.

The regulations in 10 CFR 50.82 also specify the criteria that a licensee must meet before they can withdraw funds from the decommissioning fund for decommissioning activities.

4.3.11.2 Potential Impacts of Decommissioning Activities on Cost

As indicated in Table E-3 in Appendix E, all aspects of decommissioning will have an impact on decommissioning costs. The potential impacts of decommissioning activities on cost vary due to the cost of waste management and disposal of the LLW generated during decommissioning and to the uncertainty associated with regulatory requirements.

The variability in waste management and disposal arises because the Barnwell Low-Level Radioactive Waste Management Disposal Facility, the last remaining facility that is available to dispose of all classifications of LLW generated by all but two nuclear power facilities located throughout the United States, is scheduled to stop accepting waste from all NRC licensees except those located in the Atlantic Compact by 2009 (see NUREG-1307, Rev. 9, *Report on Waste Burial Charges* [NRC 2000]). However, decommissioning of most of the nuclear power facilities in the United States is not expected to occur until sometime after 2009. This cost uncertainty is generally applicable to most of the nuclear power facilities that are currently being decommissioned and those that will be decommissioned in the future. This cost uncertainty, however, is somewhat mitigated by the availability of the Envirocare disposal facility in Utah. Envirocare can accept most Class A LLW for disposal from any generator in the United States. (More than 95 percent of LLW generated during nuclear power facility decommissioning is Class A.) Other LLW storage and disposal sites are also currently being proposed.

The uncertainty associated with regulatory requirements is a reflection of the different requirements and standards for cleanup applied by different States and localities. While NRC cleanup requirements for terminating a license are well defined, these other external requirements may significantly influence the cost of decommissioning. For example, local jurisdictions might impose additional requirements than those imposed by the NRC. The cost of the extra cleanup is not reflected in the decommissioning fund required by the NRC.

4.3.11.3 Evaluation

The estimated cost of decommissioning all of the nuclear power facilities that have been built and operated in the United States is provided in Table 4-3 (in January 2001 dollars). The costs provided in the table are those estimated by the owners of the individual plants and reported to the NRC.

Shown in the table are the actual costs to complete the decommissioning and terminate the 10 CFR Part 50 licenses for each of those facilities that have reached this milestone of their life-cycle. Facility-specific estimates are also provided for each plant that has been permanently shut down and is either actively undergoing decommissioning or is in safe storage awaiting active decontamination and dismantlement. The costs shown are estimates developed by the licensee and reported in their PSDARs, site-specific cost estimate reports, LTPs, etc. These estimates are adjusted to January 2001 dollars.

Table 4-3 provides the range of costs estimated by utilities to decommission all of the nuclear power facilities that are currently operating or have not indicated an intent to permanently shut down. Cost ranges, rather than facility-specific cost estimates, are provided for these plants, reflecting the fact that these estimates are not as well developed as for those plants that have already permanently shut down. These cost ranges were developed from licensee-provided estimates in the March 1999 biennial decommissioning reports adjusted to January 2001 dollars.

Finally, Table 4-3 provides a range of decommissioning cost estimates for the ENTOMB options. These options have not been used or considered by any U.S. nuclear power facility licensee to date. Cost estimation methods for the ENTOMB options are, thus, not as well developed as for the DECON and SAFSTOR methods. The values quoted in the table were developed from an analysis of the two entombment scenarios described in Chapter 3 for a "reference" (i.e., typical) PWR and BWR. The reference PWR was assumed to be the Trojan Plant in Oregon; the reference BWR was assumed to be the Columbia Generating Station in Washington.

The cost of decommissioning results in impacts on the price of electricity paid by ratepayers. These impacts generally occur over the life of the facility as the decommissioning fund is being collected. However, for those nuclear reactor facilities that shut down prematurely (as is the case for the majority of the facilities identified in Table 4-3), the impact may also occur for a number of years after permanent shutdown while the under-collected portion of the fund continues to be collected.

This analysis assesses the impact of cost by evaluating the total cost to decommission a nuclear power facility and terminate its Part 50 license. This impact is summarized in Table 4-4. As can be seen, the cost to decommission a large (>200 MWe) nuclear power facility is estimated to range from $150 million to $700 million and is highly dependent on the factors discussed previously.

4.3.11.4 Conclusions

The staff has reviewed these data, recognizing that an evaluation of decommissioning cost is not a NEPA requirement. This information is presented here as a summary of actual and predicted decommissioning costs based on recently available data.

4.3.12 Socioeconomics

There are two primary pathways through which nuclear power plant activities create socioeconomic impacts on the area surrounding the plant. The first is through expenditures in the local community by the plant work force, and direct purchases of goods and services required for plant activities. The second pathway for socioeconomic impact is through the effects on local government tax revenues and services. When a nuclear power plant is closed and decommissioned, most of the important socioeconomic impacts will be associated with the plant closure rather than with the decommissioning process.

4.3.12.1 Regulations

There are no Federal or State regulations pertaining to any particular level of socioeconomic impacts, as there are for some environmental effects. Socioeconomic impacts are an element of NEPA documentation that must be addressed and mitigated, if warranted.

4.3.12.2 Potential Impacts of Decommissioning Activities on Socioeconomics

As indicated in Table E-3 in Appendix E, all of the socioeconomic impacts of decommissioning are related to organizational or staffing changes. The impacts of decommissioning were assessed recognizing that the potentially large impacts of plant closure may occur simultaneously with those of the actual decommissioning activities. However, as indicated in Section 1.3, impacts related to the decision to permanently cease operations are outside the scope of this Supplement.

Socioeconomic changes related to direct expenditures in the local community are considered not detectable if there is little or no impact on housing values, education and other public services, and local government finances, are not distinguishable from normal background variation due to other causes. Impacts on housing are considered not detectable when no discernable change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and little or no housing construction or conversion

Table 4-3. Cost Impacts of Decommissioning (in January 2001 Dollars)

Nuclear Plant	Electric Power Generation Rating	Reactor Type	Decommissioning Option	Estimated Decommissioning Cost, $ million
Decommissioning Completed				
Fort St. Vrain	330 MWe	HTGR	DECON	230 (189 [1996])[a]
Pathfinder	59 MWe	BWR	SAFSTOR	20 (13 [1992])[a]
Shoreham	809 MWe	BWR	DECON	258 (182 [1994])[a]
Currently Being Decommissioned				
Big Rock Point	67 MWe	BWR	DECON	364
Dresden, Unit 1	200 MWe	BWR	SAFSTOR	340
Fermi, Unit 1	61MWe	FBR	SAFSTOR	36
GE-VBWR	13 MWe	BWR	SAFSTOR	10
Haddam Neck	619 MWe	PWR	DECON	404
Humboldt Bay, Unit 3	65 MWe	BWR	SAFSTOR	284
Indian Point, Unit 1	257 MWe	PWR	SAFSTOR	259
La Crosse	50 MWe	BWR	SAFSTOR	111
Maine Yankee	860 MWe	PWR	DECON	400
Millstone, Unit 1	660 MWe	BWR	SAFSTOR	563
Peach Bottom, Unit 1	40 MWe	HTGR	SAFSTOR	65
Rancho Seco	913 MWe	PWR	SAFSTOR	394
San Onofre, Unit 1	410 MWe	PWR	SAFSTOR	427
Saxton	NA	PWR	SAFSTOR	44
Three Mile Island, Unit 2	792 MWe	PWR	SAFSTOR	502
Trojan	1130 MWe	PWR	DECON	250
Yankee Rowe	167 MWe	PWR	DECON	244
Zion, Unit 1	1085 MWe	PWR	SAFSTOR	386
Zion, Unit 2	1085 MWe	PWR	SAFSTOR	495
Currently Operating				
69 PWR Reactors	486 - 1270 MWe	PWR	DECON/SAFSTOR	264 - 695
35 BWR Reactors	514 - 1265 MWe	BWR	DECON/SAFSTOR	152 - 663
"Reference PWR"	1130 MWe	PWR	ENTOMB1/ ENTOMB2	290 - 400
"Reference BWR"	1100 MWe	BWR	ENTOMB1/ ENTOMB2	410 - 750

(a) Actual cost to complete the decommissioning and the year the license was terminated.

Table 4-4. Summary of Cost Impacts by Decommissioning Option and Reactor Type and Size (January 2001 Dollars)

	Decommissioning Cost Range, $million					
Decommissioning Option	**PWR < 200 MWe**	**PWR ≥ 200 MWe**	**BWR < 200 MWe**	**BWR ≥ 200 MWe**	**HTGR**	**FBR**
DECON	244	250 - 404	364	>182[a]	189	--
SAFSTOR	44	259 - 597	13 - 284	340 - 563	65	36
DECON/SAFSTOR (currently operating reactors)	--	264 - 695	--	152 - 663	--	--
ENTOMB1/ENTOMB2	--	290 - 400	--	410 - 750	--	--

(a) Cost data from the Shoreham plant, which only generated one effective full power day. There was little or no contamination to many plant systems. Not representative of other large BWRs.

occurs. Detectable impacts result when there is a discernable increase or reduction in housing availability, rental rates and housing values exceed the inflation rate elsewhere in the State, or more than minor housing conversions and additions or abandonments occur. Destabilizing impacts occur when project-related demand results in a very large excess of housing or very limited housing availability, where there are considerable increases or decreases in rental rates and housing values, or when substantial conversion or abandonment of housing units occurs.

Socioeconomic changes related to tax revenues and services (education, transportation, public safety, social services, public utilities, and tourism and recreation) are considered not detectable if the existing infrastructure (facilities, programs, and staff) could accommodate changes in demand related to plant closure and decommissioning without a noticeable effect on the level of service. Detectable impacts arise when the changes in demand for service or use of the infrastructure is sizeable and would noticeably decrease the level of service or require additional resources to maintain the level of service. Destabilizing impacts would result when new local government programs, upgraded or new facilities, or substantial numbers of additional staff and unsupportable levels of resources are required because of facility-related demand.

4.3.12.3 Evaluation

The size of the work force varies considerably among operating U.S. nuclear power facilities, with the onsite staff generally consisting of 600 to 800 personnel per reactor unit. The average permanent staff size at a nuclear power facility ranges from 600 to 2400 people, depending on the number of operating reactors at the site. In rural or low-population communities, this number of permanent jobs can provide employment for a substantial portion of the local work

force. In addition to the work force needed for normal operations, many temporary personnel are required for various tasks that occur during outages. Between 200 and 900 additional workers may be employed during these outages to perform the normal outage maintenance work. These are work force personnel who may be in the local community only a short time, but during these periods of extensive maintenance activities, the additional personnel could have a substantial effect on the locality. If, as expected, the decommissioning process requires a smaller work force than the onsite operating staff (typically 100 to 200 staff) and if the local economy is stable or declining, the result of the reduction in work force related to plant closure could be economic hardships, including declining property values and business activity, and problems for local government as it adjusts to lower levels of tax revenues. However, even the small decommissioning work force will tend to mitigate temporarily the full adverse socioeconomic effects of terminating operations.

If there is a net reduction in the community work force but the economy is growing, the adverse impacts of this ongoing growth (e.g., housing shortages and school overcrowding) could be reduced.

If the decommissioning work force were substantially larger than the operating work force, the result could be increased demand for housing and public services but also increased tax revenues and higher real estate values. If the economy is characterized by decline, then decommissioning could temporarily reverse the adverse economic effects.

In a stable economy, a net increase in the community work force could lead to some shortages in housing and public services, as well as to the higher tax revenues and real estate values mentioned previously. In a growing economy, decommissioning could act as an exacerbating factor to the ongoing shortages that already might exist.

Changes in work force and population: Changes of over 3 percent to local population in a single year are expected to have detectable effects, while changes of over 5 percent are expected to result in destabilizing impacts. These negative impacts include reduction of school system enrollments, weakened housing markets, and loss of demand for goods and services provided by local businesses. The size of the work force required during decommissioning, relative to that during operations, is an important determinant of population growth or decline.

The impact from facility closure depends on the rate and amount of population change. If decommissioning begins shortly after shutdown with a large work force, then the impact of facility closure is mitigated. Facilities where layoffs are sudden and there is a long delay before active decommissioning begins are more likely to experience negative population-related socioeconomic impacts. Thus, large plants located in rural areas that permanently shut down early and choose the SAFSTOR option are the likeliest to have negative impacts. Considering all variables such as plant size and community size as the same, plants that go into immediate

DECON have less immediate negative impacts; the impacts from the ENTOMB option, assuming those preparations were made immediately after shutdown, would be less significant than those of SAFSTOR.

Data on changes in work force were collected at facilities that are being decommissioned where information on operational and decommissioning work force is available. This information is presented in Appendix J, Table J-1. The table also shows total population in the host county at the time of plant shutdown, to indicate the potential importance of the facility closure.

In order to identify any unusual downward trends in county population around the time of a facility shutdown, data were collected showing the range of percentage changes in population that have occurred at facilities currently being decommissioned. U.S. Census population data for the counties that house the decommissioning facility are used to assess changes in population around the time of shutdown by comparing percentage changes in the county population with State population changes during the same time period. This information is provided in Appendix J, Table J-2.

In only two cases did the corresponding county populations decline around the time of the closure (Indian Point, Unit 1, in Westchester, New York, and Millstone, Unit 1, in New London, Connecticut). However, during the same time period that the host counties experienced population declines, the hosting States also experienced population declines. This suggests that the decline in the county population was part of an overall State population trend. Observing population trends over a decade may not capture small population declines or reductions in the rate of growth from one year to the next; however, longer trends should indicate whether or not the county had any large destablizing population or housing impacts from the facility closure.

In 18 out of the 20 facility case studies where populations grew, the populations of the counties where the facilities are located increased more rapidly or at the same rate as the State population. The two cases where the populations of the counties grew at a slower rate include relatively rural counties in California (Humboldt and Alameda) during time periods when the State of California experienced very high urban population growth. In general, experience of decommissioning facilities to date does not show any impacts from population change, either because the closure-related changes were small relative to the population base or because they were offset by other growth in the area.

Local tax revenues: Changes in tax revenues of less than 10 percent are considered not detectable, i.e., they result in little or no change in local property tax rates and the provision of public services. Losses between 10 percent and 20 percent result in detectable impacts, with increased property tax levies (where State statutes permit) and decreased services by local municipalities. Changes over 20 percent have destabilizing impacts on the governments involved. Tax levies must usually be increased or services cut substantially, and the payment of debt for any substantial infrastructure improvements made in the past becomes problematic.

Borrowing costs for local jurisdictions may also increase because bond rate agencies downgrade their credit rating. However, it is important to remember that these rules of thumb are based on uncompensated changes. For example, if a local taxing jurisdiction lost a nuclear facility that amounted to 35 percent of its tax base, but 30 percentage points of this loss were made up by the opening of a new manufacturing facility, the net impact would be 5 percent or not detectable. Small, rural areas are more likely to be affected than more urban areas having a wider variety of economic opportunities and more sources of tax revenue. Impacts depend on the type of plant, size of plant, and whether or not there are multiple units at a site, all of which help determine the net loss in employment at plant closure as well as the loss of tax base.

More information is available for facilities that have recently closed than for facilities closed more than 10 years ago (see Appendix J, Table J-3). The findings from this body of evidence confirm the findings discussed above. The primary taxing authorities for most of the decommissioning plants are the county and city in which the facility is sited. Tax information is typically provided by local taxing authorities (assessor's office) or from town planners familiar with the tax revenues generated by the facility.

The tax revenue impacts on the local communities of facility closure range from zero impact (tax-exempt plants) to loss of 90 percent of the community tax base. The magnitude of tax-related impacts varies primarily by the size of the taxing jurisdiction and the taxing structure of the State in which the plant is sited, as well as certain plant characteristics. Hence, the smaller the taxing community (less economically diverse), the greater the tax revenue impact when the nuclear facility closes down.

In communities where the revenues from the facility made up over 50 percent of the tax revenue base (with the remaining tax revenues made up primarily of private residential real estate), there were significant increases in the tax rates on the remaining real estate as well as cut-backs in services provided by property-tax revenues. The manner in which a State calculates the value of the plant also affects both the amount and timing of tax losses when a nuclear power facility closes and how much such a closure disrupts the tax revenue stream in a given community:

- At one plant, the assessed value of the plant was calculated as a proportional share of the value of the parent corporation, where the percentage is based on the book value of assets in the State (or sub-State taxing jurisdiction) compared with the book value of the assets of the entire corporation. This approach kept the plant at full assessed value for 7 years after its permanent closure until it was dropped from the books of the parent corporation as an asset. Several other approaches are discussed in Appendix J.

- Tax rules may or may not permit gradual phase-out. In some cases, the taxable asset value of the plants was allowed to phase out over a period of time (3 to 5 years). In other cases, the plants were simply taken off the tax roles in 1 year.

- The State may or may not share the burden with local government. In one State, school districts' lost property-tax collections were offset by equalization methods at the State level, which reduced the impact due to plant closures. In another State, the small neighboring township was the sole recipient of all property-tax revenues generated by the plant. Thus, the community's tax revenues were significantly reduced when the revenue source shut down.
- Utility ratepayers in some jurisdictions are entitled to share in funds recovered from sale of plant components and commodities and unspent decommissioning funds. These are not taxes but are available to general fund revenues.

In addition to characteristics specific to the taxing jurisdiction, the size, age, and ownership of the facilities play a role in how much the facilities affect tax revenues. Generally, the larger the facility (MWt), the larger the tax revenue impact. In addition, aging of the facility depreciates its book value and its assessed value over time. Usually, the falling assessed value of an aging facility will have reduced the tax revenue of the facility before closure, thus lessening the change in tax revenues generated by the facility after closure. A facility that closes suddenly, well before the end of its license expiration, will have a greater impact on the community tax base. Finally, if a facility is owned by a public entity, there is no effect on the tax base from closure because the facility was never taxable.

The choice of the decommissioning option appears to have had no bearing on the loss of tax receipts. The impact has to do with the size and suddenness of the loss of tax revenue (size and age of facility) related to plant closure only. The length of delay between shutdown and decommissioning does not appear to affect the size of the impact on tax revenue losses. No commercial nuclear power reactor has used the ENTOMB options, but there is no reason to expect ENTOMB to have any different impact on tax revenue losses than SAFSTOR or DECON.

Public services: The impacts of decommissioning on public services are generally much smaller than the impacts of plant closure. Impacts of closure are closely related to the tax-related impacts on the community and are affected by the same characteristics of the plant (size and age, tax treatment, and dependence of the local community on plant-related revenues), but not on the choice of decommissioning option or the amount of time between shutdown and active decommissioning. Inquiries were made to local governments in the vicinity of closed plants about public service impacts during and after shutdown and decommissioning. Their assessments are discussed in Appendix J and data are shown in Table J-4. Analysis was also conducted in the course of preparing NUREG-1437 (NRC 1996). Based on that experience, the following generalizations can be made.

Detectable impacts on housing result when there is a discernable increase or reduction in housing availability, when rental rates and housing values exceed the inflation rate elsewhere in the State, or when minor housing conversions and additions or abandonments occur.

Destabilizing impacts occur when project-related demand results in a very large excess of housing or very limited housing availability, where there are considerable increases or decreases in rental rates and housing values, and when there is substantial conversion or abandonment of housing units. The prevailing belief of realtors and planners in communities surrounding the case study facilities is that closing the facilities has had a range of effects on the marketability or value of homes in the vicinity. Housing choices of local residents are rarely affected by the presence of the facility, but people may move into the area in response to (temporarily) softer housing prices and commute to a nearby urban area. However, the decommissioning process itself does not appear to have produced any detectable impacts on housing.

The impacts to the following public services may occur as a result of plant closure: education, transportation, public safety, social services, public utilities, and tourism and recreation.

In general, detectable impacts arise when the demand for service or use of the infrastructure is sizeable. Impacts would noticeably decrease the level of service or require additional resources to maintain the level of service. Destabilizing impacts would result when new programs, upgraded or new facilities, or substantial additional resources and staff are required because of facility-related demand. Specific information for each of the areas of public service for closed plants is provided in Appendix J.

In general, the communities that suffered the most from the tax-related impacts of plant closure also experienced the greatest impacts on public services. To some extent, the communities themselves control the amount of impact by how they allocate property taxes to local budgets before shutdown, and how they prioritize these services post-shutdown. For example, one community channeled a great deal of the surplus revenues into building extensive social services for the elderly and for local youth in its community. After the plant ceased operations, the tax revenues decreased, all of the social services were downsized, and many will have to be eliminated because they are not considered priority programs (relative to public safety and education). In a second case, the county provided relatively few social services. Thus, the impact on social services after the shutdown was minor, although several other categories of public service experienced larger impacts. For example, education was largely funded by plant tax revenues and the responsible school district has recently indicated that it may have to file for bankruptcy, so the impact there was substantial[(a)]. However, all of these impacts were related to plant closure; in no case did the decommissioning process itself result in detectable impacts on public services.

(a) The size of impact can be significantly influenced by the mechanism that the State uses for funding, e.g., if the State makes up the difference between what the local school districts can fund from the local property tax and what the State has decided is the appropriate level of per-student expenditures.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in impacts on socioeconomics that are different from those found at other nuclear facilities.

Summary: The impacts of plant closure are those that are observed by the community, rather than the impacts from decommissioning activities because they occur at about the same time. The impacts occur either through changing employment levels and local demands for housing and infrastructure, or through decline of the local tax base and the ability of local government entities to provide public services. The effects of employment changes on population growth are expected to be not detectable if population changes (reductions or increases) are less than 3 percent per year, detectable but not destabilizing if the population change is between 3 percent and 5 percent, and destabilizing if the population change is greater than 5 percent per year. Experience so far has shown that in most cases, reductions in employment related to plant closure even at fairly large sites do not generally produce local population changes greater than 3 percent, regardless of the type of plant and decommissioning option selected. The impacts of the decommissioning work force are even smaller.

The effect on the local tax base and public services related to closure depends on the size of the plant-related tax base relative to the overall tax base of local government, as well as on the rate at which the tax base is lost. Changes in annual tax revenues less than about 10 percent are considered nondetectable, i.e., they result in little or no change in local property tax rates and the provision of public services. Losses between 10 percent and 20 percent result in detectable but not destabilizing impacts, with increased property tax levies (where State statutes permit) and decreased services by local municipalities. Changes over 20 percent have destabilizing impacts on the governments involved. Experience has shown that publicly owned tax-exempt plants will not have an impact through this mechanism. In addition, fully depreciated plants, or a plant that is located in an urban or urbanizing area with a large or rapidly growing tax base will also not be impacted by this mechanism. A large, newer, relatively undepreciated plant, located in a small, isolated community, is much more likely to exceed the 20-percent criterion. If the plant tax base is phased out slowly after closure in these circumstances, the impact is more likely to be mitigated. Neither the type of reactor nor the method chosen for decommissioning matters.

Decommissioning itself has no impact on the tax base and no detectable impact on the demand for public services.

4.3.12.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential impacts of decommissioning on socioeconomics. This information indicates that the impacts of decommissioning on socioeconomics are neither detectable nor destabilizing. Therefore, the staff makes the generic conclusion that the impacts on socioeconomics are SMALL. The staff has considered mitigation and concludes

that no additional measures are likely to be sufficiently beneficial to be warranted.

4.3.13 Environmental Justice

An evaluation of environmental justice is performed to determine if minority and/or low-income groups bear a disproportionate share of negative environmental consequences. Executive Order 12898, dated February 16, 1994 (59 FR 7629), directs Federal executive agencies to consider environmental justice under NEPA. The Executive Order does not create whole new categories of impacts that need to be considered; nor does it create any right, benefit, or trust responsibility, substantive or procedural, that can be enforced by law or equity. It is designed to improve internal management of agencies to ensure that low-income and minority populations do not experience disproportionately high and adverse human health or environmental effects because of Federal actions.

Environmental justice has not been evaluated previously for decommissioning activities at reactor facilities.

4.3.13.1 Regulations

The CEQ has provided *Environmental Justice: Guidance Under the National Environmental Policy Act* (CEQ 1997). Although NRC is an independent agency, the Commission has committed to undertake environmental justice reviews, and has provided specific information in Office Instruction LIC-203, Nuclear Reactor Regulation (NRR), *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues* (NRC 2001a). The CEQ guidance and NRR instructions provide several key definitions and the framework for analysis.

Low-income population: Low-income populations in an environmental impact area should be identified where census block groups within the environmental impact area have (1) more than 50 percent low-income persons or (2) the percentage of persons in households below the poverty level is significantly greater (typically, at least 20 percentage points) than in the geographical area chosen for comparative analysis. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another or a set of individuals (e.g., migrant workers or American Indians[(a)]), where either type of group experiences common conditions of environmental exposure or effect.

Minority: Individuals who are members of the following population groups: American Indian and Alaska Native; Asian; Native Hawaiian and other Pacific Islander; Black or African

(a) For consistency, the term "American Indian" is used throughout this document to conform to the definition of "minority population."

American, not of Hispanic or Latino origin; or some other race and Hispanic or Latino (of any race).[a]

Minority population: According to the CEQ, minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another or a geographically dispersed/transient set of individuals (e.g., migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as not to artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds. NRR adopted a standard of 20 percentage points as "meaningfully greater."

Disproportionately high and adverse human health effects: When determining whether human health effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable: (a) whether the health effects, which may be measured in risks and rates, are significant (as used by NEPA), or above generally accepted norms (adverse health effects may include bodily impairment, infirmity, illness, or death); (b) whether the risk or rate of hazard exposure by a minority or low-income population, to an environmental hazard is significant (as used by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and (c) whether health effects occur in a minority or low-income population, affected by cumulative or multiple adverse exposures from environmental hazards.

Disproportionately high and adverse environmental effects: When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable: (a) whether there is or will be an impact on the natural or physical environment that significantly (as used by NEPA) and adversely affects a minority or low-income population (such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or American Indian tribes when those impacts are interrelated to impacts on the natural or physical environment); (b) whether environmental effects are significant (as used by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or

(a) "Other" may be considered a separate minority category. In addition, the 2000 Census included multi-racial data. Multi-racial individuals should be considered in a separate minority, in addition to the aggregate minority category.

American Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and (c) whether the environmental effects occur or would occur in a minority or low-income population, affected by cumulative or multiple adverse exposures from environmental hazards.

4.3.13.2 Potential Impacts of Decommissioning Activities on Environmental Justice

As indicated in Table E-3 in Appendix E, decommissioning activities that may affect environmental justice are related to organizational or staffing changes and offsite transportation issues. However, the assessment of environmental justice is related to most of the other specific issues discussed throughout this Supplement. Any decommissioning activity that results in a disproportionate share of negative environmental consequences to minority or low-income groups has the potential to be an adverse environmental justice impact.

Detectability and destabilization, as they relate to environmental justice, must be defined in proportion to the minority and low-income populations that reside in the area of the power plant. Proportionment must be determined at each site at the time of decommissioning.

4.3.13.3 Evaluation

Most of the environmental justice impacts relate to land use, environmental and human health, and socioeconomics. Impacts due to onsite land disturbance are likely to be not detectable because the amounts of land disturbance are generally very small and usually occur in areas of the site previously disturbed by construction or operation of the facility. Impacts from disturbances to offsite land will generally not occur because offsite land generally is not disturbed as a result of decommissioning. If offsite land disturbance is required (e.g., if a new offsite road or rail spur is needed to transport large components or waste from decommissioning), the impact on environmental justice is site-specific because it will depend on the location of the new route relative to low-income populations or other affected resources on which they may depend. Some minority and low-income populations normally live along rail lines and truck routes. Previous transportation analyses have found that the impacts would be small from normal operations or from accidents. Thus, no disproportionately high and adverse effects are expected for any particular segment of the population, including minority and low-income populations, that may live along proposed rail and truck routes. Siting and construction of these offsite transportation upgrades would include an evaluation of cultural and other resources in the disturbed areas. Usually, offsite physical environmental impacts of decommissioning will be not be detectable because offsite environmental impacts from decommissioning are generally not detectable.

Socioeconomic impacts on minority and low-income populations due to plant closure could range from nondetectable to destabilizing, depending on the distribution of job impacts within the community and the effects of plant closure on local tax revenues and public services; however, the impact of decommissioning would generally not be detectable. More generic

information on overall socioeconomic impacts can be obtained by observing demographic statistics. In the 21 decommissioning case studies observed, it was concluded that facility closure would not have a detectable socioeconomic impact on low-income and minority populations. In other words, there appears to be no indication that minority or low-income populations would suffer disproportionately high and adverse impacts from the closure of the facilities. Because decommissioning has even smaller effects, its impact also would have been not detectable. The environmental justice conclusions are based on demographic information, i.e., the overall impact of the facility on the community. Discussions were also held with community members at some sites.

In addition, information provided by local government and social service providers helps determine the socioeconomic impacts on low-income and minority populations. In many of these case studies, the nuclear facilities are located in primarily white communities and tend to be located near bodies of water where upper-income real estate is built. Those that are employed by the facility tend to fall into the upper-income bracket within the communities where the facilities are located. Selected socioeconomic indicators are found in Appendix J, Table J-5, for the closed nuclear power plants studied.

The determination of whether the minority or low-income populations are disproportionately highly and adversely impacted by facility decommissioning activities needs to be made on a site-by-site basis because their presence and their socioeconomic circumstances will be site-specific. Data indicate there is no reason to expect adverse socioeconomic impacts to be correlated with type of plant (see Table J-5). However, adverse socioeconomic impacts are correlated with large facility size, early shutdown, and small, isolated host communities. If minority and low-income populations are present, adverse impacts from facility closure would be somewhat more likely in small, isolated communities than in larger urban areas. It is not clear whether these effects would be disproportionately high and adverse.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in environmental justice considerations that are different from those found at other nuclear facilities.

4.3.13.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on environmental justice, including comments received on the draft of Supplement 1 of NUREG-0586. Based on this information, the staff has concluded that the adverse impacts and associated significance of the impacts must be determined on a site-specific basis. Executive Order 12898 (59 FR 7629), dated February 16, 1994, directs Federal executive agencies to consider environmental justice under the National Environmental Policy Act 1969 (NEPA). Although the NRC is an independent agency, the Commission has committed to undertake environmental justice reviews. Subsequent to the submittal of the PSDAR, the NRC staff will consider the impacts related to environmental justice from decommissioning activities.

4.3.14 Cultural, Historic, and Archeological Resources

Cultural resources include any prehistoric or historic archeological site or historic property, site, or district listed in or eligible for inclusion in the National Register of Historic Places or otherwise having significant local importance. The Federal agency (in this case the NRC) is responsible for the evaluations through consultations with the State Historic Preservation Officer (SHPO), or if appropriate, the Tribal Historic Preservation Officer (THPO), that is responsible for determining which sites or properties are of significant historic or archeological importance. The NRC is also responsible for including other interested parties and affected American Indian tribes. Disagreements between the parties are resolved by the Advisory Council on Historic Preservation.

Evaluation of the potential presence of cultural resources should not rely solely on a query of the SHPO database, but should be based on field surveys and evaluations of the site. Although these evaluations may have been performed as part of the initial environmental evaluation for the sites or as part of another licensing action (e.g., license renewal), the coverage and adequacy of earlier survey efforts needs to be re-evaluated in cases where an impact may occur. Earlier field surveys and methods may not conform to current standards.

4.3.14.1 Regulations

The Federal statute that is most directly applicable to cultural resource issues during the decommissioning process is the National Historic Preservation Act (NHPA) of 1966 as amended (16 USC 470 et seq.). This Act created the National Register of Historic Places (National Register) and requires the heads of all Federal agencies to consider the impacts of the undertakings on any cultural properties that are listed on the National Register or that are eligible for listing. Section 106 of the NHPA requires each Federal agency to identify, evaluate, and determine the effects of an undertaking on any cultural resource site that may be within the area impacted by that undertaking. This section also requires consultation to resolve adverse effects of an undertaking and establishes mechanisms to obtain and incorporate comments from consulting parties. Federal agencies are directed by 36 CFR Part 800 to comply with the stipulations of NHPA as well as pertinent cultural, historical, and archeological protection provisions of NEPA, the Historic Sites Act of 1935, and the Antiquities Act of 1906 and their implementing regulations. The Historic Sites Act of 1935 (16 USC 461-467) declared a national policy of preserving for the public historic sites, buildings, and objects of national significance. It also led to the establishment of the Historic Sites Survey, the Historic American Buildings Survey, and the Historic American Engineering Record within the National Park Service.

Most other cultural, historical, and archeological protection regulations are primarily directed at resource protection on Federal lands, but in some cases these statutes may be applicable to the decommissioning of commercial power reactors. Several commercial nuclear power reactors are located on Federal lands. The Antiquities Act of 1906 (16 USC 431-433) prohibits destruction of vertebrate fossils and archeological sites on Federal lands and regulates their

removal under a permitting procedure. These regulations were further strengthened by the Archeological Resources Protection Act of 1979 (16 USC 470aa-47011), which prohibits the willful or knowing destruction and unauthorized collection of archeological sites and objects located on Federal lands. It also establishes a permitting system for archeological investigations and requires consultation with concerned tribes prior to permit issue. The Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.) protects graves on Federal lands and establishes tribal ownership of human remains and/or associated funerary objects taken from Federal lands and requires the inventory and repatriation to the tribes of any remains or funerary objects held by Federal agencies. Certain more recent Executive Orders regarding consultation with American Indian tribes and protection of religious sites and values could also be relevant.

Many of the States also have statutes that protect cultural, historical, and archeological resources on State lands. Some States also have burial and cemetery statutes that apply to private land as well. These State-level statutes are usually administered through the appropriate SHPO.

4.3.14.2 Potential Impacts of Decommissioning Activities on Cultural, Historic, and Archeological Resources

As indicated in Table E-3 in Appendix E, decommissioning activities that have a potential to adversely impact cultural resources include stabilization, decontamination and dismantlement, and large component removal. These activities adversely impact cultural resources primarily via land disturbance, which could damage or destroy the resource, or alter the contextual setting of the resource. In addition to the direct effects of land clearing, indirect effects such as erosion and siltation may adversely affect some cultural resources. Decommissioning activities also may alter the site access and administrative protection of the resources.

In a few situations, the nuclear facility itself could be potentially eligible for inclusion in the National Register of Historic Places, especially if it is older than 50 years and represents a significant historic or engineering achievement. In this case, appropriate mitigation would be developed in consultation with the SHPO. Even for buildings that are less than 50 years old, the processes and engineering that were employed may be of interest and may be eligible for the Historic American Engineering Record.

Impacts to cultural, historical, or archeological resources are considered detectable if the activity has a potential to have a discernable adverse affect on the resources. The impacts are destabilizing if the activity would degrade the resource to the point that it would be of significantly reduced value to the future generations, such as physically damaging structures or artifacts or destroying the physical context of the resource in its environment.

4.3.14.3 Evaluation

In most cases, the amount of land required to support the decommissioning process is relatively small and is a small portion of the overall plant site. Usually, the areas disturbed or utilized to support decommissioning are within the operational areas of the site and typically are within the protected area. Usually, there is sufficient room within the operational areas to function as temporary storage, laydown, and staging sites. In most cases, management, engineering, and administrative staff would be assigned space in existing support or administration buildings. In some cases, the licensees have installed trailers or temporary buildings to house engineering and administrative staff or to otherwise support decommissioning. In most cases examined, the licensees expect to restrict decommissioning activities to highly disturbed operational areas but a few do expect to use lands beyond the operational areas. The licensees typically anticipate utilizing an area of between 0.4 ha (1 ac) to approximately 10.5 ha (26 ac) to support the decommissioning process. One facility (Big Rock Point) required a new transmission line right of way (ROW) to provide electrical power to the plant site during decommissioning (this line will also provide power to the onsite independent spent fuel storage installation [ISFSI] after decommissioning is completed). However, construction of a new transmission line ROW is considered an unusual situation. It is expected that some sites will require the reconstruction or installation of new transportation links, such as railroad spurs, road upgrades, or barge slips. Activities conducted within the operational areas are not expected to have a detectable effect on important cultural resources because these areas have normally been highly degraded during facility construction and operation. Activities conducted outside of the operational areas may have detectable impacts, depending on the size and type of impact, and the cultural resources potentially affected.

The potential for adverse impacts is probably not affected by the type of facility (BWR, PWR, HGTR, or FBR) or the decommissioning option selected. However, the different decommissioning options are likely to alter the timing of the impact to cultural resources more than the magnitude of the impacts. DECON may require slightly more land area to support a larger number of activities occurring at the same time. ENTOMB2 would probably have the least likelihood of adverse impacts because some large components may be left in place, reducing the land requirements needed for large construction equipment, as well as waste storage and barge or rail loading areas. The potential impacts of SAFSTOR may be smaller than DECON or ENTOMB1, depending on the time period over which activities are performed. If dismantling and decontamination occur slowly over many years (incremental decontamination and dismantlement), the same storage and staging areas can be reused for sequential activities; however, if many activities are performed over a short time period at the end of the SAFSTOR period, the impacts may be as large as DECON.

4.3.14.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on cultural, historic, and archeological resources, including comments received on the draft of

Supplement 1 of NUREG-0586. For plants where the disturbance of lands beyond the operational areas is not anticipated, the impacts on cultural, historic, and archeological resources are not considered to be detectable or destabilizing. Therefore, the staff makes a generic conclusion that for such plants, the potential impacts to cultural, historic, and archeological resources are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

If disturbance beyond the operational areas is anticipated, the impacts may or may not be detectable or destabilizing, depending on site-specific conditions, and cannot be predicted generically. Therefore, the staff concludes that if disturbance beyond the operation areas is anticipated, the potential impacts may be SMALL, MODERATE, or LARGE and must be determined through site-specific analysis. Before the licensee conducts any decommissioning activity that might result in the disturbance of historic properties or archeological resources outside the site operational area, the NRC will, in accordance with the National Historic Preservation Act of 1966 as amended (16 USC 470 et seq.), consult with the appropriate SHPO or THPO to evaluate potential impacts.

4.3.15 Aesthetic Issues

Aesthetics is the study or theory of beauty and the psychological responses to it. Aesthetic resources include natural and man-made landscapes and the way the two are integrated. In this evaluation, aesthetic resources are considered to be primarily visual and relate the structures and the visual attributes of the decommissioning site.

4.3.15.1 Regulations

There are no regulations that relate specifically to the degree to which aesthetics may be impacted by a Federal project. The Bureau of Land Management (BLM), however, has developed a Visual Resource Management (VRM) system,[a] which involves cataloging scenic values, establishing management objectives for those values through the resource-management planning process, and evaluating proposed activities to determine whether they conform with the management objectives. This system provides tools for identifying the visual resources of an area and assigning them to inventory classes. It also provides tools for determining whether the potential visual impacts from proposed activities or developments meet the management objectives established for an area or whether design adjustments will be required. This tool was designed to meet the BLM's responsibilities for maintaining scenic values of public lands. However, it does not directly apply to a decommissioning facility, where the landscape has already been altered by the facility's structure.

(a) VRM System (http://www.blm.gov/nstc/VRM/vrmsys.html), accessed July 7, 2001.

4.3.15.2 Potential Impacts of Decommissioning Activities on Aesthetics

Table E-3 in Appendix E indicates that structure dismantlement and entombment are activities that may have aesthetic impacts. Nuclear power facilities generally contain four main buildings or structures, as described in Chapter 3: the containment or reactor building, the turbine building, auxiliary building, and cooling towers (if any). Cooling towers and stacks may be clearly visible from a distance. Sites also contain a number of storage tanks, a large switchyard, and various administrative and security buildings. Decommissioning may include demolition or dismantlement of any of these structures. The switchyard may be left in place after the termination of the license because it is an integral part of the power distribution grid.

Levels of impacts for aesthetic resources are defined largely by the impact of the proposed changes as perceived by the public, not merely the magnitude of the changes themselves. The potential for significance arises with the introduction (or continued presence) of an intrusion into an environmental context, resulting in measurable changes to the community (e.g., population declines, property value losses, increased political activism, tourism losses).

Decommissioning activities and the changes that they bring are considered to have a nondetectable impact on the host communities' aesthetic resources if there are (1) no complaints from the affected public about a changed sense of place or a diminution in the enjoyment of the physical environment and (2) no measurable impact on socioeconomic institutions and processes. They are considered to have detectable but not destablizing impacts on the host communities' aesthetic resources if there are (1) some complaints from the affected public about a changed sense of place or a diminution in the enjoyment of the physical environment and (2) measurable impacts that do not alter the continued functioning of socioeconomic institutions and processes. The activities are considered to have detectable and destabilizing impacts on the host community's aesthetic resources if there are (1) continuing and widely shared opposition to the activities or the changes the activities bring based solely on a perceived degradation of the area's sense of place or a diminution in the enjoyment of the physical environment and (2) measurable social impacts that perturb the continued functioning of community institutions and processes.

4.3.15.3 Evaluation

The aesthetic impacts of decommissioning fall into two sets: (a) impacts, such as noise, associated with decommissioning activities that are temporary and cease when decommissioning is complete and (b) the changed appearance of the site when decommissioning is complete.

Typically, nuclear power facilities are located in flat-to-rolling countryside in wooded or agricultural areas. In some cases, the facility structures are visible for many miles. In other cases, there are only a few views of the facility from the land, although it is more obvious from the water (lake, ocean, or bay).

Aesthetic issues related to construction and operation of facility structures were addressed in many (but not all) of the Final EISs prepared in response to applications for construction permits and operating licenses. In most cases, the visual impacts of the plant were said to have been mitigated to some extent by the surrounding topography or vegetation. In other cases, visible structures (such as cooling towers) were said to be "highly visible" but "the staff does not consider such an impact to be unacceptable." For decommissioning, the issue related to aesthetics is not one of placing another facility or building on a site, but one of removing buildings or structures.

The issues evaluated in this section concern the impacts of decommissioning activities on aesthetic resources at and around all types of nuclear power facilities (PWRs, BWRs, HTGR, or FBR). During the decommissioning period, the appearance of the facility will be slowly altered if the buildings are dismantled.

During decommissioning, the impact of activities on aesthetic resources would be temporary. The impacts would be limited both in terms of land disturbance and the duration of activity and would have characteristics similar to those encountered during industrial construction: dust and mud around the construction site, traffic and noise of trucks, and construction disarray on the site itself. In most cases, these impacts would not easily be visible offsite. Aesthetic impacts could improve fairly rapidly in the case of an immediate DECON if the licensee chooses to dismantle the facility, remove the structures, and regrade and revegetate the site before license termination. Impacts could also remain the same or similar in the case where the licensee maintains the structures throughout the decommissioning period and leaves them standing even after license termination (either after decontamination of the structures or possibly along with entombment of the reactor building) or throughout a long SAFSTOR period or ENTOMB. In these latter cases, the aesthetic impacts of the plant would be similar to those that occurred during the operational period.

The removal of structures is generally considered beneficial to the aesthetic impacts of the site. In a few cases, where facilities have been located on the Great Lakes or ocean coast, the facility may have been used by boaters as a landmark. However, it is highly unlikely that this would become an issue that would preclude dismantlement of the facility structures.

The retention of the structures during a SAFSTOR period or the retention of structures onsite at the time the license is terminated is likewise not an increased visual impact, but instead a continuation of the visual impact analyzed in the facility construction or operations FES. The staff has not identified any mechanism that would result in a greater negative aesthetic impact than had previously been considered during the development of the construction FES.

Decommissioning activities will be conducted onsite, both inside and outside existing buildings (in the case of dismantlement or shipping activities). Any visual intrusion (such as the

dismantlement of buildings or structures) would be temporary and would serve to reduce the aesthetic impact of the site. At a minimum, the aesthetic impact of the site would not be improved but would remain that of an industrial site as evaluated in the facility's original FES.

Licensees are expected to use best-management practices (BMPs) to control many of the potentially adverse impacts of decommissioning activities on aesthetics (e.g., dust and noise), as discussed in other sections.

4.3.15.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential impacts of decommissioning activities and the changes in plant appearance on aesthetics. This information indicates that the impacts on aesthetics are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that for all plants, the potential impacts on aesthetics are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

4.3.16 Noise

Noise is a "direct effect," as defined by Section 1508 of the CEQ Regulations for Implementing NEPA, i.e., effects caused by an action that occur at the same time and place as that action. For NRC licensees, the implementing regulations for NEPA are given in 10 CFR Part 51.

Noise is usually defined as sound that is undesirable because it interferes with speech, communication, or hearing; is intense enough to damage hearing, or is otherwise annoying. Noise levels often change with time. To compare levels over different time periods, several descriptors were developed that take into account this time-varying nature. These descriptors are used to assess and correlate the various effects of noise, including land-use compatibility, sleep and speech interference, annoyance, hearing loss, and startle effects:

- A-weighted sound levels (dBA) - typically used to account for the response of the human ear
- C-weighted scale (dBC) - generally used to measure impulsive noise such as air blasts from explosions, sonic booms, and gunfire
- day-night average sound level (DNL) - used to evaluate the total community noise environment. The DNL is the average A-weighted sound level during a 24-hour period with 10 dB added to nighttime levels (between 10 p.m. and 7 a.m) to account for the increased human sensitivity to night-time noise events.

The discussions in this section relate to noise and related impacts that may be heard offsite. The impacts from noise to workers is addressed in Section 4.3.10.

4.3.16.1 Regulations

The EPA was given the jurisdiction in the Noise Control Act of 1972 (42 USC 4901 et seq.) to promulgate and enforce the regulations that were issued under the Act. Funding for EPA to perform this function was eliminated in early 1981. However, Congress did not repeal the Noise Control Act. The DNL was endorsed by the EPA and is mandated by the U.S. Department of Housing and Urban Development (HUD), the Federal Aviation Administration (FAA), and the Department of Defense (DoD) for land-use assessments. The EPA has determined that no significant effects on public health and welfare occur for the most sensitive portion of the population (within an adequate margin of safety) if the prevailing DNL is less than 55 dB (NAS 1977). The FAA bases its noise guidelines on land use. For residential uses, sound levels up to 65 dB are acceptable. Certain residential areas with sound-blocking features can handle up to 75 dB. For livestock farming and breeding, compatibility is considered to exist up to 75 dBA. These guidelines are advisory in nature and are not mandatory (14 CFR Part 150).

The Federal Housing Administration (FHA), under HUD, established noise assessment guidelines under 24 CFR 51B (1979; amended April 25, 1996). The FHA/HUD site acceptability levels are summarized as follows:

- Acceptable (DNL is 65 dBA or less) - Typical building materials and construction will make any impacts to indoor noise minimal. Outdoor recreation and activities would not be impacted. No approval requirements or abatement measures are needed under this condition.

- Normally unacceptable (DNL is 65 to 75 dBA) - Noise exposure will impact outdoor use of the area and indoor use may be affected. Walls or other barriers may be needed to reduce outdoor noise levels. Indoor noise levels may need to be reduced using special construction methods.

- Unacceptable (DNL above 75 dBA) - The noise conditions in this situation are unacceptable and activities need to be approved on a case-by-case basis.

Local and State regulations may also exist regarding noise restrictions and abatement decisions. Many States prohibit only nuisance noise and have not established specific numerical environmental noise standards, while others have very specific requirements. For example, the State of Maine has sound-level limitations for construction that are a function of time of day, area characteristics, and duration of the noise.

4.3.16.2 Potential Impacts from Noise of Decommissioning Activities

Table E-3 in Appendix E indicates that structure dismantlement is an activity that may have noise impacts. During the decommissioning process, the sounds that might be heard at offsite locations include noise from construction, vehicles, grinders, saws, pneumatic drills, compressors, and loudspeakers. Noise levels from these sources have to be compared to current noise levels of the operating facility and background noise present at the site to determine potential impacts. Table 4-5 lists predicted noise ranges for significant sources of noise during decommissioning.

Noise level increases larger than 10 dBA to the DNL at the site boundary during the day might be expected to lead to interference with outdoor speech communication, particularly in rural areas or low-population areas where the day-night background noise level is in the range of 45 to 55 dBA.

The noise impacts of decommissioning activities are considered detectable if sound levels are sufficiently high to disrupt normal human activities on a regular basis. The noise impacts of decommissioning activities are considered destabilizing if sound levels are sufficiently high that the affected area is essentially unsuitable for normal human activities, or if the behavior or breeding of a threatened or endangered species is affected.

Table 4-5. Predicted Noise Ranges from Significant Decontamination and Dismantlement Sources (INEEL 1999)

Source	Source Strength dBA	Reference Distance, m	Predicted Noise Level Ranges (dBA) at Various Distances from the Reference Distance			
			150 m (500 ft)	300 m (1000 ft)	0.8 km (0.5 mi)	1.6 km (1 mi)
Construction Equipment	85-90	15[a]	65-75	59-69	51-61	45-55
Truck	85-90	15	65-75	59-69	51-61	45-55
Rail Engine	86-96	30[b]	76-86	71-81	64-74	58-68
Rail Car, 64 km/h (40 mph)	80-86	30	68-74	62-68	53-59	48-54

(a) 15 m ≈ 50 ft.
(b) 30 m ≈ 100 ft.

4.3.16.3 Evaluation

When noise levels are below those that result in hearing loss, impacts are judged primarily in terms of adverse public reactions to the noise. Generally, surveys around major sources of noise such as large highways and airports find that, when the DNL increases above 60 to 65 dBA, noise complaints increase significantly (FICN 1992). FHA/HUD uses a DNL of 65 dBA as the primary criterion for impact on residential properties and nearby populations. The staff believes that noise levels below 60 to 65 dBA are considered to be insignificant. Business and institutional properties may be less sensitive to changes in noise levels, but all populations of concern should be considered when estimating the noise impact of decommissioning activities.

Typically, operating reactor facilities do not result in offsite sound levels greater than 10 dBA above background. However, at some sites, sound levels at and above this level have been calculated at critical receptor locations. The principal sources of noise from facility operations are natural-draft and mechanical-draft cooling towers, transformers, and loudspeakers. Other occasional noise sources may include auxiliary equipment, such as pumps to supply cooling water from a remote reservoir. Generally, noise from these sources is not heard by a large number of people offsite. Of these sources, only loudspeakers would be anticipated to continue during the decommissioning period. The staff assumes that decommissioning activities will be scheduled to minimize high noise levels during the night and during critical periods for important animal species.

In most cases, during decommissioning the sources of noise would be sufficiently distant from critical receptors outside the plant boundaries that the noise would be attenuated to nearly ambient levels and would be scarcely noticeable, as in the case for operating plants. However, in some cases, such as the use of equipment to demolish concrete, the noise levels offsite could be sufficiently loud (60 to 65 dBA at the nearest receptor site) that activities may need to be curtailed during early morning and evening hours. It is highly unlikely, based on past decommissioning experience, that the offsite noise level from a plant during decommissioning would be sufficient to cause hearing loss. However, in one case, noises at a facility being decommissioned have been reported at levels of up to 107 dB (dropping to 50 dB less than 1.6 km [1 mi] away) as a result of the spent fuel pool cooling system. Nearby residents complained to the plant staff about these noise levels; engineering changes were made in the fans that were causing the noise and the issue was resolved.

The timing of the noise impacts and the duration or intensity will vary depending on the decommissioning option and the procedures that are used. More noise will occur during active dismantlement than during the storage period of SAFSTOR. Some demolition activities could increase noise levels temporarily. In addition to mitigation of noise levels based on engineering design, noise abatement procedures can be considered in decommissioning plans to reduce noise, particularly at night.

No differences are expected between the noise levels of future decommissioning activities at operating plants and the noise levels observed at facilities undergoing decommissioning. It is anticipated that most decommissioning activities will not represent an audible intrusion on the community for any type of nuclear power facility (BWR, PWR, HGTR, or FBR).

4.3.16.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential noise impacts of decommissioning activities. This information indicates that the noise impacts are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that for all facilities, the potential noise impacts are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

4.3.17 Transportation

In considering activities for decommissioning, transportation can be considered both an activity and an issue. Transportation of equipment, material, and waste is an activity that is performed throughout the entire decommissioning process. However, it is treated as an issue in this Supplement and is given its own section.

This section addresses impacts related to transporting equipment and materials (radiological and nonradiological) offsite. Materials transported to offsite disposal facilities include nonhazardous waste, LLW, hazardous waste, and mixed waste. As discussed in Chapter 1, the shipment of spent nuclear fuel is not within the scope of this Supplement. Radiological impacts include exposure of transport workers and the general public along transportation routes. Nonradiological impacts include additional traffic volume, additional wear and tear on roadways, and potential traffic accidents.

4.3.17.1 Regulations

Regulations that apply to the transportation of hazardous, mixed waste, and radioactive material promulgated by the U.S. Department of Transportation (DOT) are contained in 49 CFR Parts 171-177. NRC regulations related to transportation of LLW are contained in 10 CFR Part 71, "Packaging and transportation of radioactive material." These regulations contain requirements for transport vehicles, maximum radiation levels for packages and vehicles, special packaging requirements, driver training, vehicle and packaging inspections, marking and labeling of packages, placarding of vehicles, and training of emergency personnel to respond to mishaps. Highway routing restrictions for certain shipments of LLW are also included in DOT regulations. NRC regulations contain performance requirements for certain

types of transportation packages of radioactive material. In addition, Federal and State regulations govern the size and weights of trucks. The staff assumes that equipment, materials, and waste transportation are conducted within applicable regulations.

4.3.17.2 Potential Decommissioning Impacts from Transportation

Table E-3 in Appendix E indicates that transportation-related activities may impact the transportation infrastructure and public health and safety. The types of transportation impacts for decommissioning nuclear power facilities and operating plants are similar. The factors that determine the magnitude of transportation impacts of decommissioning include:

- changes in waste production due to decontamination and dismantlement activities that increase the amount of waste shipped offsite
- changes in the transportation methods (rail, truck, or barge) related either to the increased amount to be shipped offsite or to the type of material to be shipped.
- changes in the mix of types of waste categories shipped offsite.

The public health impacts result from exposures of transport workers and the general public along transportation routes during normal shipments and from material released as a result of transportation accidents, as well as from transportation accidents that do not involve the release of radioactive material. The radiological impacts to public health and safety are considered detectable if the dose rates from shipping containers exceed regulatory limits. They are considered destabilizing if material is shipped in unapproved containers. The nonradiological impacts of transportation of radioactive waste are considered detectable or destabilizing if the vehicles are maintained or driven in a manner that would result in a significantly greater accident rate than experienced by the trucking industry.

The nonradiological, infrastructure impacts are increases in traffic density, wear and tear on roadways and railways, and transportation accidents. The impacts of decommissioning activities on the transportation infrastructure are considered detectable if the increased traffic causes a decrease in level of service or measurable deterioration of affected roads that can be directly tied to activities at the plant. The impacts of decommissioning activities are considered destabilizing if the level of service becomes unacceptable or roads become unusable because of activities at the plant.

4.3.17.3 Evaluation

The transportation impacts are dependent on the number of shipments to and from the facility, the type of shipments, the distance that material is shipped, and the nonradiological waste/fixed waste quantities and disposal plans. The distance that the waste travels depends on the plant's proximity to a disposal site. One decommissioning facility, located in Oregon, ships LLW 480

km (300 mi) to the U.S. Ecology burial site on the Hanford Reservation in Richland, Washington. Another decommissioning facility located in California ships LLW 4300 km (2700 mi) to the Barnwell facility in South Carolina.

The number of shipments and volume of waste shipped during the decontamination and dismantlement phases of decommissioning are greater than during operations. Information on shipments, which was received from nine plants, is shown in Appendix K. Because data on the waste volume of shipments were received from only seven plants, estimates of waste volume and shipment numbers in several cases (as footnoted in the table) reflect only a single facility and may be significantly higher or lower than for the average facility in that grouping. The impacts from FBRs and HTGRs would be encompassed by those for the PWRs and BWRs since the distance shipped is less and the plant sizes are generally smaller.

Nonradioactive material from the site for general disposal will likely be shipped to landfills. However, because licensees cannot release material with detectable amounts of radioactive material, a number of sites may ship much of their solid waste to vendors specializing in the management of LLW or to LLW sites such as that at Clive, Utah.

A generic analysis was conducted to estimate human health impacts associated with transporting decontamination and dismantlement wastes from reactor sites to LLW burial grounds. The RADTRAN 4 computer code (Neushauser and Kanipe 1992), which is commonly used for transportation impact calculations in support of environmental documentation, was used for the analysis. RADTRAN 5 (Neushauser and Kanipe 1996) is the latest version of the code, originally developed by Sandia National Laboratories to support the NUREG-0170 environmental impact analysis (NRC 1977). It uses the same basic methods for calculating impacts but does the calculations in a probabilistic framework.

Based on information from Trojan and Maine Yankee, LLW was categorized as one of three types--high activity, low activity, and very low activity--and a typical volume and activity were estimated for each type of LLW. The impacts of transporting each type of LLW were estimated. There are likely to be additional nonradiological impacts on public health and safety from transportation accidents associated with transportation of uncontaminated material.

Radiological impacts: For this Supplement, the public health and safety impacts of transportation of radioactive waste are evaluated on the basis of compliance with applicable regulations. The Commission has taken the position (46 FR 21619) that its "...regulations are adequate to protect the public against unreasonable risk from the transportation of radioactive materials." This evaluation was based, in part, on the findings of NUREG-0170 (NRC 1977). A recent re-evaluation of transportation risks, using updated information and assessment tools (Sprung et al. 2000), found that risks are lower than estimated in NUREG-0170. Licensees are expected to comply with all applicable regulations when shipping radioactive waste from decommissioning. Therefore, the effects of transportation of radioactive waste on public health and safety are considered to be neither detectable nor destabilizing.

Nevertheless, the staff performed an evaluation of the likely magnitude of these impacts using available data. Radiological impacts are divided into those for "routine" or incident-free shipments (i.e., the shipment reaches its destination without incident) and those for shipments that involve an accident with a subsequent radiological release. In each case, the impact is expressed in cumulative dose for the transport workers and public. The results of the calculations are shown in Table 4-6. The details of the assumptions made in the analysis are discussed in Appendix K. In order to bound the impacts, a distance of 4800 km (3000 mi) was selected. Dose rates for incident-free shipment of high-activity LLW were assumed to be at the regulatory limits, and dose rates for incident-free shipment of low-activity LLW were assumed to be at one-tenth of regulatory limits. Radiological impacts of shipment of very low-level activity LLW were assumed to be negligible compared to shipments of high-level and low-level activity LLW. However, shipment of very low-level activity waste was considered in evaluating nonradiological transportation of LLW. With these assumptions and the additional assumptions listed in Appendix K, the results of the analysis should bound the transportation impacts for all decommissioning options for PWRs and BWRs.

Ramsdell et al. (2001) indicate that shipment of spent fuel by rail reduces the radiological impacts significantly (more than a factor of 10 for shipments from the northeast to Nevada). Similar reductions would be expected in the radiological impacts of the shipment of LLW from decommissioning if shipments were made by rail rather than by truck. Barge shipments of the high-activity waste could reduce the radiological impacts even further.

Nonradiological impacts: Nonradiological impacts of transportation of LLW include increased traffic and wear and tear on roadways. Decommissioning experience has been that the number of LLW shipments from a site averages much less than 1 per day. This number of shipments per day is not nearly large enough to have a detectable or destabilizing effect on traffic flow or road wear.

Nonradiological impacts of transportation accidents are typically expressed in terms of fatalities. RADTRAN estimates fatalities caused by traffic accidents using the distance traveled and average fatality rates per unit distance. Traffic accidents are not related to radioactivity; therefore, the impacts of transportation accidents should be based on the round-trip distance between the decommissioning site and the waste facility. For consistency, a 9600-km (6000-mi) round-trip distance is assumed for the fatality estimates shown in Table 4-6. Again, these numbers reflect the entire decommissioning period. The fatality estimates would be the same for shipments of any other commodity.

The following values may provide some perspective for evaluating the values in Table 4-6. A recent publication (Saricks and Tompkins 1999) gives average accident rates on interstate highways. The average accident rates for trucks are 3.15×10^{-7}, 3.66×10^{-7} and 6.54×10^{-7} per kilometer (5.07×10^{-7}, 5.89×10^{-7}, and 1.05×10^{-6} per mile) for highways in rural, suburban, and urban areas, respectively. The national average fatality rate for trucks is 5.5×10^{-9} fatalities per

Table 4-6. Impacts of Transportation of LLW from Decommissioning

	High-Activity Waste	Low-Activity Waste	Very Low-Activity Waste	Total
Number of Shipments during Decommissioning	227	84	360	671[a]
Incident-Free Transportation Impacts -- Cumulative Dose, person-Sv (person-rem)				
Crew	0.496 (49 6)	0.184 (18.4)	--	0.680 (68 0)
Public along route	0.129 (12 9)	0 020 (2 00)	--	0.149 (14 9)
Onlookers	0.123 (12 3)	0 019 (1.90)	--	0.142 (14.2)
Total	0.748 (74.8)	0 223 (22.3)	--	0 971 (97.1)
Incident-Free Transportation Impacts -- Latent Cancer Fatalities (LCF)				
Crew[b]	0 0198	0.00736	--	0.0272
Public along route[c]	0 0065	0 00100	--	0 00744
Onlookers[c]	0 0062	0 00096	--	0.00711
Total	0.0324	0 00931	--	0.0417
Accident Impacts				
Cumulative Dose, person-Sv (person-rem)	5.39×10^{-5} (5.39×10^{-3})	1.28×10^{-4} (1.28×10^{-2})	--	1.82×10^{-4} (1.82×10^{-2})
Nonradiological Fatalities	0 0120[d]	0 00465[d]	0.019[d]	0.0356[d,e]
Total				
Cumulative Dose, person-Sv (person-rem)	0.748 (74.8)	0 223 (22.3)	--	0 971 (97.1)
Fatalities	0 0419	0.0136	0 0190	0 0745[e]

(a) The total number of shipments during decommissioning may be significantly increased if State or local government agencies require removal of all structures and concrete from the site. However, the additional shipments would be uncontaminated material.
(b) Assuming 4.0×10^{-2} LCF/person-Sv (4.0×10^{-4} LCF/person-rem) for crew.
(c) Assuming 5.0×10^{-2} LCF/person-Sv (5.0×10^{-4} LCF/person-rem) for general public.
(d) Based on fatal accident rate of 5.5×10^{-9} per km (8.8×10^{-9} per mi).
(e) The number of fatalities will increase if there are additional shipments of uncontaminated material in proportion to the number of miles driven.

kilometer (8.8×10^{-9} fatalities per mile). Historically, the accident rate for activities at nuclear facilities has been lower than the national average for similar activities because of the industry emphasis on training and adherence to established procedures.

It is not likely that the actual nonradiological impacts of transportation accidents would be as high as indicated or that they would be either detectable or destabilizing.

The number of shipments into the decommissioning facility would be much smaller than the number of shipments from the facility. The concrete used to entomb a plant would be manufactured at a batch plant onsite, or the licensee would use local sources for the materials needed for entombing a facility. Shipments of materials into the facility during decommissioning or following the preparation for entombment of the facility would be minimal. It is anticipated that many of the shipments to the facility undergoing decommissioning, including shipments of equipment and heavy machinery, would come from local sources and, thus, the distance traveled would be minimal. Therefore, the staff concludes that transporting the materials to the site would not significantly impact the overall traffic volume or compromise the safety of the public.

Previous or anticipated decommissioning activities at the FBR or HTGR have not and are not expected to result in impacts on transportation that are different from those found at other nuclear facilities.

4.3.17.4 Conclusions

The staff has considered available information, including comments received on the draft of Supplement 1 of NUREG-0586, on the potential transportation impacts of decommissioning activities. This information indicates that the transportation impacts are not detectable or destabilizing. Therefore, the staff makes a generic conclusion that for all plants, the potential transportation impacts are SMALL. The staff has considered mitigation measures and concludes that no additional mitigation measures are likely to be sufficiently beneficial to be warranted.

4.3.18 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments are commitments of resources that cannot be recovered, and irretrievable commitments of resources are those that are lost only for a period of time. The irreversible and irretrievable commitments of resources that are anticipated during the decommissioning process are similar to those that were considered in the FESs for facility construction permits and operating licenses. The FESs for plant operation cite uranium as the principal natural resource irretrievably consumed in facility operation. However, following permanent cessation of operations, uranium is no longer consumed. As discussed in Chapter 1, disposal of uranium as part of spent nuclear fuel is not within the scope of this Supplement. Other resources considered in some FESs include land, water, human resources, cultural, and threatened and endangered species.

4.3.18.1 Regulations

CEQ regulations at 40 CFR 1502.13 and NRC regulations at 10 CFR 51, Appendix A to Subpart A, state that an environmental impact statement include a discussion of any irreversible or irretrievable commitments of resources. In addition, there are regulations that deal with the use of land (addressed in Section 4.3.1, "Onsite/Offsite Land Use"), water use and quality (Sections 4.3.2 and 4.3.3), and air quality (Section 4.3.4). Disposal of uranium is not within the

scope of this document. Land devoted to LLW disposal sites or in industrial landfills is also not within the scope of this document and is addressed in the licensing documents for the disposal site.

4.3.18.2 Potential Impacts of Decommissioning Activities on Irretrievable Resources

Table E-3 in Appendix E indicates that decommissioning activities with the potential to impact irreversible and irretrievable commitment of resources include structural dismantlement; LLW packaging, storage, and disposal; and transportation.

An irreversible commitment of resources is defined as a loss that is detectable and destabilizing, such as when a species becomes extinct, or, in the case of mining, when ore is removed. Irretrievable commitments can be considered as a tradeoff. If a transportation corridor is constructed, the land uses are not available for as long as the corridor remains. The destabilizing impacts are those that adversely impact the resources discussed in this Supplement (Sections 4.3.1 through 4.3.17).

4.3.18.3 Evaluation

Although most FESs addressed primarily uranium fuel, other resources were discussed in some of the FESs. This included land used for plant buildings, components such as large underground concrete foundations, and certain other equipment considered irretrievable due to practical aspects of reclamation and/or radioactive decontamination. The use of the environment (air, water, and land) by the facilities was not deemed to represent significant irreversible or irretrievable resource commitments but rather a relatively short-term investment.

Whether land is considered to be an irretrievable resource depends largely on the decisions at the time of license termination. If the license is terminated for unrestricted use, then the land will be available for other uses, whether or not the decommissioning process returned the land to a "Greenfield" site or to an industrial complex. If ENTOMB1 is selected, license termination could still allow unrestricted access after 30 to 60 years. However, if the ENTOMB2 option is selected, the land under the facility will not be available for alternative uses and would be considered irretrievable.

The only other irretrievable resources that would occur during the decommissioning process would be materials used to decontaminate the facility (e.g., rags, solvents, gases, and tools), and fuel used for construction machinery and for transportation of materials to and from the site. However, these resources are minor.

Although the use of land, water, air, and fuel oil during decommissioning is minimal or nonexistent, the disposal of radioactive waste and nonradioactive waste would be considerable for some options, such as DECON to a "Greenfield" (nonindustrial) site. Even though the disposal of radioactive waste is outside the scope of this document, the volume of land required for radioactive waste disposal is estimated in Table 4-7 for the SAFSTOR and DECON options, based on data obtained from six plants. The quantities of waste shown in Table 4-7 for the two

ENTOMB options were estimated based on the scenarios described in Chapter 3. The greatest estimated volume of radwaste is from a facility that is being decommissioned to "Greenfield" (no structures remaining onsite). It is located in a State that does not allow disposal of the industrial waste within an in-state industrial waste site.

Table 4-7. Volumes of Land Required for LLW Disposal[a]

Decommissioning Option	Reactor Type	Volume of Land Required for LLW Disposal, m^3 (ft^3)	Plant Size (Electrical Capacity, MWe)
DECON	PWR	8000 - 10,000 (282,500 - 353,000)	1130 to 1825
	BWR	2000 (71,000)	240
SAFSTOR	PWR	600 - 45,000 (21,000 -1.5 million)	23 to 1437
	BWR	18,000 (636,000)	660
ENTOMB1	Either	<5000 (<177,000)	Variable
ENTOMB2	Either	<500 (<17,700)	Variable

(a) Data were available from a limited number of facilities and based on actual estimates provided by the licensees.

4.3.18.4 Conclusions

The staff has considered available information on the potential impacts of decommissioning on irreversible and irretrievable commitments of resources, including comments received on the draft of Supplement 1 of NUREG-0586. This information indicates that the impacts of decommissioning on irreversible and irretrievable commitments are neither detectable nor destabilizing. Therefore, the staff makes the generic conclusion that the impacts on irreversible and irretrievable commitments are SMALL. The staff has considered mitigation and concludes that no additional measures are likely to be sufficiently beneficial to be warranted.

4.4 References

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for protection against radiation."

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic licensing of production and utilization facilities."

10 CFR 51. Code of Federal Regulations. Title 10, Energy, Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions."

10 CFR 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, "Packaging and

transportation of radioactive material."

10 CFR 100. Code of Federal Regulations, Title 10, *Energy*, Part 100, "Reactor site criteria."

14 CFR 150. Code of Federal Regulations, Title 14, *Aeronautic and Space*, Part 150, "Airport noise compatibility planning."

24 CFR 51B. Code of Federal Regulations, Title 24, *Housing and Urban Development*, Part 51B, "Environmental criteria and standards."

29 CFR 1902. Code of Federal Regulations, Title 29, *Labor*, Part 1902, "State plans for the development and enforcement of State standards."

29 CFR 1910. Code of Federal Regulations, Title 29, *Labor*, Part 1910, "Occupational safety and health standards."

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40 CFR 50. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 50, "National primary and secondary ambient air quality standards."

40 CFR 51. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 51, "Requirements for preparation, adoption, and submittal of implementation plans."

40 CFR 61. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 61, "National emission standards for hazardous air pollutants; regulation of radionuclides."

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5.0 No-Action Decommissioning Alternative

The action discussed in this Supplement and in the *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (1988 GEIS; NRC 1988) is decommissioning. The only alternative to the action of decommissioning is not to decommission the facility. The option to restart the reactor is not considered to be an alternative to decommissioning because the regulations do not allow the licensee to reload fuel and restart the facility after submitting a certification that the fuel has been removed from the reactor vessel.

The alternative to decommissioning at the end of the licensing period is a "no action" alternative, implying that a licensee would simply abandon or leave a facility after ceasing operations. Once the facility permanently ceases operation, if the licensee does not conduct decommissioning activities to an extent that meets the license termination criteria in 10 CFR 20 Subpart E, then the license will not be terminated (although the licensee will not be authorized to operate the reactor). The licensee will be required to comply with the necessary requirements for the operating license. As a result, the environmental impacts for maintaining the nuclear reactor facility will be considered to be in the bounds of the appropriate, previously issued Environmental Impact Statements.

The objective of decommissioning is to restore a radiologically contaminated facility to a condition such that there is no unreasonable risk from the decommissioned facility to the public health and safety. The U.S. Nuclear Regulatory Commission (NRC) regulations do not allow the option of not decommissioning. Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years. The license may be renewed for additional 20-year periods if NRC requirements are met. However, at the end of the term of the license (whether it has been extended or not), the regulations require that the facility be decommissioned.

5.1 Reference

U.S. Nuclear Regulatory Commission (NRC). 1988. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities.* NUREG-0586, NRC, Washington, D.C.

6.0 Summary of Findings and Conclusions

6.1 Summary of Findings

This chapter summarizes the findings and conclusions from the evaluation of environmental impacts related to decommissioning of permanently shutdown commercial nuclear power reactors. Table 6-1 presents each environmental issue that was evaluated and identifies whether the issue is considered generic or site-specific. Of the environmental issues assessed (see Table 6-1), most of the impacts are generic and SMALL for all plants regardless of the decommissioning activity and identified variables (see Appendix E for a list of the variables).

Two issues were identified that require a site-specific analysis: threatened and endangered species and environmental justice.

In accordance with the Endangered Species Act of 1973 (16 USC 1531 et seq.), the appropriate Federal agency (either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service) must be consulted about the presence of threatened or endangered species. Informal consultation will be initiated by the U.S. Nuclear Regulatory Commission (NRC) staff with the appropriate service after the licensee announces permanent cessation of operations. It is expected that any formal or informal consultation will be completed prior to the licensee beginning major decommissioning activities, which can occur 90 days after the submission of the post-shutdown decommissioning activities report (PSDAR). At that time, it will be determined whether such species could be affected by decommissioning activities and whether formal consultation will be required to address the impacts. Each State should also be consulted about its own procedure for considering impacts to State-listed species.

Executive Order 12898 (59 FR 7629), dated February 16, 1994, directs Federal executive agencies to consider environmental justice under the National Environmental Policy Act of 1969 (NEPA). Although the NRC is an independent agency, the Commission has committed to undertake environmental justice reviews. Subsequent to the submittal of the PSDAR, the NRC staff will consider the impacts related to environmental justice from decommissioning activities.

Four issues were determined to be, depending on the circumstances, either generic or site-specific: land use, aquatic ecology, terrestrial ecology, and cultural and historic resources. Impacts resulting from onsite land use, impacts to aquatic and terrestrial resources resulting from activities occurring within the facility's operational areas, and impacts to cultural or historic resources resulting from activities within the facility operational area were determined to be generic and SMALL.

Table 6-1. Summary of the Environmental Impacts from Decommissioning Nuclear Power Facilities

Issue	Generic	Impact
Onsite/Offsite Land Use		
- Onsite land use activities	Yes	SMALL
- Offsite land use activities	No	Site-specific
Water Use	Yes	SMALL
Water Quality		
- Surface water	Yes	SMALL
- Groundwater	Yes	SMALL
Air Quality	Yes	SMALL
Aquatic Ecology		
- Activities within the operational area	Yes	SMALL
- Activities beyond the operational area	No	Site-specific
Terrestrial Ecology		
- Activities within the operational area	Yes	SMALL
- Activities beyond the operational area	No	Site-specific
Threatened and Endangered Species	No	Site-specific
Radiological		
- Activities resulting in occupational dose to workers	Yes	SMALL
- Activities resulting in dose to the public	Yes	SMALL
Radiological Accidents	Yes	SMALL
Occupational Issues	Yes	SMALL
Cost	NA[(a)]	NA
Socioeconomic	Yes	SMALL
Environmental Justice	No	Site-specific
Cultural and Historic Resource Impacts		
- Activities within the operational areas	Yes	SMALL
- Activities beyond the operational areas	No	Site-specific
Aesthetics	Yes	SMALL
Noise	Yes	SMALL
Transportation	Yes	SMALL
Irretrievable Resources	Yes	SMALL

(a) A decommissioning cost assessment is not a specific National Environmental Policy Act (NEPA) requirement. However, an accurate decommissioning cost estimate is necessary for a safe and timely plant decommissioning. Therefore, this Supplement includes a decommissioning cost evaluation, but the cost is not evaluated using the environmental significance levels nor identified as a generic or site-specific issue.

Impacts resulting from offsite land use to support decommissioning activities, impacts to aquatic and terrestrial resources resulting from activities occurring outside the facility's operational areas, and impacts to cultural, historic or archeological resources resulting from activities beyond the operational areas cannot be evaluated generically and would require a site-specific analysis before undertaking the activity. These are termed conditionally site-specific.

Before a licensee conducts any decommissioning activity that might result in the disturbance of historic properties or archeological resources outside the site operational area, the NRC will, in accordance with the National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.), consult with the appropriate State (or Tribal) Historic Preservation Officer to evaluate potential impacts.

The issue of cost was addressed in this Supplement but was not evaluated.

The staff also determined that the issue of long-term radiological aspects of Rubblization or onsite disposal of slightly contaminated material could not be evaluated generically and would require a site-specific analysis. The site-specific analysis would be conducted at the time the license termination plan (LTP) for the site is submitted.

For the 19 reactors listed in Table F-1 that have permanently ceased operation during the period 1963 through 1997, the staff has determined that no issue or activity must be re-evaluated immediately, provided that the licensee does not change the decommissioning option previously chosen. The NRC staff conducted a detailed environmental review on a number of these facilities prior to 1996 as part of the decommissioning plan review. Licensees for several of these reactors have submitted LTPs for NRC review and approval, and the staff has evaluated or is evaluating site-specific environmental impacts as part of that review. Therefore, for many of the 19 facilities, a site-specific assessment has been performed. Because decommissioning is substantially underway at all 19 reactors, the impacts for the issue of environmental justice have already occurred and an evaluation at the present time would provide little value and opportunity for mitigation. Impacts on threatened and endangered species are considered on an ongoing basis and the issuance of this Supplement would not accelerate a review of the issue solely because the issue is one that cannot be evaluated generically. The staff will continue to conduct site-specific consultations with the appropriate resource agency, as the need arises.

Therefore, the NRC has determined that it is not necessary at this time to conduct an evaluation of the environmental justice or impacts on threatened and endangered species at the 19 permanently shutdown reactors listed in Table F-1. However, should a licensee choose a different decommissioning option from its current choice (e.g., SAFSTOR rather than DECON),

then the site-specific issues would need to be considered prior to undertaking a decommissioning activity not previously evaluated.

For the 19 facilities listed in Table F-1 that have initiated decommissioning, as well as for any facilities that permanently cease operation in the future, any planned decommissioning activity would require a site-specific analysis prior to undertaking the proposed activity (see Section 1.5) if the activity:

- results in an impact outside the range of impacts postulated by this Supplement or
- raises environmental issues that were not considered in this Supplement or
- involves an issue determined to be site specific or conditionally site-specific as described above in this Supplement or
- involves a combination of the above.

6.2 Conclusions

A licensee undergoing or planning decommissioning of a nuclear reactor facility may use this Supplement in its evaluation of the environmental consequences from decommissioning activities. The impacts identified in this Supplement are designed to span the range of impacts for all commercial power reactor facilities that have permanently shut down as well as for the reactor facilities that are currently operating, including the facilities that have, or may, renew their operating license beyond the original 40-year license.

For those issues that have been determined to be generic, licensees may proceed with the decommissioning activity without further analysis provided that the impacts resulting from those activities fall within the range of impacts as described in Chapter 4. However, if the impacts of an activity fall outside the range predicted in Chapter 4, or if the activity results in impacts to environmental issues not considered in this Supplement, or if the impact involves an environmental issue determined to be conditionally site-specific as defined above, then the activity cannot be performed until a further site-specific analysis is completed along with a license-amendment request and NRC has approved the license amendment (the license-amendment request will provide an opportunity for a public hearing).

6.3 References

Endangered Species Act of 1973, as amended, 16 USC 1531 et seq.

Executive Order 12898. 1994. "Environmental Effects of Federal Programs on Minority and Low-Income Populations." 59 FR 7629, February 16, 1994.

National Environmental Policy Act (NEPA) of 1969, as amended, 42 USC 4321 et seq.

National Historic Preservation of 1966, as amended, 16 USC 470 et seq.

Appendix A

Appendixes A and B have been moved and redesignated as Appendixes N and O. All comments and responses, whether written or oral, are now contained in Appendixes N, O, and P, which comprise Volume 2 of this Supplement.

Appendix B

Appendixes A and B have been moved and redesignated as Appendixes N and O. All comments and responses, whether written or oral, are now contained in Appendixes N, O, and P, which comprise Volume 2 of this Supplement.

Appendix C

Contributors

Appendix C

Contributors

The overall responsibility for the preparation of this Supplement to the Generic Environmental Impact Statement (GEIS) on Decommissioning was assigned to the Office of Nuclear Reactor Regulation (NRR), U.S. Nuclear Regulatory Commission (NRC). This Supplement was prepared by members of the NRR with assistance from other NRC organizations and the Pacific Northwest National Laboratory.

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Appendix C

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Appendix D

Further Discussion of Out-of-Scope Activities

Appendix D

Further Discussion of Out-of-Scope Activities

Various activities that are performed during decommissioning may seem intuitively to be part of the decommissioning process. However, they are not considered within the scope of this Supplement because these activities have already received an environmental review during the promulgation of the U.S. Nuclear Regulatory Commission (NRC) regulations governing such activities. They are reviewed and regulated by the NRC under other regulations. These activities include the following:

- Independent Spent Fuel Storage Installation (ISFSI): construction/maintenance/decommissioning: An ISFSI is a facility designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. The ISFSI may be located at the same site as the nuclear power facility or at another location. ISFSIs are used by operating plants that require increased spent fuel storage capacity because their spent fuel pools have reached their capacity and the U.S. Department of Energy (DOE) facility for disposing of spent fuel and high-level nuclear waste is not yet available. Decommissioning facilities may use ISFSIs as an alternative to leaving the fuel in the spent fuel pool while waiting for DOE to take ownership of the spent fuel. Licensees that remove the spent fuel from their pools and place it in an ISFSI can then complete the decommissioning process on the power-generation facilities and subsequently terminate the facility license. In some instances, the license for the nuclear power reactor can be terminated while the ISFSI, which has a separate license and is located on the facility site, would continue to be regulated by the NRC.

  An ISFSI can be operated either under the same license that is used for the operating or decommissioning facility (called a "Part 50 license," referring to 10 CFR Part 50), or under a site-specific license (called a "Part 72 license," referring to 10 CFR Part 72). Regulations for the licensing and operation of an ISFSI, including quality assurance and quality control requirements, are found in 10 CFR Part 72. If a licensee chose to operate the ISFSI under a Part 50 license, they could, by way of a license-amendment request, change the ISFSI to a Part 72 license, thus allowing termination of the Part 50 license at the end of the reactor facility decommissioning process.

The decommissioning of the ISFSI is also handled separately from the decommissioning of the nuclear power facility. The 1988 Generic Environmental Impact Statement (GEIS) (NRC 1988) contained a section on decommissioning of ISFSIs, which is not updated in this Supplement.

- Spent fuel storage and maintenance: The Commission has independently, in a separate proceeding, the "Waste Confidence Proceeding," made a finding that there is:

  > reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations. (54 FR 39767)

  The Commission has committed to review this finding at least every 10 years. In its most recent review, the Commission concluded that experience and developments since 1990 were not such that a comprehensive review of the Waste Confidence Decision was necessary at that time (64 FR 68005). Accordingly, the Commission reaffirmed its finding of insignificant environmental impacts cited above. This finding is codified in the Commission's regulations at 10 CFR 51.23(a). The operation of a spent fuel pool or an ISFSI is not uniquely linked to decommissioning. All operating nuclear power facilities have spent fuel pools and some (with the number anticipated to increase) have ISFSIs generally located adjacent or near to the power reactor facility.

- Spent fuel transport and disposal away from the reactor location: The temporary storage or future permanent disposal of spent fuel at a site other than the reactor site is not within the scope of this Supplement. Licensees are prohibited from shipping spent fuel from one reactor's spent fuel pool to another's without NRC approval. Amendment of one or both of the facilities' licenses would be required before fuel transfer.

  Transportation of spent fuel and other high-level nuclear wastes is governed by regulations in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material." Disposal of spent fuel and high-level wastes (HLW) are governed by the Nuclear Waste Policy Act (NWPA) of 1982, as amended, which defined the goals and structure of a program for permanent, deep geologic repositories for the disposal of high-level radioactive waste and non-reprocessed spent fuel. Under this Act, the DOE is responsible for developing permanent disposal capacity for spent fuel and other high-level nuclear wastes. On July 9, 2002, the U.S. Congress approved Yucca Mountain as the first long-term geologic repository for spent nuclear fuel and high-level radioactive waste. A HLW repository will be built and operated by DOE and licensed by the NRC. Title 10 CFR Part 61 contains rules

governing the licensing to receive and possess source, special nuclear, and by-product material at a geological repository operations area that is sited, constructed, or operated in accordance with the NWPA (1982). However, the Commission proposes to supersede the generic criteria in Part 60 for disposal at a waste repository with specific criteria in a new 10 CFR Part 63 issued on February 22, 1999 (64 FR 8640).

- Interim storage of Greater-than-Class-C (GTCC) Waste: The NRC regulations at 10 CFR 61.55 define three classes of low-level waste (LLW) (A, B, and C) that are suitable for near-surface disposal. Class C waste is required to meet the most rigorous disposal requirements. The LLW that exceeds the concentration limits set for Class C waste is referred to as GTCC waste. Typically, GTCC waste is composed of activated metal components and process wastes.

  On October 11, 2001 the NRC amended its regulations (in 66 FR 51823), to permit interim storage of GTCC waste used or generated by commercial power reactors within an ISFSI or monitored retrievable storage (MRS) facility. This change permits the co-locating of spent fuel and solid reactor-related GTCC waste in different casks and containers within the ISFSI or MRS. Commingling of spent fuel and GTCC waste in the same storage cask is not permitted, except on a case-by-case basis. Ultimately, GTCC waste must be disposed of in a geologic repository. I

- LLW disposal at a licensed LLW site or treatment of LLW at compactor facilities: The disposal of LLW is not within the scope of this Supplement. LLW is defined as any radioactive waste that is not classified as HLW, spent nuclear fuel, transuranic waste,[a] or uranium or thorium mill tailings. LLW often contains small amounts of radioactivity dispersed in large amounts of material, but may also have activity levels requiring shielding and remote handling. LLW that is generated during decommissioning is usually composed of the following material contaminated with radionuclides: rags, papers, filters, solidified liquids, ion-exchange resins, tools, equipment, discarded protective clothing, dirt, construction rubble, concrete, and piping.

  Regulations related to LLW disposal are in 10 CFR Part 61 and 10 CFR Part 20, Subpart K. A final GEIS supporting the regulations in 10 CFR Part 61, was published in 1982 as "Final Generic Environmental Impact Statement for 10 CFR Part 61," NUREG-0945 (NRC 1982). A license for the LLW disposal site is not issued until the applicant provides an environmental report (ER) indicating that the applicant's proposed disposal site, design,

(a) Transuranic waste contains man-made elements heavier than uranium that decay by emitting alpha particles. Such waste is produced during reactor fuel assembly, weapons fabrication, and chemical processing operations.

operations, site closure, and post-closure institutional controls are adequate to protect public health and safety. The licensee for the LLW site must show that there is reasonable assurance that (1) the general population will be protected from releases of radioactivity, (2) that individual inadvertent intruders are protected, (3) that standards for radiation protection in 10 CFR Part 20 are met, and (4) that the long-term stability of the disposed waste and the disposal site will be achieved and will eliminate, to the extent practical, the need for ongoing active maintenance of the disposal site following closure. The ER will be reviewed by the NRC and the impacts of LLW disposal evaluated in an Environmental Impact Statement (EIS) that is written for the specific LLW site. The technical requirements for land-disposal facilities are covered in Subpart D of 10 CFR Part 61. The financial assurance requirements are covered in Subpart E of 10 CFR Part 61.

- Activities related to the ENTOMBMENT Period:

  On October 16, 2001, the Commission issued an advance notice of proposed rulemaking (ANPR) inviting input from stakeholders on "Entombment options for Power Reactors" (66 FR 52551). Consistent with the environmental evaluation of the DECON and SAFSTOR decommissioning options, the staff has limited its environmental evaluation of ENTOMB to those issues related to activities necessary to prepare the facility for entombment.

  Issues and resulting impacts related to the ENTOMB option after the facility begins entombment, such as NRC oversight and monitoring requirements, durability of institutional controls and engineered barriers, indefinite retention onsite of radioactive materials, and other long-term site-specific issues are outside the scope of this Supplement.

  A future environmental assessment in support of NRC rulemaking related to the entombment options may address these issues depending on the proposed changes to the regulations.

- Activities following license termination under restricted use conditions: Licensees are allowed by regulations in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination," to release the site for restricted use. The impacts following a restricted release license termination will not be considered by this Supplement because the licensee is required to conduct a site-specific analysis to support development of an NRC site-specific EIS.

- Activities and impacts from living or working on the site after license termination: Analysis of radiological impacts from unrestricted use after decommissioning and license termination are presented in NUREG-1496, *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities* (NRC 1997). This GEIS analyzed regulatory

alternatives for establishing radiological criteria for decommissioning structures and lands of licensed facilities. The scope included both radiological and nonradiological impacts on human health and safety, including radiation exposure resulting from occupancy of site buildings and residence on site lands following decommissioning and license termination.

D.1 References

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for protection against radiation."

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic licensing of production and initialization facilities."

10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions."

10 CFR 61. Code of Federal Regulations, Title 10, *Energy*, Part 61, "Licensing requirements for land disposal of radioactive waste."

10 CFR 63. Code of Federal Regulations, Title 10, *Energy*, Part 63, "Disposal of high-level radioactive wastes in a geologic repository at Yucca Mountain, Nevada."

10 CFR 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, "Packaging and transportation of radioactive material."

10 CFR 72. Code of Federal Regulations, Title 10, *Energy*, Part 72, "Licensing requirements for the independent storage of spent nuclear fuel and high-level radioactive waste."

54 FR 39767. "10 CFR Part 51 Waste Confidence Decision Review." *Federal Register*. September 28, 1989.

64 FR 8640. "10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 60, 61, and 63 Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada." *Federal Register*. February 22, 1999.

64 FR 68005. "Waste Confidence Decision Review." *Federal Register*. December 6, 1999.

66 FR 51823. "Interim Storage for Greater Than Class C Waste 10 CFR Parts 30, 70, 72, and 150." *Federal Register*. October 11, 2001.

66 FR 52551. "Entombment Options for Power Reactors." *Federal Register*. October 16, 2001.

Nuclear Waste Policy Act of 1982, as amended, 42 USC 10.101 et seq.

U.S. Nuclear Regulatory Commission (NRC). 1982. *Final Generic Environmental Impact Statement for 10 CFR Part 61*. NUREG-0945, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1988. *Final Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities*. NUREG-0586, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997. *Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*. NUREG-1496, Vol. 1, NRC, Washington, D.C.

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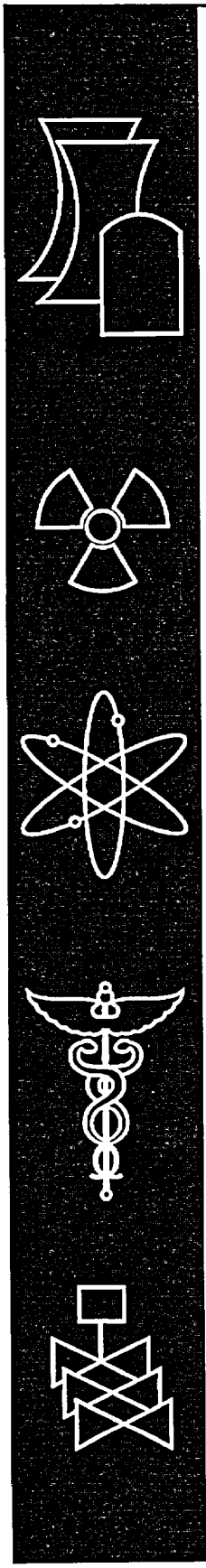

Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities

Supplement 1

Regarding the Decommissioning of Nuclear Power Reactors

Appendices N, O and P

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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NUREG-0586, Supplement 1
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Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities

Supplement 1

Regarding the Decommissioning of Nuclear Power Reactors

Appendices N, O and P

Final Report

Manuscript Completed: October 2002
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Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Abstract

This document is a supplement to the U.S. Nuclear Regulatory Commission (NRC) document *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* issued in 1988 (NUREG-0586, referred to here as the 1988 Generic Environmental Impact Statement [GEIS]). This Supplement was prepared because of technological advances in decommissioning operations, experience gained by licensees, and changes made to NRC regulations since the 1988 GEIS.

This Supplement updates the information provided in the 1988 GEIS. It is intended to be used to evaluate environmental impacts during the decommissioning of nuclear power reactors as residual radioactivity at the site is reduced to levels that allow for termination of the NRC license. This Supplement addresses only the decommissioning of nuclear power reactors licensed by the NRC. It updates the sections of the 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor stations. It goes beyond the 1988 GEIS to explicitly consider high-temperature gas-cooled reactors and fast breeder reactors. This document can be considered a stand-alone document for power reactor facilities such that readers should not need to refer back to the 1988 GEIS. The environmental impacts described in this Supplement supercede those described for power reactor facilities in the 1988 GEIS.

The scope of this Supplement is based on the decommissioning activities performed to remove radioactive materials from structures, systems, and components from the time that the licensee certifies that it has permanently ceased power operations until the license is terminated. The scope of the document was determined through public scoping meetings and meetings with other Federal agencies and the nuclear industry. An evaluation process was then developed to determine environmental impacts from nuclear power reactor facilities that are being decommissioned. The evaluation process involved determining the specific activities that occur during reactor decommissioning and obtaining data from site visits and from licensees at reactor facilities currently being decommissioned. The data obtained from the sites were analyzed and then evaluated against a list of variables that defined the parameters for facilities that are currently operating but which will one day be decommissioned. This evaluation resulted in a range of impacts for each environmental issue that may be used for comparison by licensees that are or will be decommissioning their facilities.

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Abbreviations/Acronyms

µGy	microGray(s)
µSv	microSieverts
ac	acre(s)
AEA	Atomic Energy Act of 1954
AEC	U.S. Atomic Energy Commission
ALI	annual limits on intake
ALARA	as low as reasonably achievable
ANPR	advance notice of proposed rulemaking
BLM	Bureau of Land Management
BMP	best management practice
Bq	Bequerel(s)
BWR	boiling water reactor
C	Celsius
CAA	Clean Air Act
CDE	committed dose equivalent
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Ci	Curie
CWA	Clean Water Act
DAC	derived air concentration
dB	decibel
dBA	A-weighted sound levels
dBC	C-weighted sound levels
DBA	design basis accident
DDREF	dose or dose rate effectiveness factor
DE	dose equivalent
DNL	day-night average sound level
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment

Abbreviations/Acronyms

EDE	effective dose equivalent
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESA	Endangered Species Act of 1973
ES&H	environment, safety and health
F	Fahrenheit
FAA	Federal Aviation Administration
FBR	fast breeder reactor
FES	final environmental statement
FHA	Federal Housing Administration
FR	Federal Register
FSAR	Final Safety Analysis Report
ft	foot/feet
FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act of 1977)
FWS	U.S. Fish and Wildlife Service
gal.	gallon(s)
GEIS	Generic Environmental Impact Statement
gpd	gallons per day
gpm	gallons per minute
GTCC	Greater-than-Class-C (waste)
Gy	gray(s)
ha	hectare(s)
HDA	high decommissioning activity
HEPA	high-efficiency particulate air (filter)
HLW	high-level waste
h	hour
HTGR	high-temperature gas-cooled reactor
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilation, and air conditioning
IAEA	International Atomic Energy Agency
in.	inch(es)
I&C	instrumentation and control
ICRP	International Commission on Radiological Protection

ISFSI	independent spent fuel storage installation
kg	kilogram(s)
km	kilometer(s)
kV	kilovolt(s)
kWh	kilowatt hour(s)
L	liter(s)
LDA	low-decommissioning activity
LER	licensee event report
LET	linear energy transfer
LLW	low-level waste
LOS	level of service
LRA	license renewal application
LTP	license termination plan
LWR	light water reactor
m	meter(s)
m^3/d	cubic meters per day
m^3/s	cubic meters per second
MARSSIM	Multi-agency Radiation Survey and Site Investigation Manual, NUREG-1575
MBTA	Migratory Bird Treaty Act of 1918
mi	mile(s)
mGy	milliGray(s)
MPC	maximum permissible concentrations
mrad	millirad(s)
mrem	millirem(s)
MRS	monitored retrievable storage
mSv	milliSievert(s)
MTHM	metric tonnes of heavy metal
MT	metric ton(s) (or tonne[s])
MTU	metric ton(s)-uranium
MW	megawatt(s)
MWd/MTU	megawatt-days per metric ton of uranium
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
MWh	megawatt hour(s)
NA	not applicable
NAS	National Academy of Sciences
NBS	National Bureau of Standards

Abbreviations/Acronyms

NCRP	National Council on Radiation Protection and Measurements
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxide(s)
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NWPA	Nuclear Waste Policy Act of 1982
ODCM	Offsite Dose Calculation Manual
OSHA	Occupational Safety and Health Administration
PAG	protective action guide
PCBs	polychlorobiphenyls
PEL	permissible exposure limit
POL	possession-only license
PPE	personal protective equipment
PSDAR	post-shutdown decommissioning activities report
PV	pressure vessel
PWR	pressurized water reactor
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act of 1976
RCS	reactor coolant system
ROW	right-of-way/rights-of-way
RPV	reactor pressure vessel
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Officer
SI	Systeme Internationale (international system of units)
SO_2	sulfur dioxide
SO_x	sulfur oxide(s)
SSCs	structures, systems, and components
Sv	sievert(s)

TEDE	total effective dose equivalent
THPO	Tribal Historic Preservation Officer
UNSCEAR	United Nations Scientific Committee on The Effects of Atomic Radiation
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VRM	Visual Resource Management (system)
wk	week(s)
YNPS	Yankee Nuclear Power Station
yr	year(s)

Appendix N

Summary of Scoping Comments

Appendix N

Summary of Scoping Comments

On Tuesday, March 14, 2000, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the Federal Register (65 FR 13797), to notify the public of the staff's intent to prepare a supplement to the *Generic Environmental Impact Statement on Decommissioning Nuclear Facilities* (1988 GEIS), NUREG-0586, to support decommissioning activities at commercial power production facilities and to conduct scoping. This Supplement to the 1988 GEIS was prepared in accordance with the National Environmental Policy Act (NEPA 1969), Council on Environmental Quality guidelines, and 10 CFR Part 51. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the Federal Register Notice. The NRC invited all stakeholders to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting written suggestions and comments no later than July 15, 2000. The scoping process included four public scoping meetings, which were held in Lisle, IL, on April 27, 2000; Boston, MA, on May 17, 2000; Atlanta, GA, on June 13, 2000; and San Francisco, CA, on June 21, 2000. Approximately 60 members of the public attended the meetings. All four meetings began with NRC staff members providing a brief overview of the decommissioning and NEPA process. After the NRC's prepared statements, the meetings were open to public comments. Twenty-three attendees provided either oral or written statements that were recorded and transcribed by a certified court recorder. The corrected meeting transcripts were provided in four letters dated June 30, 2000 (NRC 2000a, 2000b, 2000c, 2000d) and are available on the NRC website at http://www.nrc.gov/NRC/REACTOR/DECOMMISSIONING/GEIS/index.html. In addition to the comments provided during the public meetings, 11 comment letters were received by the NRC in response to the Notice of Intent.

While developing this Supplement to the 1988 GEIS, the staff and its contractor considered all of the relevant issues raised during the scoping process. The full scoping summary report is accessible through NRC's Public Electronic Reading Room (ADAMS) website at http://www.nrc.gov/NRC/ADAMS/index.html; the accession number is ML011100625. Each comment that was applicable to this Supplement is summarized in this section. This information was extracted from the Scoping Summary Report, dated April 17, 2001 (65 FR 13797) and is being provided in this report for the convenience of those interested in the scoping comments applicable to this environmental review. The comments that were determined to be general or outside the scope of Supplement are not included in this Appendix.

Appendix N

Meetings

Location	Date
Lisle, IL	April 27, 2000
Boston, MA	May 17, 2000
Atlanta, GA	June 13, 2000
San Francisco, CA	June 21, 2000

Written Comment Letters

Name/Organization	Date
Nuclear Information and Resource Service	July 11, 2000
Pamela Blockey-O'Brien	July 12, 2000
Nuclear Information and Resource Service (submitted a supplement to the letter they originally sent)	July 13, 2000
Lynnette Hendricks (Nuclear Energy Institute)	July 14, 2000
Massachusetts Citizens for Safe Energy	July 14, 2000
Campaign for a Prosperous Georgia	July 14, 2000
Paul Gunter (Nuclear Information and Resource Service)	July 14, 2000
George Crocker (Executive Director of the North American Water Office)	July 14, 2000
Citizens Awareness Network	July 15, 2000
Glenn Carroll (Georgians Against Nuclear Power)	July 15, 2000
George A. Zinke (Director, Nuclear Safety & Regulatory Affairs, Maine Yankee Atomic Power Co.)	July 17, 2000

Generic Environmental Impact Statement - Public Scoping Meeting Comments and Responses in Scope

1. Why is the GEIS being updated?

Three commenters (five comments) inquired about the reason that the NRC decided to update the GEIS. The question was raised whether the update was based on new information such as worker exposure, volume of high- or low-level radioactive waste, differences in disposal methodologies or decommissioning options, such as options in addition to entombment and rubblization. One commenter asked if the NRC had already found new information that would make the GEIS more conservative.

Response: *The basis for this Supplement is discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

One commenter (in two different comments) questioned the creation of the GEIS if decommissioning is not a major Federal action and also indicated that the GEIS and the decommissioning process are the "deregulation of decommissioning."

Response: *The update of the GEIS as related to the National Environmental Policy Act (NEPA) of 1969 is discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

Four commenters expressed concern that the revisions to the GEIS would be used in negative ways such as to serve private corporate nuclear industry interests, to allow a release of unnecessary radioactive material onsite and offsite, or to reduce liability for the nuclear industry and increase environmental damage and public health. One commenter indicated that the GEIS should regulate all forms of radioactive releases.

Response: *The appropriate uses of the Supplement are discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

Three commenters (four comments) agreed with the NRC's efforts to update the 1988 GEIS on decommissioning. One commenter indicated that the Supplement should be updated to incorporate and evaluate new decommissioning technologies developed over the past decade. A second commenter specified that rubblization should be considered.

Response: *One of the purposes of revising the GEIS is to incorporate and evaluate new decommissioning technologies and methods such as rubblization. This comment is within the scope of this Supplement. Technologies and methods are incorporated into the discussion and analysis in Chapter 4, Environmental Impacts.*

2. How will the GEIS be used?

One commenter inquired as to how the GEIS would be used.

Response: *The appropriate uses of this Supplement are discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

One commenter encouraged the NRC to make the Supplemental GEIS user-friendly with plain English and straightforward explanations for the public.

Response: *The NRC has specific criteria that must be met in publications that are related to the usage of plain English. This comment is within the scope of this Supplement and incorporated throughout the document.*

3. Will the GEIS satisfy the NEPA process?

One commenter asked about the actions and reviews involved in determining if the environmental impact concerns considered by the NRC sufficiently satisfy the NEPA requirements.

Response: *The relationship between the GEIS and the NEPA requirements are discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

One commenter asked if the NRC was planning to communicate the results of the scoping meetings and the final scope of the GEIS to the public.

Response: *The NEPA process provides for publishing and presentation of a draft report for comment before the final Supplement is issued. The comments noted in this summary report as being within the scope of the GEIS are addressed in this Supplement. Comments on the Supplement are solicited and considered before the report is finalized. This comment is within the scope of this Supplement.*

One commenter asserted that the NRC made false assumptions in the GEIS and indicated that these assumptions must be addressed and the true risk discovered before any further generic considerations are implemented.

Response: *The assumptions in the 1988 GEIS have been reconsidered in the development of this Supplement. This comment is within the scope of this Supplement and is discussed in Chapter 1, Introduction, and Chapter 4, Environmental Impacts.*

One commenter indicated that decommissioning was a Federal major action and required NEPA compliance and site-specific EISs.

Response: *Chapter 1, the introduction to this Supplement, describes the NEPA requirements for site-specific EISs and the basis for the agency's determination that decommissioning is not a Federal major action. This comment is within the scope of this Supplement.*

One commenter stated that the 1988 GEIS is a robust analysis that has stood the test of time. They supported a Supplement at this time.

Response: *A discussion of the use of the previous GEIS is provided in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

4. Reactors that will be included in the GEIS

One commenter thought the GEIS should be explicit regarding which reactors were covered. The commenter was specifically concerned about Peach Bottom and Fermi.

Response: *The applicability of this Supplement to specific reactor facilities is discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

One commenter indicated that it was prudent at this time to incorporate issues that were identified through actual experience and to include issues relevant to the limited number of commercial non-light-water reactors.

Response: *The use of data from previous reactor decommissioning experience is discussed throughout this Supplement. This comment is within the scope of this Supplement.*

5. Decommissioning Activities

A. General Decommissioning Activities

One commenter inquired how the GEIS would handle two different methodologies for the same activity (such as removing steam generators as a whole or in pieces).

Response: This Supplement considers different methods for an activity to determine an acceptable envelope for that activity. If an activity results in impacts that are outside the envelope, then a site-specific assessment may be required. The process for developing this Supplement is described in Chapter 1, Introduction, further discussed in Chapter 4, Environmental Impacts, and described in more detail in Appendix E. This comment is within the scope of this Supplement.

One commenter indicated that the GEIS should provide more detail about specific decommissioning activities and technologies in order to accurately assess the associated environmental impacts. Another commenter indicated that they did not agree with the statement that decommissioning activities are not significantly different from operating the plant.

Response: *This Supplement considers specific decommissioning activities. The process for developing this Supplement is described in Chapter 1, Introduction, further discussed in Chapter 4, Environmental Impacts, and described in more detail in Appendix E. This comment is within the scope of this Supplement.*

B. Decommissioning Options

One commenter encouraged the NRC to adequately address alternatives. A second commenter inquired whether a preferred alternative would be specified in the GEIS.

Response: *Chapter 5 of this Supplement discusses alternatives to the proposed action, as required by the NEPA process. This comment is within the scope of this Supplement.*

1. DECON

No comments within scope.

2. SAFSTOR

One commenter encouraged the use of the SAFSTOR option because of the advantages in terms of exposure to workers and the public. Another reason for the commenter's support of SAFSTOR as an option was their opposition to shallow land burial of radioactive waste.

Response: *In Chapter 3, Description of Reactors, this Supplement addresses the options for decommissioning activities, including SAFSTOR and variations to SAFSTOR (such as the duration of the storage period or the use of incremental DECON, which includes incremental decontamination and dismantlement activities during the SAFSTOR period). This comment is within the scope of this Supplement.*

3. Entombment

One commenter asked what factors had changed since the 1988 GEIS that would suggest that ENTOMB was a possible option. A second commenter suggested that the lack of dumps for contaminated material made entombment a viable solution. A third commenter asked why entombment was considered not to be viable. And a fourth commenter inquired why the NRC would even be considering entombment if they already knew that the residual levels of radioactivity would be unacceptable.

Response: *This Supplement addresses varying options for decommissioning activities, including ENTOMB in Chapter 3, Description of Reactors. These comments are within the scope of this Supplement.*

One commenter encouraged the NRC to address entombment and to consider a name change to SAFSTOR II or Assured Isolation.

Response: *This Supplement addresses varying options for decommissioning activities, including ENTOMB in Chapter 3, Description of Reactors. This comment is within the scope of this Supplement.*

One commenter indicated that a Supplemental EIS must be required for the entombment option to assess the impact of what they perceive to be near-surface dumping of greater than Class C (GTCC) waste.

Response: *This Supplement addresses varying options for decommissioning activities including ENTOMB in Chapter 3, Description of Reactors. This comment is within the scope of this Supplement.*

4. Rubblization

Five commenters indicated that rubblization was an area that needed to be addressed in the revised GEIS. One commenter also added in a second comment that this included the environmental impact of residual radioactive material deeper than 6 in. below the surface, activated concrete, activated rebar, internal contamination in cracks, and sub-slab contamination. One of the commenters recommended that an additional intruder scenario be addressed.

Response: *This Supplement considers various decommissioning activities including rubblization in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

Two commenters indicated that rubblization turns the reactor site into a low-level or perhaps high-level radioactive waste site and that deep monitoring wells, liners, etc., should be required and evaluated on a site-specific basis. One commenter also mentioned that salt-water corrosion should be evaluated because of the potential for some leakage from the facility if the waste is left onsite, such as occurs in rubblization.

Response: *This Supplement considers various decommissioning activities including rubblization in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

5. Partial Site Release

Three commenters stated that partial site release should be addressed in the GEIS. One commenter inquired whether partial site release would be addressed in the Supplement. Another commenter stated that they opposed partial site release.

Response: *This Supplement considers partial site release and whether it can be included as a generic issue. Discussion of partial site release can be found in Chapter 1, Introduction. These comments are within the scope of this Supplement.*

C. Specific Activities to be included in the GEIS

1. Decommissioning Process

No comments within scope.

2. Post-Shutdown Decommissioning Activities Report (PSDAR)

One commenter was concerned that the only time a site-specific analysis would be conducted for a decommissioning plant would be if the facility failed the PSDAR.

Response: *This Supplement discusses the circumstances that will result in a site-specific analysis in Chapter 2, Introduction. This comment is within the scope of the GEIS.*

3. Public Meetings

No comments within scope.

4. Citizen Advisory Panels

No comments within scope.

5. Opportunity for Public Hearings

No comments within scope.

6. Inspections

No comments within scope.

7. Removal of Resident Inspectors

No comments within scope.

8. Intact Vessel Removal

Two commenters indicated that intact removal of the reactor vessel should be considered in the Supplement. One of the commenters actively advocated this alternative because of reduced worker dose, costs, and excellent isolation of the waste packages.

Response: *This Supplement considers specific decommissioning activities including intact removal of the reactor vessel. Decommissioning activities are discussed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

9. Spent Fuel

One commenter indicated that the delay in the schedule for removal of spent fuel should be reflected in the GEIS as far as decommissioning schedule, costs, and doses.

Response: *This Supplement addresses the impacts resulting from the variation in the timing of activities such as the removal of the spent fuel from the pool. This issue is addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

10. Waste Disposal

No comments within scope.

11. Waste Transport

One commenter asked what kind of transportation activities will be covered in the Supplement.

Response: *This Supplement considers impacts associated with the transportation of waste from the facility and transportation of equipment into the facility. The issue of transportation is addressed in Section 4.3.16, Transportation. This comment is within the scope of this Supplement.*

12. Offsite Cleanup

No comments within scope.

13. Site Characterization and Final Site Surveys

No comments within scope.

14. License Termination Plan - Timing of Submittal

No comments within scope.

15. License Termination Plan - Contents

No comments within scope.

16. License Termination Criteria

No comments within scope.

17. Life after License Termination

No comments within scope.

18. Reuse of Material

No comments within scope.

19. Transfer of Ownership

No comments within scope.

20. Financial Assurance

No comments within scope.

21. License Extensions

No comments within scope.

22. Safety of Decommissioning

No comments within scope.

6. Impacts that should be included or considered in the Supplement

A. Ecological Impacts

Three commenters (in four different comments) indicated that decommissioning has environmental impacts and that the GEIS should include an analysis of the environment and not just an analysis of impacts on humans.

Response: *The environmental impacts of decommissioning are addressed in this Supplement. Ecological issues are addressed in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

One commenter recommended that the GEIS assess the degree to which the environmental parameters of the site may have changed during the operation of the facility.

Response: *This Supplement may include a consideration of the degree to which environmental parameters of the site may have changed during operation. Ecological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter recommended that the GEIS take into account the relevant environmental characteristics of the site and the impacts from the use of the decommissioning techniques.

Response: *Relevant characteristics of the commercial nuclear power facility sites are being considered in the development of this Supplement. The impacts from the use of decommissioning techniques are also considered. Site characteristics and decommissioning techniques are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter recommended that land use, water use, air quality, and animal and human life be included in the GEIS as environmental impacts.

Response: *Ecological impacts such as land use, water use, air quality, and the impact on animals and humans are considered in this Supplement. Ecological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

Two commenters recommended a mesh screen to prevent birds from landing and nesting on the site. Another recommended sterilizing the wildlife and containing them to allow them to die naturally in order to keep them from passing on genetic material.

Response: *The impacts of the decommissioning process on the terrestrial environment are considered in this Supplement. Mitigative actions will be considered if necessary. Ecological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

B. Groundwater

Three commenters expressed concern about contamination in ground or surface water. Commenters indicated that studies should be conducted related to leaking pipes or plumes of contamination in the groundwater. One commenter specified that protocols should be in place that would be adhered to, particularly for underwater drilling. A third commenter thought that appropriate methodologies should be included to determine groundwater contamination before decommissioning occurs.

Response: *The impact of potentially contaminated groundwater is considered in this Supplement. Water quality issues are addressed in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

One commenter cautioned that impacts to groundwater specifically from rubblization should not be underestimated.

Response: *The radiological impacts of rubblization for the period beyond the license termination must meet the requirements in 10 CFR Part 20, Subpart E, before the license will be terminated. Impacts to groundwater during the decommissioning period and nonradiological impacts following the termination of the license are generically addressed in this Supplement. Water quality issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

Two commenters recommended that wells be monitored within five miles of the facility and that specific actions be taken if contamination is found.

Response: *Monitoring of effluents during decommissioning are addressed in this Supplement. Water quality issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter indicated that all plumes must be traced, blocked, pumped, and filtered. Another commenter recommended pumping groundwater through resin beds, sand filters, and charcoal filters.

Response: *An evaluation of the impact of potentially contaminated water is considered in this Supplement. Mitigative measures are discussed, as appropriate. Water quality issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of the GEIS.*

C. Surface Water

Two commenters indicated that sediment up to a mile downstream from the discharge "valves" should be removed and treated as hazardous waste.

Response: *The staff is uncertain as to the meaning of "discharge valve" but is responding to this question assuming the commenters meant the discharge structure. An evaluation of the impact of potentially contaminated sediment and its removal during the decommissioning process is considered within this Supplement. Mitigative measures are discussed as appropriate. Water quality issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter recommended routing site runoff to covered detention ponds equipped with filters, etc.

Response: *An evaluation of the impacts to surface water is considered in this Supplement. Mitigative measures are discussed as appropriate. Water quality issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

D. Radiological Concerns

One commenter requested that NRC include a definition of background radiation in the GEIS. It should be clear whether the background was measured before or after 1945.

Response: *This Supplement uses the NRC's definition of background radiation as given in 10 CFR 20.1003 as the basis for any discussion of radiological impacts. The background for a particular site would correspond to the background radiation levels determined at the time that the Final Environmental Impact Statement for the facility was issued. Radiological issues are*

addressed in Chapter 4, Environmental Impacts. This comment is within the scope of the GEIS.

E. Occupational Dose Impacts

One commenter indicated that the dose estimates for decommissioning activities should be revised and that an envelope should be used to account for attempts to use certain techniques that may not be the best way to solve the problem.

Response: *This Supplement addresses the occupational dose estimates for decommissioning. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter recommended that a good look be taken at the radiation exposure projections and that the projected exposure should be a good challenge for the industry.

Response: *This Supplement addresses the occupational dose estimates for decommissioning. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of the GEIS.*

One commenter recommended that a comparison be made of the dose estimates if the facility is decommissioned initially or if decommissioning does not start for 2 years.

Response: *The timing of activities and its impact on the anticipated radiological dose for a decommissioning facility are considered in this Supplement. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter encouraged caution in comparing risks among processes. The commenter recommended that all the aspects of different processes be considered and that the comparisons be compatible.

Response: *The comment is noted. The impacts of decommissioning activities are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter thought the scientific studies that have been performed since 1988 that show that radiation is more harmful to human health should also be included.

Response: *This Supplement will include a determination of the impacts on human health from the potential radiological dose. The discussion will be based on current scientific guidelines. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter indicated that the total dose should be a very high priority.

Response: *This Supplement includes an analysis of the dose impacts of decommissioning. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter suggested that exposure levels for workers are monitored every day and tallied every week or so and tracked against the limits given in the GEIS. A second commenter indicated that worker doses during decommissioning have been repeatedly underestimated because decommissioning is an experiment and there is a lack of experience and enforcement by the NRC. A third commenter specifically identified Connecticut Yankee as underestimating worker dose assessments and predictions.

Response: *This Supplement includes an analysis of impacts of radiation dose to workers due to decommissioning. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter recommended that the GEIS include estimates for worker inhalation of materials of high specific activity that have been vaporized and particulated by a particular decommissioning operation.

Response: *This Supplement includes an analysis of the impact of radiation dose to workers during decommissioning. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

F. Public Dose Impacts

One commenter thought the NRC did not deal with incidental contamination that affected a community, but focused instead on contamination from processes. The implication was that an analysis of incident contamination and its effect on the community should be included in the GEIS. Three other commenters specified the inadvertent release of hot particles and the routine decommissioning releases as jeopardizing health and safety of the public. One other commenter (in two comments) thought the health and safety problems needed to be taken more seriously.

Response: *The incidental contamination and inadvertent release of hot particles are unplanned releases and are handled on a site-specific basis and are not within the scope of this Supplement. An analysis of the routine decommissioning releases on the health and safety of the public are within the scope of this Supplement and are considered. Radiological issues are addressed in Chapter 4, Environmental Impacts.*

One commenter thought the dose to the public from shipment of material to other locations should be included in the consideration of dose from decommissioning a facility.

Response: *The dose to the public during transportation of radioactive material to disposal facilities are considered in this Supplement. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter indicated that the priority of the whole process was not the decommissioning of the sites, but rather the protection of public health and the environment.

Response: *The NRC's mission includes the protection of public health and safety, the common defense and security, and the protection of the environment. The NRC's mission influences the entire decommissioning process. Public safety and protection of the environment are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter expressed concern over the issue of hot particles and their impact on the community.

Response: *The inadvertent or accidental release of hot particles is handled on a site-specific basis. Analysis of contamination that is removed from the site into the public realm is considered to be an accident and would be treated as such in this Supplement. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

One commenter stated that NRC should not recalibrate and redefine background radiation levels so that they include regular plant operations, accidents, and weapons testing.

Response: *This Supplement uses the NRC's definition of background radiation as given in 10 CFR 20.1003 as a basis for any discussion of radiological impacts. Radiological issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of the GEIS.*

G. Transportation Dose Impacts

One commenter indicated that transportation doses should be considered and any site-specific issues. One commenter indicated that the changes in the transportation dose since 1988 (in the programs and methodologies that are used) warrant a revision in this area in the GEIS.

Response: *The transportation dose to the public and workers from the transport of wastes are within the scope of this Supplement. Transportation issues are addressed in Chapter 4, Environmental Impacts.*

H. Nonradiological Impacts

One commenter encouraged the incorporation of nonradiological contaminants into the GEIS. Four commenters expressed concern over nonradiological impacts of decommissioning. Two of the commenters specifically mentioned nonradiological impacts such as polychlorobiphenyls, heavy metals, and concrete. Another commenter inquired where the information would be obtained that related to nonradiological issues. Another commenter asked if nonradiological issues would be addressed in the license termination plan. (It was uncertain if this commenter thought this would also apply to the GEIS).

Response: *Nonradiological chemical hazards are regulated by the provisions of the Resource Conservation and Recovery Act (RCRA 1976). Most states have received authority from the U.S. Environmental Protection Agency (EPA) to regulate and enforce RCRA. The EPA controls hazardous waste storage, treatment, and disposal in those states that do not have this authority. Mixed waste (hazardous waste that contains radioactive material) is subject to regulation by the NRC under the Atomic Energy Act, as amended (AEA 1954), and by EPA under RCRA, as amended. Nonradiological chemical hazards are addressed in this Supplement as they relate to the radiological decommissioning of the facility. Nonradiological issues are addressed in Chapter 4, Environmental Impacts. Mixed waste (radiological contamination that is mixed with chemical contamination) are within the scope of this Supplement.*

I. Public Health Impacts (Nonradiological)

Two commenters discussed the spread of contamination into the community. One of the commenters recommended that the GEIS address health problems in the community as a result of contamination in the community.

Response: *This Supplement considers health impacts to the community as a result of radiation dose, noise, and transportation accidents. Public health issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

J. Socioeconomic Impacts

Two commenters indicated that community impacts are not adequately addressed in the GEIS and need to be looked at more carefully.

Response: *This Supplement considers socioeconomic impacts. Socioeconomic issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

Appendix N

K. Cultural Resource Impacts

One commenter inquired if the facilities are required to adhere to the National Park Service's requirement for Historic American Engineering Records and the Historic Architectural Building requirements.

Response: *Cultural resources are considered in this Supplement and are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

L. Cost Impacts

Two commenters recommended that the NRC take a look at the decommissioning projects or sites in detail to see if cost estimates do or do not match the final results. One of the commenters specifically addressed the variation in cost with time.

Response: *The cost of decommissioning is included in this Supplement. The variation in the cost estimates based on different start and end times of decommissioning are also considered. Cost issues are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of the Supplement.*

Two commenters thought that the storage of spent fuel should be considered as part of the decommissioning costs. One commenter also recommended that the removal of nonradioactive structures should be considered as part of the decommissioning costs.

Response: *The dismantlement of nonradioactive structures is not considered as part of the radiological decommissioning of the site unless it is necessary to remove a structure in order to complete the radiological decommissioning of the facility. However, the removal of structures that were necessary for the production of power are included in this Supplement for the sake of completeness even if the structures are not part of the radiological decommissioning of the site. Structure dismantlement issues are within the scope of this Supplement and are addressed in Chapter 4, Environmental Impacts. The management and funding for the storage of spent fuel is required by 10 CFR 50.54 and is regulated separately from the decommissioning costs. This comment is not within the scope of this Supplement.*

One commenter recommended placing the facility in SAFSTOR as a means to allow more time to gather money for decommissioning and to look at the availability of low-level waste sites.

Response: *The regulations for the accrual of funds for decommissioning are given in 10 CFR 50.75 and are not within the scope of this Supplement. However, the cost benefits of various decommissioning options are considered, and are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

M. Environmental Justice

Three commenters suggested that an analysis of the impacts of decommissioning on environmental justice be considered in the Supplement.

Response: *An analysis of environmental justice is included in this Supplement in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

N. Impacts of Fuel Storage

No comments within scope.

O. Cumulative Impacts

One commenter recommended that the whole picture be looked at with regards to the overall purpose and the environmental effects of the combined decommissioning options.

Response: *Cumulative impacts are within the scope of this Supplement and are considered in Chapter 4, Environmental Impacts.*

One commenter recommended that the GEIS include a description and analysis of cumulative impacts for each waste stream in the community, including transportation routes, NRC and DOE facilities, and proposed sites for waste management, storage, and disposition.

Response: *Cumulative impacts related to the decommissioning of the site are considered in this Supplement. Impacts related to transportation of the waste and to irretrievable commitment of land for waste storage are also considered in this Supplement. Cumulative impact, transportation, and retrieval resource impacts are addressed in Chapter 4, Environmental Impacts. Cumulative impacts from waste management, storage, and disposition facilities are not within the scope of this Supplement.*

7. Site-Specific Information versus Generic Information

Two commenters asked how impacts or site conditions will be addressed - if they would be handled generically in the GEIS or on a site-specific basis.

Response: *Ecological and environmental issues have been considered to determine if they are generic issues that should be included in this Supplement. Those issues determined not to be generic and that require a site-specific assessment are identified in this Supplement, in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

Two commenters asked how site-specific conditions such as groundwater pathways would be

considered in the Supplement. If they would be considered generically or on a site-specific basis.

Response: *Ecological and environmental issues have been considered to determine if they are a generic issue that should be included in this Supplement. Those issues determined not to be generic and that require a site-specific assessment are identified in this Supplement, in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

Eight commenters (in 16 different comments) asked about the situations and rules for triggering a site-specific environmental impact assessment. Specific examples of items that might trigger a site-specific analysis include contamination in pools and under reactor sites, coastal and flood plain issues, seismology, background radiation, pollution, reactor types, geology, operating experiences, land use, economy, synergistic effects of other toxins or industries in the area, decommissioning techniques, uniqueness of the site soil contamination, and river sediments.

Response: *This Supplement discusses the issue of site-specific versus generic environmental impacts in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

Six commenters (nine comments) indicated that, in general, a site-specific impact statement or a set of guidelines that the utilities need to consider during decommissioning might be more appropriate than a GEIS because of the site-specific nature of decommissioning. One of the commenters thought that the question of what does and does not legitimately constitute site-specific factors in need of an EIS are economically driven instead of safety driven.

Response: *This Supplement will discuss the issue of site-specific versus generic environmental impacts in Chapter 4, Environmental Impacts. These comments are within the scope of this Supplement.*

8. Incorporation of Information from Previously Developed EISs

One commenter recommended that the Supplement address whether and how to incorporate findings from the EISs for plant construction and operation, analyses that have accrued during plant operations, and reports on referenced facilities.

Response: *Chapter 1, Introduction, in this Supplement discusses the interface between this Supplement for decommissioning and the EISs for plant construction, operation, and license renewal. This comment is within the scope of this Supplement.*

9. Methodology

A. Methodology - Process

One commenter recommended that decommissioning be treated as an activity separate from operations.

Response: *Environmental impacts from decommissioning activities are specifically addressed (and separately from impacts of operation) in this Supplement. Environmental impacts are considered in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

B. Determination of Boundary Conditions

One commenter asked how the boundary conditions for the GEIS would be determined. The commenter then proceeded to recommend several methods for determining boundary conditions for waste volumes.

Response: *This Supplement has been developed by collecting a reasonable range of information from the sites that are undergoing decommissioning and using that information to set boundaries for environmental impacts. Environmental Impacts are addressed in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

C. Changing the Parameters from the Initial Study

One commenter recommended that the existing GEIS be used as a baseline and that it should be supplemented in those areas where additional information is available. This would allow those licensees currently undergoing decommissioning to remain enveloped and those that are using the GEIS to evaluate a future decommissioning would have more up-to-date information.

Response: *The 1988 GEIS is being supplemented based on additional information and decommissioning experience and history. The analysis in Chapter 4, Environmental Impacts, and the corresponding appendices contain the data used for evaluating the environmental impacts. This comment is within the scope of this Supplement.*

10. Mitigation

One commenter recommended that the NRC adequately address mitigation in the GEIS or a site-specific analysis.

Response: *Mitigation is within the scope of this Supplement and is addressed in Chapter 1, Introduction, and Chapter 4, Environmental Impacts.*

11. Grandfathering

Three commenters asked about the impact of the new Supplement on facilities that have shut down and are in compliance with the 1988 GEIS.

Response: *The use of this Supplement by facilities that have previously shut down is addressed in this Supplement in Chapter 1, Introduction, and Chapter 4, Environmental Impacts.*

12. Regulations

A. Relationship to Other Regulations

One commenter thought the GEIS should address the relationship with other NRC regulations, such as site-release criteria.

Response: *The relationship between this Supplement and other NRC regulations or EISs is discussed in Chapter 1, Introduction. This comment is within the scope of this Supplement.*

One commenter recommended that NRC treat all problems and areas of concern as "site-specific problems" rather than as generic industry problems.

Response: *This Supplement identifies issues that require a site-specific analysis. Site-specific issues are addressed in Chapter 4, Environmental Impacts. This comment was within the scope of this Supplement.*

13. Scoping Meetings - Schedule, Substance, etc.

No comments within scope.

14. Comments Related to Specific Nuclear Power Plants

Three commenters addressed the use of rubblization as an activity for decommissioning at Maine Yankee. One commenter agreed that the NRC needed to fulfill their responsibilities related to NEPA. A second commenter believed that a full environmental assessment should be made to determine if a site-specific EIS is necessary. A third commenter strongly opposed any delay in a specific plant initiative based on the Supplement to the GEIS.

Response: *Rubblization is addressed by this Supplement. Specific areas or activities requiring site-specific analyses are also addressed. Rubblization and site-specific issues are considered in Chapter 4, Environmental Impacts. This comment is within the scope of this Supplement.*

N.1 References

10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for protection against radiation."

10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic licensing of production and utilization facilities."

10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions."

65 FR 13797. "Notice of Intent to Prepare a Supplement to the Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities and to Hold Public Meetings for the Purpose of Scoping and to Solicit Public Input into the Process." Nuclear Regulatory Commission. *Federal Register*. March 14, 2000.

Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq.

National Environmental Policy Act (NEPA) of 1969, as amended, 42 USC 4321 et seq.

Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Amendments Act of 1984, 42 USC 6901 et seq.

U.S. Nuclear Regulatory Commission (NRC). 1988. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*. NUREG-0586, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2000a. Letter from NRC to "People who Requested a Copy of Meeting Transcript for GEIS Public Scoping Meeting on April 27, 2000 in Lisle, Illinois." Dated June 30, 2000.

U.S. Nuclear Regulatory Commission (NRC). 2000b. Letter from NRC to "People who Requested a Copy of Meeting Transcript for GEIS Public Scoping Meeting on May 17, 2000 in Boston, Massachusetts." Dated June 30, 2000.

U.S. Nuclear Regulatory Commission (NRC). 2000c. Letter from NRC to "People who Requested a Copy of Meeting Transcript for GEIS Public Scoping Meeting on June 13, 2000 in

Atlanta, Georgia." Dated June 30, 2000.

U.S. Nuclear Regulatory Commission (NRC). 2000d. Letter from NRC to "People who Requested a Copy of Meeting Transcript for GEIS Public Scoping Meeting on June 21, 2000 in San Francisco, California." Dated June 30, 2000.

Appendix O

Comments on the Draft Supplement and Staff Responses

Contents

Table

Appendix O

Comments on the Draft Supplement and Staff Responses

Introduction

On November 9, 2001 a notice of availability was published by the U.S. Nuclear Regulatory Commission in the Federal Register (66 FR 56721) announcing the publication of the *Generic Environmental Impact Statement on Decommissioning Nuclear Facilities, Draft Report for Comment* (NUREG-0586, Supplement 1). The draft Supplement was published for comment by Federal, State, and local government agencies as well as interested members of the public. As part of the process to solicit public comments on the draft Supplement, the staff:

- placed a copy of the draft Supplement into the NRC's electronic Public Document Room,
- sent copies of the draft Supplement to certain Federal, State, and local agencies,
- provided a copy of the draft Supplement to any member of the public that requested one free of charge,
- sent copies of the draft Supplement to identified public interest groups and concerned citizens in the vicinity of all 22 power reactors undergoing decommissioning,
- published a notice of availability of the draft Supplement in the Federal Register on November 9, 2001 (66 FR 56721), and
- announced and held public meetings in San Francisco, California on December 4, 2001, Chicago, Illinois on December 6, 2001, in Boston, Massachusetts on December 10, 2001, and in Atlanta, Georgia on December 12, 2001 to describe the results of the environmental review and answer related questions.

During the comment period, the staff received a total of 52 comment letters in addition to the comments received during the transcribed public meetings.

Appendix O

The staff has reviewed the public meeting transcripts and the 52 comment letters that are part of the docket file for the application, all of which are available in the NRC's Electronic Public Document Room (ADAMS) located at http://www.nrc.gov/NRC/ADAMS/index.html. Appendix O contains the excerpted comments and the staff's responses. Related issues are grouped together. The staff chose not to edit comments, and instead reprinted the comments in this appendix without modification. Emphasis added by the authors of the comments, such as capitalization, was retained. Appendix P contains excerpts of the public meeting transcripts, the written statements provided at the public meetings, and comment letters.

Each comment identified by the staff from the transcripts and comment letters was assigned a specific alpha-numeric comment number. The comment number is typed in the margin of the transcript or letter at the beginning of the comment. Table O-1 contains a cross-reference of the comment numbers, the speaker or author of the comment, the page where the comment can be found in Appendix P, and the section of this Appendix where the comment is addressed.

The speakers at the meetings are listed in speaking order in Table O-1. The comments from the transcript are identified by the letters "SF," "CH," "BO," or "AT," followed by a number that identifies each comment in approximate chronological order in which the comments were made. The letters "SF" indicate that the comments were made at the meeting in San Francisco, California, the letters "CH" indicate that the comments were made at the meeting in Chicago, Illinois, the letters "BO" indicate that the comments were made at the meeting in Boston, Massachusetts, and the letters "AT" indicate the comments were made in Atlanta, Georgia. The written statements (from the public meetings) and written comment letters are identified by the letters "CL," for "comment letter."

The staff made a determination on each comment that it was one of the following:

(1) a comment that was actually a request for information, or a statement of opinion, which did not introduce new information.

(2) a comment that raised an environmental issue that was not addressed in the supplement, but is within the scope of the environmental review.

(3) a comment outside the scope of this environmental review (based on the determination of scope and purpose of this Supplement, see Section 1.3, Scope of the Supplement).

Comments without a supporting technical basis or without any new information are discussed in this Appendix, and not in other sections of this Supplement. Relevant references that address the issues within the regulatory authority of the NRC are provided where appropriate. Many of these references can be obtained from the NRC Electronic Public Document Room.

Within each section of this Appendix, similar comments are grouped together for ease of

reference, and are followed by the staff's response. Where the comment or question resulted in a change in the text of the draft Supplement, the corresponding response refers the reader to the appropriate section of the final Supplement where the change was made. Revisions to the text in this final Supplement report are designated by vertical lines beside the text.

Some numbers were initially assigned to portions of verbal or written statements that were later determined not to be comments or some comments were combined. These items were removed from the table. As a result, not all numbers in Table O-1 are sequential.

Table O.1. Comment Log

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
SF-A/1	Sokolsky, David	Meeting Transcript - San Francisco	12/4/2001	P-1	O 6.2
SF-A/2	Sokolsky, David	Meeting Transcript - San Francisco	12/4/2001	P-7	O.6.2
SF-B/1	Cabasso, Jackie	Meeting Transcript - San Francisco	12/4/2001	P-2	O 6.2
SF-B/2	Cabasso, Jackie	Meeting Transcript - San Francisco	12/4/2001	P-2	O.6.2
SF-B/4	Cabasso, Jackie	Meeting Transcript - San Francisco	12/4/2001	P-11	O 2.3 1
SF-B/5	Cabasso, Jackie	Meeting Transcript - San Francisco	12/4/2001	P-11	O 4.4
SF-C/1	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-4	O 5.5
SF-C/2	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-6	O 5.5
SF-C/3	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-10	O 2.4.1
SF-C/4	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-10	O 2.4.1
SF-C/5	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-10	O 4.4
SF-C/6	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-10	O.2.4.1
SF-C/7	Nesbitt, Dale	Meeting Transcript - San Francisco	12/4/2001	P-11	O.1.6
SF-D/1	Olson, Patricia	Meeting Transcript - San Francisco	12/4/2001	P-9	O 5.2
SF-D/2	Olson, Patricia	Meeting Transcript - San Francisco	12/4/2001	P-9	O 4.1
SF-D/3	Olson, Patricia	Meeting Transcript - San Francisco	12/4/2001	P-9	O 4.1
CH-A/1	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-14	O.6.2
CH-A/2	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-14	O.6 2
CH-A/3	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-16	O 3 0
CH-A/4	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-21	O.6.4
CH-A/5	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-21	O.2.3.2
CH-A/6	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-21	O 4.10
CH-A/7	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-21	O.2.4 2
CH-A/8	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-21	O.2.4.1
CH-A/9	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 2.4.1
CH-A/10	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 1.16
CH-A/11	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 2.3 4
CH-A/12	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 2.3.1
CH-A/13	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 6.1
CH-A/14	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-22	O 2.3 1
CH-A/15	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-25	O 4.10
CH-A/16	Musiker, Debbie	Meeting Transcript - Chicago	12/6/2001	P-29	O 6.2
CH-B/1	Gaynor, Paul	Meeting Transcript - Chicago	12/6/2001	P-15	O.1.4

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CH-B/3	Gaynor, Paul	Meeting Transcript - Chicago	12/6/2001	P-23	O.5.1
CH-B/4	Gaynor, Paul	Meeting Transcript - Chicago	12/6/2001	P-23	O 5.1
CH-C/1	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-17	O 2.3 3
CH-C/2	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-18	O 2.3 3
CH-C/3	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-18	O.5.4
CH-C/4	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-18	O 2.3 3
CH-C/5	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-18	O.2 3 3
CH-C/6	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-19	O.1 6
CH-C/7	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-19	O.2.3.3
CH-C/8	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-19	O.2 3 3
CH-C/9	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-19	O.2.3 3
CH-C/10	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-19	O.2 2
CH-C/11	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-20	O.2.3 3
CH-C/12	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-20	O.2 2
CH-C/14	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-27	O.2.3 3
CH-C/15	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-28	O 2.3
CH-C/16	Klebe, Michael	Meeting Transcript - Chicago	12/6/2001	P-29	O 2.3
CH-D/1	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-23	O.6 5
CH-D/2	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-23	O.1 8
CH-D/5	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-23	O 6.1
CH-D/6	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-23	O.1 9
CH-D/7	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O.1.8
CH-D/8	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O.1.7
CH-D/9	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O 6.5
CH-D/10	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O 6 5
CH-D/11	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O.1.6
CH-D/12	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-24	O 5.1
CH-D/13	Goodman, Lynne	Meeting Transcript - Chicago	12/6/2001	P-30	O.5.3
BO-A/1	Dierker, Carl	Meeting Transcript - Boston	12/10/2001	P-30	O.2.3.2
BO-A/2	Dierker, Carl	Meeting Transcript - Boston	12/10/2001	P-31	O 2.3.2
BO-A/3	Dierker, Carl	Meeting Transcript - Boston	12/10/2001	P-31	O.2.3.2
BO-A/4[a]	Dierker, Carl	Meeting Transcript - Boston	12/10/2001	P-31	O.5.7
BO-A/6	Dierker, Carl	Meeting Transcript - Boston	12/10/2001	P-32	O 5 5
BO-B/1	Williams, Carl	Meeting Transcript - Boston	12/10/2001	P-32	O 5.4
BO-B/2	Williams, Carl	Meeting Transcript - Boston	12/10/2001	P-33	O 5 4

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
AT-A/1	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-38	O.6.2
AT-A/2	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-44	O 5.2
AT-A/3	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-44	O.5.2
AT-A/5	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-44	O.5.2
AT-A/6	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-45	O.5.3
AT-A/7	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-45	O 5.2
AT-A/8	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-45	O 6.3
AT-A/9	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-45	O 2.2
AT-A/10	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-45	O 2.4.2
AT-A/11	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O 2.4.2
AT-A/12	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O 2.4.1
AT-A/13	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O 5.3
AT-A/14	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O 2.4.1
AT-A/15	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O 4 4
AT-A/16	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-46	O.4 4
AT-A/17	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.5.9
AT-A/18	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.5 5
AT-A/19	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.5.10
AT-A/20	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.5.2
AT-A/21	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.1.16
AT-A/22	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.2.2
AT-A/23	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-47	O.5.6
AT-A/24	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-48	O 4 6
AT-A/25	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-48	O.4.4
AT-A/26	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-48	O.4.5
AT-A/27	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-48	O.1.6
AT-A/29	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-48	O.1.9
AT-A/30	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-49	O.1.10
AT-A/31	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-49	O.1.9
AT-A/32	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-49	O.5.9
AT-A/33	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-49	O.1.6
AT-A/34	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-49	O.1.16
AT-A/35	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-50	O.1.16
AT-A/36	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-50	O.1.2
AT-A/37	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-50	O.2.3.4
AT-A/38	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-50	O 4 1.1
AT-A/39	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-50	O 4 8

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
AT-A/40	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O.1.10
AT-A/41	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O.5.9
AT-A/42	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O 2.3 2
AT-A/43	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O 4.3
AT-A/44	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O.6.5
AT-A/45	Barczak, Sara	Meeting Transcript - Atlanta	12/12/2001	P-51	O.5 9
AT-B/1	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-38	O.1.6
AT-B/2	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-39	O 4.7
AT-B/3	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-39	O 4 7
AT-B/4	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-40	O 4.8
AT-B/5	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O.5 8
AT-B/6	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O 4 7
AT-B/7	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O.5.2
AT-B/8	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O.4.5
AT-B/9	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O.6 5
AT-B/10	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-55	O.2.1
AT-B/11	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-56	O.2.4.1
AT-B/12	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-56	O.2 4.3
AT-B/13	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-56	O.5 2
AT-B/14	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-56	O.1.10
AT-B/15	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-57	O.4.7
AT-B/16	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-57	O 2.3 2
AT-B/17	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-57	O 2.3 3
AT-B/18	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-57	O.6.4
AT-B/19	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-73	O.5.2
AT-B/20	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-73	O.5 2
AT-B/21	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-73	O 2 2
AT-B/22	Zeller, Janet	Meeting Transcript - Atlanta	12/12/2001	P-73	O 2.1
AT-C/1	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-41	O 5.9
AT-C/2	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-41	O.1.9
AT-C/3	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-42	O.2.3.4
AT-C/4	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-41	O.1 9
AT-C/5	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-41	O.4.7
AT-C/6	Martin, Ed	Meeting Transcript - Atlanta	12/12/2001	P-41	O.1.9
AT-D/1	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.1.9
AT-D/2	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.2.4 2
AT-D/3	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.5 9
AT-D/4	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O 4 4
AT-D/5	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.3 0

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
AT-D/6	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.1.15
AT-D/7	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.4 3
AT-D/8	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O.6 5
AT-D/9	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-52	O 2 3.3
AT-D/10	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-53	O 6 3
AT-D/11	Kushner, Adele	Meeting Transcript - Atlanta	12/12/2001	P-53	O 2.4.2
AT-E/1	Genoa, Paul	Meeting Transcript - Atlanta	12/12/2001	P-53	O 2.3.4
AT-E/2	Genoa, Paul	Meeting Transcript - Atlanta	12/12/2001	P-72	O 2.2
AT-F/1	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-58	O.2.2
AT-F/2	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-58	O 2.4.1
AT-F/3	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-58	O 4.4
AT-F/4	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-58	O.2 4.1
AT-F/5	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-58	O.2.2
AT-F/6	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-59	O 1.6
AT-F/7	Zeller, Lou	Meeting Transcript - Atlanta	12/12/2002	P-60	O.1.15
AT-G/1	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-60	O.2.3.3
AT-G/2	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-61	O.4.3
AT-G/3	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-61	O.4.1
AT-G/4	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-61	O.3 0
AT-G/5	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-61	O.2 3.3
AT-G/7	Carroll, Glen	Meeting Transcript - Atlanta	12/12/2001	P-71	O.1.9
AT-H/1	Ferguson, Tom	Meeting Transcript - Atlanta	12/12/2001	P-62	O.5 2
CL-01/1	Scherer, A Edward	Letter	12/27/2001	P-75	O.6 5
CL-01/2	Scherer, A Edward	Letter	12/27/2001	P-75	O.5 6
CL-01/3	Scherer, A Edward	Letter	12/27/2001	P-75	O.6 1
CL-01/4	Scherer, A Edward	Letter	12/27/2001	P-75	O.1.2
CL-01/5	Scherer, A Edward	Letter	12/27/2001	P-75	O.6 1
CL-01/6	Scherer, A Edward	Letter	12/27/2001	P-76	O.1.11
CL-01/7	Scherer, A Edward	Letter	12/27/2001	P-76	O.1.13
CL-01/8	Scherer, A Edward	Letter	12/27/2001	P-76	O.4.1.1
CL-02/1	Epstein, Eric Joseph	Letter	12/28/2001	P-79	O.1.9
CL-02/2	Epstein, Eric Joseph	Letter	12/28/2001	P-79	O.4 10
CL-02/3	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.1.9
CL-02/4	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.6.5
CL-02/5	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.4 4
CL-02/6	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.4.3
CL-02/7	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.1.9
CL-02/8	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.6 5

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Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-02/9	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O 4.9
CL-02/10	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O 2.2
CL-02/11	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.2.2
CL-02/12	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.4.10
CL-02/13	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.4.4
CL-02/14	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.6.5
CL-02/15	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O 2.2
CL-02/16	Epstein, Eric Joseph	Letter	12/28/2001	P-80	O.6 5
CL-02/17	Epstein, Eric Joseph	Letter	12/28/2001	P-81	O.1.9
CL-02/18	Epstein, Eric Joseph	Letter	12/28/2001	P-84	O 2.1
CL-02/19	Epstein, Eric Joseph	Letter	12/28/2001	P-84	O.1.9
CL-02/20	Epstein, Eric Joseph	Letter	12/28/2001	P-86	O.1.9
CL-02/21	Epstein, Eric Joseph	Letter	12/28/2001	P-86	O 4 4
CL-02/22	Epstein, Eric Joseph	Letter	12/28/2001	P-87	O.1.9
CL-02/23	Epstein, Eric Joseph	Letter	12/28/2001	P-87	O 4.4
CL-02/24	Epstein, Eric Joseph	Letter	12/28/2001	P-87	O 4.4
CL-02/25	Epstein, Eric Joseph	Letter	12/28/2001	P-88	O 4.4
CL-02/26	Epstein, Eric Joseph	Letter	12/28/2001	P-88	O 4.4
CL-02/27	Epstein, Eric Joseph	Letter	12/28/2001	P-88	O.1.9
CL-02/28	Epstein, Eric Joseph	Letter	12/28/2001	P-89	O.1.9
CL-02/29	Epstein, Eric Joseph	Letter	12/28/2001	P-89	O 4.3
CL-02/30	Epstein, Eric Joseph	Letter	12/28/2001	P-90	O 4.3
CL-02/31	Epstein, Eric Joseph	Letter	12/28/2001	P-90	O.4.10
CL-02/32	Epstein, Eric Joseph	Letter	12/28/2001	P-92	O 4.9
CL-02/33	Epstein, Eric Joseph	Letter	12/28/2001	P-92	O.4.10
CL-02/34	Epstein, Eric Joseph	Letter	12/28/2001	P-92	O.1.10
CL-02/35	Epstein, Eric Joseph	Letter	12/28/2001	P-93	O 4.9
CL-02/36	Epstein, Eric Joseph	Letter	12/28/2001	P-94	O.1.9
CL-02/37	Epstein, Eric Joseph	Letter	12/28/2001	P-95	O 2 2
CL-02/38	Epstein, Eric Joseph	Letter	12/28/2001	P-95	O 2 2
CL-02/39	Epstein, Eric Joseph	Letter	12/28/2001	P-95	O 4.10
CL-02/40	Epstein, Eric Joseph	Letter	12/28/2001	P-95	O.6.1
CL-02/41	Epstein, Eric Joseph	Letter	12/28/2001	P-96	O 4.10
CL-02/42	Epstein, Eric Joseph	Letter	12/28/2001	P-96	O.4.10
CL-02/43	Epstein, Eric Joseph	Letter	12/28/2001	P-96	O.5 8
CL-02/44	Epstein, Eric Joseph	Letter	12/28/2001	P-97	O.5.5
CL-02/45	Epstein, Eric Joseph	Letter	12/28/2001	P-97	O.1.4
CL-02/46	Epstein, Eric Joseph	Letter	12/28/2001	P-98	O.1.13
CL-02/47	Epstein, Eric Joseph	Letter	12/28/2001	P-98	O 1.1

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Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-02/48	Epstein, Eric Joseph	Letter	12/28/2001	P-98	O.1.2
CL-02/49	Epstein, Eric Joseph	Letter	12/28/2001	P-99	O.1.2
CL-02/50	Epstein, Eric Joseph	Letter	12/28/2001	P-99	O.1.3
CL-02/51	Epstein, Eric Joseph	Letter	12/28/2001	P-100	O.1.4
CL-02/52	Epstein, Eric Joseph	Letter	12/28/2001	P-101	O.1.16
CL-02/53	Epstein, Eric Joseph	Letter	12/28/2001	P-101	O.1.4
CL-02/54	Epstein, Eric Joseph	Letter	12/28/2001	P-101	O.1.8
CL-02/55	Epstein, Eric Joseph	Letter	12/28/2001	P-101	O.1.10
CL-02/56	Epstein, Eric Joseph	Letter	12/28/2001	P-102	O.1.16
CL-02/57	Epstein, Eric Joseph	Letter	12/28/2001	P-102	O.1.9
CL-02/58	Epstein, Eric Joseph	Letter	12/28/2001	P-102	O.1.10
CL-02/59	Epstein, Eric Joseph	Letter	12/28/2001	P-103	O.1.10
CL-02/60	Epstein, Eric Joseph	Letter	12/28/2001	P-103	O.1.11
CL-02/61	Epstein, Eric Joseph	Letter	12/28/2001	P-103	O.1.12
CL-02/62	Epstein, Eric Joseph	Letter	12/28/2001	P-103	O.1.12
CL-02/63	Epstein, Eric Joseph	Letter	12/28/2001	P-103	O.1.16
CL-02/64	Epstein, Eric Joseph	Letter	12/28/2001	P-104	O 1.13
CL-02/65	Epstein, Eric Joseph	Letter	12/28/2001	P-104	O.1.15
CL-02/66	Epstein, Eric Joseph	Letter	12/28/2001	P-104	O.1.9
CL-02/67	Epstein, Eric Joseph	Letter	12/28/2001	P-105	O.5.7
CL-02/68	Epstein, Eric Joseph	Letter	12/28/2001	P-105	O.1.10
CL-02/69	Epstein, Eric Joseph	Letter	12/28/2001	P-105	O 1.10
CL-02/70	Epstein, Eric Joseph	Letter	12/28/2001	P-105	O.1.11
CL-02/71	Epstein, Eric Joseph	Letter	12/28/2001	P-106	O 1.15
CL-03/1	Scott, Collier Shannon	Letter	12/31/2001	P-108	O.4.1.1
CL-03/2	Scott, Collier Shannon	Letter	12/31/2001	P-108	O.4.1.1
CL-03/3	Scott, Collier Shannon	Letter	12/31/2001	P-108	O.4.1.1
CL-03/4	Scott, Collier Shannon	Letter	12/31/2001	P-108	O.4.1.1
CL-03/5	Scott, Collier Shannon	Letter	12/31/2001	P-109	O.1.10
CL-03/6	Scott, Collier Shannon	Letter	12/31/2001	P-109	O.4.1.1
CL-03/7	Scott, Collier Shannon	Letter	12/31/2001	P-109	O.1.10
CL-03/8	Scott, Collier Shannon	Letter	12/31/2001	P-109	O 4.1.1
CL-03/9	Scott, Collier Shannon	Letter	12/31/2001	P-110	O 4.1.1
CL-04/1	Williamson, Thomas	Letter	12/27/2001	P-111	O.6.5
CL-04/2	Williamson, Thomas	Letter	12/27/2001	P-111	O.5.4
CL-04/3	Williamson, Thomas	Letter	12/27/2001	P-111	O.1.3
CL-04/4	Williamson, Thomas	Letter	12/27/2001	P-111	O.1.4
CL-04/5	Williamson, Thomas	Letter	12/27/2001	P-111	O.1.4
CL-04/6	Williamson, Thomas	Letter	12/27/2001	P-112	O 1.5

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-04/7	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.6
CL-04/8	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.11
CL-04/9	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.12
CL-04/10	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.15
CL-04/11	Williamson, Thomas	Letter	12/27/2001	P-112	O 6.1
CL-04/12	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.6
CL-04/13	Williamson, Thomas	Letter	12/27/2001	P-112	O.1.6
CL-04/14	Williamson, Thomas	Letter	12/27/2001	P-113	O.1.10
CL-04/15	Williamson, Thomas	Letter	12/27/2001	P-113	O.1.15
CL-04/16	Williamson, Thomas	Letter	12/27/2001	P-113	O.1.6
CL-04/17	Williamson, Thomas	Letter	12/27/2001	P-113	O 6.1
CL-04/18	Williamson, Thomas	Letter	12/27/2001	P-113	O.1.4
CL-04/19	Williamson, Thomas	Letter	12/27/2001	P-113	O 6.1
CL-05/1	Davis, James	Letter	12/28/2001	P-114	O 6.5
CL-05/2	Davis, James	Letter	12/28/2001	P-115	O.1.6
CL-05/3	Davis, James	Letter	12/28/2001	P-115	O 5.5
CL-05/4	Davis, James	Letter	12/28/2001	P-115	O 6.1
CL-05/5	Davis, James	Letter	12/28/2001	P-115	O 6.1
CL-05/6	Davis, James	Letter	12/28/2001	P-115	O 6.1
CL-05/7	Davis, James	Letter	12/28/2001	P-115	O 6.1
CL-05/8	Davis, James	Letter	12/28/2001	P-115	O.1 6
CL-05/9	Davis, James	Letter	12/28/2001	P-115	O 6.1
CL-05/10	Davis, James	Letter	12/28/2001	P-116	O 2.3 3
CL-05/11	Davis, James	Letter	12/28/2001	P-116	O.1.3
CL-05/12	Davis, James	Letter	12/28/2001	P-116	O 6.1
CL-05/13	Davis, James	Letter	12/28/2001	P-116	O.1.15
CL-05/14	Davis, James	Letter	12/28/2001	P-116	O.1.4
CL-05/15	Davis, James	Letter	12/28/2001	P-116	O.1.4
CL-05/16	Davis, James	Letter	12/28/2001	P-116	O 6.1
CL-05/17	Davis, James	Letter	12/28/2001	P-116	O.1.11
CL-05/18	Davis, James	Letter	12/28/2001	P-116	O 6.1
CL-05/19	Davis, James	Letter	12/28/2001	P-116	O.1.15
CL-06/1	Routh, Stephen	Letter	12/21/2001	P-117	O.1 6
CL-06/2	Routh, Stephen	Letter	12/21/2001	P-117	O 5 4
CL-06/3	Routh, Stephen	Letter	12/21/2001	P-117	O 1.7
CL-07[a]	Sokolsky, David	Letter	12/21/2001		
CL-08/1	Barczak, Sara	Letter	12/27/2001	P-119	O 5 2
CL-08/2	Barczak, Sara	Letter	12/27/2001	P-119	O 5 2
CL-08/3	Barczak, Sara	Letter	12/27/2001	P-119	O 2 4.1

(a) CL-07 Letter submitted by Mr. David Sokolsky–superceded by CL-15 dated 12/21/2001–duplicate comments.

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-08/4	Barczak, Sara	Letter	12/27/2001	P-119	O.5 9
CL-08/5	Barczak, Sara	Letter	12/27/2001	P-119	O.5.5
CL-08/6	Barczak, Sara	Letter	12/27/2001	P-119	O.5.6
CL-08/7	Barczak, Sara	Letter	12/27/2001	P-119	O.4.4
CL-08/8	Barczak, Sara	Letter	12/27/2001	P-119	O.4.5
CL-08/9	Barczak, Sara	Letter	12/27/2001	P-120	O.2.1
CL-08/10	Barczak, Sara	Letter	12/27/2001	P-120	O.4.10
CL-08/11	Barczak, Sara	Letter	12/27/2001	P-120	O.1.9
CL-08/12	Barczak, Sara	Letter	12/27/2001	P-120	O.4 10
CL-08/13	Barczak, Sara	Letter	12/27/2001	P-120	O.4.10
CL-08/14	Barczak, Sara	Letter	12/27/2001	P-120	O.1.9
CL-08/15	Barczak, Sara	Letter	12/27/2001	P-120	O.1.10
CL-08/16	Barczak, Sara	Letter	12/27/2001	P-120	O.4.10
CL-08/17	Barczak, Sara	Letter	12/27/2001	P-120	O.5.9
CL-08/18	Barczak, Sara	Letter	12/27/2001	P-120	O.1.16
CL-08/19	Barczak, Sara	Letter	12/27/2001	P-121	O.1.2
CL-08/20	Barczak, Sara	Letter	12/27/2001	P-121	O.2.3.4
CL-08/21	Barczak, Sara	Letter	12/27/2001	P-121	O.1.15
CL-08/22	Barczak, Sara	Letter	12/27/2001	P-121	O.2.3.4
CL-08/23	Barczak, Sara	Letter	12/27/2001	P-121	O.4.1.1
CL-08/24	Barczak, Sara	Letter	12/27/2001	P-121	O.4 8
CL-08/25	Barczak, Sara	Letter	12/27/2001	P-121	O.1.6
CL-08/26	Barczak, Sara	Letter	12/27/2001	P-121	O.1.16
CL-08/27	Barczak, Sara	Letter	12/27/2001	P-121	O.4 4
CL-08/28	Barczak, Sara	Letter	12/27/2001	P-121	O.4.9
CL-08/29	Barczak, Sara	Letter	12/27/2001	P-121	O.4.10
CL-08/30	Barczak, Sara	Letter	12/27/2001	P-121	O.2.2
CL-08/31	Barczak, Sara	Letter	12/27/2001	P-121	O.4 8
CL-08/32	Barczak, Sara	Letter	12/27/2001	P-122	O.6 3
CL-08/33	Barczak, Sara	Letter	12/27/2001	P-122	O.1.6
CL-08/35	Barczak, Sara	Letter	12/27/2001	P-122	O.5.9
CL-08/36[a]	Barczak, Sara	Letter	12/27/2001	P-122	
CL-09/1	O'Connor, Jr, WT	Letter	12/28/2001	P-123	O.6 5
CL-09/2	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/3	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/4	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1

(a) CL-08/36 is a comment submitted by Ms. Sara Barczak in a written statement that was read into the transcript at the Atlanta public meeting The written statement was submitted to the NRC on December 27, 2001 along with comment letter CL-08. All the comments were duplicates of those in the transcript, except for comment CL-08/36, which has been added for completeness.

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-09/5	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/6	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/7	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/8	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/9	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/10	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/11	O'Connor, Jr, WT	Letter	12/28/2001	P-124	O.6.1
CL-09/12	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O 6.1
CL-09/13	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O 6.1
CL-09/14	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O 6.1
CL-09/15	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/16	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/17	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.2
CL-09/18	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O 6.1
CL-09/19	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.3
CL-09/20	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.3
CL-09/21	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.3
CL-09/22	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1 3
CL-09/23	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.7
CL-09/24	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.7
CL-09/25	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.8
CL-09/26	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.1.8
CL-09/27	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/28	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/29	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/30	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/31	O'Connor, Jr, WT	Letter	12/28/2001	P-125	O.6.1
CL-09/32	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O 6.1
CL-09/33	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.1.8
CL-09/34	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O 6.1
CL-09/35	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O 6.1
CL-09/36	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.6.1
CL-09/37	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.1.6
CL-09/38	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.1.6
CL-09/39	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.1.6
CL-09/40	O'Connor, Jr, WT	Letter	12/28/2001	P-126	O.1.6
CL-09/41	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6
CL-09/42	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6
CL-09/43	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O 6.1
CL-09/44	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-09/45	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6
CL-09/46	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6
CL-09/47	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.6
CL-09/48	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.8
CL-09/49	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O 6.1
CL-09/50	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O 6.1
CL-09/51	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.7
CL-09/52	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.7
CL-09/53	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.7
CL-09/54	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.7
CL-09/55	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.1.7
CL-09/56	O'Connor, Jr, WT	Letter	12/28/2001	P-127	O.6.1
CL-09/57	O'Connor, Jr, WT	Letter	12/28/2001	P-128	O.6.1
CL-09/58	O'Connor, Jr, WT	Letter	12/28/2001	P-128	O.6.5
CL-10/1	Kushner, Adele	Letter	12/29/2001	P-129	O.2 3 2
CL-10/2	Kushner, Adele	Letter	12/29/2001	P-129	O.2.2
CL-10/3	Kushner, Adele	Letter	12/29/2001	P-129	O 3 0
CL-10/4	Kushner, Adele	Letter	12/29/2001	P-129	O.1.15
CL-10/5	Kushner, Adele	Letter	12/29/2001	P-129	O.1.7
CL-10/6	Kushner, Adele	Letter	12/29/2001	P-129	O.5.9
CL-10/7	Kushner, Adele	Letter	12/29/2001	P-129	O.2.3 2
CL-10/8	Kushner, Adele	Letter	12/29/2001	P-129	O.2.3 3
CL-10/9	Kushner, Adele	Letter	12/29/2001	P-129	O.2.3 2
CL-10/10	Kushner, Adele	Letter	12/29/2001	P-129	O.2.3 2
CL-10/11	Kushner, Adele	Letter	12/29/2001	P-129	O.1.6
CL-10/12	Kushner, Adele	Letter	12/29/2001	P-129	O.5.2
CL-11/1	Musiker, Debbie	Letter	12/31/2001	P-130	O.6.4
CL-11/2	Musiker, Debbie	Letter	12/31/2001	P-130	O.1.16
CL-11/3	Musiker, Debbie	Letter	12/31/2001	P-130	O.1.6
CL-11/4	Musiker, Debbie	Letter	12/31/2001	P-130	O.1.4
CL-11/5	Musiker, Debbie	Letter	12/31/2001	P-131	O.1.4
CL-11/6	Musiker, Debbie	Letter	12/31/2001	P-131	O.3.0
CL-11/7	Musiker, Debbie	Letter	12/31/2001	P-131	O.1.16
CL-11/8	Musiker, Debbie	Letter	12/31/2001	P-131	O.1.4
CL-11/9	Musiker, Debbie	Letter	12/31/2001	P-131	O.2.3.1
CL-11/10	Musiker, Debbie	Letter	12/31/2001	P-131	O.4.10
CL-11/11	Musiker, Debbie	Letter	12/31/2001	P-131	O.1.6
CL-11/12	Musiker, Debbie	Letter	12/31/2001	P-131	O 2.4.1
CL-11/13	Musiker, Debbie	Letter	12/31/2001	P-131	O.2.4.1
CL-11/14	Musiker, Debbie	Letter	12/31/2001	P-131	O 2.2

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-11/15	Musiker, Debbie	Letter	12/31/2001	P-131	O.2.2
CL-12/1	Martin, Ed	Letter	12/31/2001	P-133	O.5.2
CL-12/2	Martin, Ed	Letter	12/31/2001	P-133	O.5.2
CL-12/3	Martin, Ed	Letter	12/31/2001	P-133	O.5.2
CL-13/1	Shadis, Raymond	Letter	12/31/2001	P-134	O.2.4 3
CL-13/2	Shadis, Raymond	Letter	12/31/2001	P-134	O.1.6
CL-13/3	Shadis, Raymond	Letter	12/31/2001	P-134	O.1.7
CL-13/4	Shadis, Raymond	Letter	12/31/2001	P-134	O.1.7
CL-13/5	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/6	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/7	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.9
CL-13/8	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/9	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/10	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/11	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/12	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/13	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.10
CL-13/14	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.6
CL-13/15	Shadis, Raymond	Letter	12/31/2001	P-135	O.1.9
CL-13/16	Shadis, Raymond	Letter	12/31/2001	P-136	O.1.14
CL-13/17	Shadis, Raymond	Letter	12/31/2001	P-136	O.1.15
CL-13/18	Shadis, Raymond	Letter	12/31/2001	P-136	O.4.4
CL-13/19	Shadis, Raymond	Letter	12/31/2001	P-136	O.4.3
CL-14/1	Oncavage, Mark P.	Letter	12/31/2001	P-137	O.1.16
CL-14/2	Oncavage, Mark P.	Letter	12/31/2001	P-137	O.1.16
CL-14/3	Oncavage, Mark P.	Letter	12/31/2001	P-138	O.1.16
CL-14/4	Oncavage, Mark P.	Letter	12/31/2001	P-138	O.2..3 4
CL-14/5	Oncavage, Mark P.	Letter	12/31/2001	P-138	O.1.9
CL-14/6	Oncavage, Mark P.	Letter	12/31/2001	P-138	O 2.4.1
CL-14/7	Oncavage, Mark P.	Letter	12/31/2001	P-138	O.5.2
CL-15/1	Sokolsky, David	Letter	1/2/2002	P-140	O.6.2
CL-15/2	Sokolsky, David	Letter	1/2/2002	P-140	O.6.1
CL-15/3	Sokolsky, David	Letter	1/2/2002	P-140	O.6.1
CL-15/4	Sokolsky, David	Letter	1/2/2002	P-140	O.6.1
CL-15/6	Sokolsky, David	Letter	1/2/2002	P-140	O.1.6
CL-16/1	Miller, Anne Norton	Letter	12/21/2001	P-141	O.6.5
CL-16/2	Miller, Anne Norton	Letter	12/21/2001	P-141	O.6.1
CL-16/3	Miller, Anne Norton	Letter	12/21/2001	P-141	O.5.5
CL-16/4	Miller, Anne Norton	Letter	12/21/2001	P-141	O.6.1

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-16/5	Miller, Anne Norton	Letter	12/21/2001	P-141	O.1.2
CL-16/6	Miller, Anne Norton	Letter	12/21/2001	P-142	O.6 1
CL-16/7	Miller, Anne Norton	Letter	12/21/2001	P-142	O.4.6
CL-16/8	Miller, Anne Norton	Letter	12/21/2001	P-142	O.6 1
CL-16/9	Miller, Anne Norton	Letter	12/21/2001	P-142	O.2.4.1
CL-16/10	Miller, Anne Norton	Letter	12/21/2001	P-142	O 2.3.3
CL-16/11	Miller, Anne Norton	Letter	12/21/2001	P-143	O.5.6
CL-16/12	Miller, Anne Norton	Letter	12/21/2001	P-143	O.5 4
CL-16/13	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1 2
CL-16/14	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.7
CL-16/15	Miller, Anne Norton	Letter	12/21/2001	P-143	O.5.5
CL-16/16	Miller, Anne Norton	Letter	12/21/2001	P-143	O.6 1
CL-16/17	Miller, Anne Norton	Letter	12/21/2001	P-143	O.3.0
CL-16/18	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.6
CL-16/19	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.2
CL-16/20	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.6
CL-16/21	Miller, Anne Norton	Letter	12/21/2001	P-143	O.6 1
CL-16/22	Miller, Anne Norton	Letter	12/21/2001	P-143	O.6.1
CL-16/23	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.1
CL-16/24	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.1
CL-16/25	Miller, Anne Norton	Letter	12/21/2001	P-143	O.1.1
CL-16/26	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.1
CL-16/27	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.1
CL-16/28	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/29	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/30	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/31	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/32	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/33	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/34	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/35	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/36	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/37	Miller, Anne Norton	Letter	12/21/2001	P-144	O.1.2
CL-16/38	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.2
CL-16/39	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3
CL-16/40	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3
CL-16/41	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3
CL-16/42	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3
CL-16/43	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3

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Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-16/44	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.3
CL-16/45	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/46	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/47	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/48	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/49	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/50	Miller, Anne Norton	Letter	12/21/2001	P-145	O.1.4
CL-16/51	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/52	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/53	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/54	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/55	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/56	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/57	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/58	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/59	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/60	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.4
CL-16/61	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.5
CL-16/62	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.5
CL-16/63	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.6
CL-16/64	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.6
CL-16/65	Miller, Anne Norton	Letter	12/21/2001	P-146	O.1.6
CL-16/66	Miller, Anne Norton	Letter	12/21/2001	P-147	O.1.6
CL-16/67	Miller, Anne Norton	Letter	12/21/2001	P-147	O 2.3 4
CL-16/68	Miller, Anne Norton	Letter	12/21/2001	P-147	O 6.1
CL-16/69	Miller, Anne Norton	Letter	12/21/2001	P-147	O.1.12
CL-16/70	Miller, Anne Norton	Letter	12/21/2001	P-147	O.1.15
CL-16/71	Miller, Anne Norton	Letter	12/21/2001	P-147	O 6.1
CL-16/72	Miller, Anne Norton	Letter	12/21/2001	P-147	O.6.1
CL-16/73	Miller, Anne Norton	Letter	12/21/2001	P-147	O.6.1
CL-16/74	Miller, Anne Norton	Letter	12/21/2001	P-147	O.6.1
CL-17/1	Ortciger, Thomas W.	Letter	1/7/2002	P-148	O.2.3.3
CL-17/2	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O.5.4
CL-17/3	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O.4.8
CL-17/4	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O.2.3.3
CL-17/5	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O.2.2
CL-17/6	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O.4.8
CL-17/7	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 2.3.3
CL-17/8	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 2.2

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-17/9	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 4.3
CL-17/10	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 6 5
CL-17/11	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 6 5
CL-17/12	Ortciger, Thomas W.	Letter	1/7/2002	P-149	O 2.2
CL-18/1	Delezenski, Jerry	Letter	11/20/2001	P-150	O.6.1
CL-18/2	Delezenski, Jerry	Letter	11/20/2001	P-150	O.1.9
CL-18/3	Delezenski, Jerry	Letter	11/20/2001	P-150	O 6 5
CL-19/1	Byrne, Stephen A.	Letter	12/20/2001	P-151	O.2.3 3
CL-19/2	Byrne, Stephen A.	Letter	12/20/2001	P-151	O.2.3.3
CL-20/1	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-152	O.6.5
CL-20/2	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-152	O 6.3
CL-20/3	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-152	O 6 5
CL-20/4	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-152	O.2.2
CL-20/5	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-152	O.1.16
CL-20/6	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-152	O.5 5
CL-20/7	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-153	O.1.6
CL-20/8	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-153	O.1.6
CL-20/9	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-153	O.1.4
CL-20/10	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-153	O 1.4
CL-20/11	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-154	O.6.5
CL-20/12	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.4.7
CL-20/13	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-154	O.4 8
CL-20/14	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.3 0
CL-20/15	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.1.2
CL-20/17	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.4.6
CL-20/18	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.1.2
CL-20/19	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-154	O.1.2
CL-20/20	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-155	O.2.3 4
CL-20/21	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.4 3
CL-20/22	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.3.0
CL-20/23	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.3.0
CL-20/24	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.1.8
CL-20/25	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.4.4
CL-20/26	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.4.4
CL-20/27	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.4.4
CL-20/28	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.1.2
CL-20/29	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-155	O.1.2
CL-20/30	Blockey-O'Bnen, Pamela	Letter	12/26/2001	P-155	O.1.16

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-20/31	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.1.3
CL-20/32	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.3.0
CL-20/33	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-155	O.1.6
CL-20/34	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.1.6
CL-20/35	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.4.3
CL-20/36	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.1.4
CL-20/37	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.1.6
CL-20/38	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.1.4
CL-20/40	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.1.4
CL-20/41	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.4.9
CL-20/42	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.4.8
CL-20/43	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.5.4
CL-20/44	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-156	O.2.2
CL-20/45	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.2.2
CL-20/47	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.9
CL-20/48	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.9
CL-20/49	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.9
CL-20/50	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.10
CL-20/51	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.10
CL-20/52	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O 1.6
CL-20/53	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O 2 2
CL-20/54	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.6
CL-20/55	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.6
CL-20/56	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-157	O.1.6
CL-20/57	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.3.0
CL-20/58	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.3 0
CL-20/59	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O 3 0
CL-20/60	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O 3 0
CL-20/61	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2 3 2
CL-20/62	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2.3 2
CL-20/63	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2.3 2
CL-20/64	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.6.5
CL-20/65	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2.2
CL-20/66	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2.2
CL-20/67	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.2 2
CL-20/68	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.1.2
CL-20/69	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.3 0

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-20/70	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.1.6
CL-20/71	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.4.3
CL-20/72	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O 3.0
CL-20/73	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-158	O.4.2
CL-20/74	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.2.4.1
CL-20/75	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.3 0
CL-20/76	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.1.2
CL-20/77	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.4.3
CL-20/78	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.4.3
CL-20/79	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.2.4.1
CL-20/80	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.2.4.1
CL-20/81	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.4 4
CL-20/82	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.6 5
CL-20/83	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.5.4
CL-20/84	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-159	O.4.4
CL-20/85	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.15
CL-20/86	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.15
CL-20/87	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.5.4
CL-20/88	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O 4 8
CL-20/89	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/90	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/91	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/92	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/93	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/94	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/95	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O 2.2
CL-20/96	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/97	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/98	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O 1.6
CL-20/99	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.6
CL-20/100	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-160	O.1.7
CL-20/101	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.7
CL-20/102	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.7
CL-20/103	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.6
CL-20/104	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.6
CL-20/105	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.6
CL-20/106	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.1.6
CL-20/107	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.2.2
CL-20/108	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O 6.5

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Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-20/109	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.4.1.1
CL-20/110	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O 4.1.1
CL-20/111	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O 4.1.1
CL-20/112	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.4.1.1
CL-20/113	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.5.2
CL-20/114	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-161	O.4.3
CL-20/115	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-162	O 6 3
CL-20/116	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-162	O 4.5
CL-20/117	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-162	O 6.5
CL-20/118	Blockey-O'Brien, Pamela	Letter	12/26/2001	P-162	O 6.5
CL-21/1	Guynup, Sharon	Letter	1/19/2002	P-163	O 2.2
CL-22/1	sublimation@webtv.net	Letter	1/19/2002	P-164	O.6.5
CL-23/1	Long, A. J. (Fred)	Letter	1/20/2002	P-165	O.4.1.1
CL-24/1	Griffiths, Rachel	Letter	1/20/2002	P-166	O 2.2
CL-24/2	Griffiths, Rachel	Letter	1/20/2002	P-166	O.5.9
CL-24/3	Griffiths, Rachel	Letter	1/20/2002	P-166	O.1.16
CL-24/4	Griffiths, Rachel	Letter	1/20/2002	P-166	O 2.3.4
CL-24/5	Griffiths, Rachel	Letter	1/20/2002	P-166	O.4.1.1
CL-24/6	Griffiths, Rachel	Letter	1/20/2002	P-166	O.2 2
CL-25/1	Russell, Edward T.	Letter	1/20/2002	P-167	O.2 2
CL-25/2	Russell, Edward T.	Letter	1/20/2002	P-167	O.1.16
CL-25/3	Russell, Edward T.	Letter	1/20/2002	P-167	O.4.9
CL-25/4	Russell, Edward T.	Letter	1/20/2002	P-167	O.4.4
CL-25/5	Russell, Edward T.	Letter	1/20/2002	P-167	O.5.9
CL-25/6	Russell, Edward T.	Letter	1/20/2002	P-167	O.1.16
CL-25/7	Russell, Edward T.	Letter	1/20/2002	P-167	O.4.8
CL-25/8	Russell, Edward T.	Letter	1/20/2002	P-167	O.1 6
CL-25/9	Russell, Edward T.	Letter	1/20/2002	P-167	O.5 8
CL-25/10	Russell, Edward T.	Letter	1/20/2002	P-167	O.2.2
CL-25/11	Russell, Edward T.	Letter	1/20/2002	P-167	O.4.1.1
CL-25/12	Russell, Edward T.	Letter	1/20/2002	P-167	O.6 5
CL-26/1	Matthews, Dave	Letter	1/21/2002	P-168	O.1.16
CL-26/2	Matthews, Dave	Letter	1/21/2002	P-168	O.2.3.4
CL-26/3	Matthews, Dave	Letter	1/21/2002	P-168	O.4 2
CL-26/4	Matthews, Dave	Letter	1/21/2002	P-168	O.2.3.3
CL-26/5	Matthews, Dave	Letter	1/21/2002	P-168	O.4 8
CL-26/6	Matthews, Dave	Letter	1/21/2002	P-168	O.4.7
CL-26/7	Matthews, Dave	Letter	1/21/2002	P-168	O.1 6
CL-26/8	Matthews, Dave	Letter	1/21/2002	P-168	O 1 6

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-26/9	Matthews, Dave	Letter	1/21/2002	P-168	O.1.6
CL-26/10	Matthews, Dave	Letter	1/21/2002	P-168	O.5.8
CL-26/11	Matthews, Dave	Letter	1/21/2002	P-168	O.5.2
CL-26/12	Matthews, Dave	Letter	1/21/2002	P-168	O 5.5
CL-26/13	Matthews, Dave	Letter	1/21/2002	P-168	O.2.2
CL-26/14	Matthews, Dave	Letter	1/21/2002	P-168	O 5.2
CL-26/15	Matthews, Dave	Letter	1/21/2002	P-168	O.4.1.1
CL-27/1	Schumann, Klaus	Letter	1/21/2002	P-169	O 5.9
CL-27/2	Schumann, Klaus	Letter	1/21/2002	P-169	O.5 2
CL-27/3	Schumann, Klaus	Letter	1/21/2002	P-169	O.2 4
CL-28/1	Larson, Dennis	Letter	1/21/2002	P-170	O.5.10
CL-29/1	Kellerman, Martin	Letter	1/21/2002	P-171	O 4.8
CL-29/2	Kellerman, Martin	Letter	1/21/2002	P-171	O.2.3 4
CL-29/3	Kellerman, Martin	Letter	1/21/2002	P-171	O.4.1.1
CL-30/1	Heider, Kenneth J.	Letter	12/26/2001	P-172	O.6 5
CL-30/2	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/3	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/4	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.2.3 4
CL-30/5	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/6	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/7	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/8	Heider, Kenneth J.	Letter	12/26/2001	P-173	O 6.1
CL-30/9	Heider, Kenneth J.	Letter	12/26/2001	P-173	O 6.1
CL-30/10	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/11	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/12	Heider, Kenneth J.	Letter	12/26/2001	P-173	O.6.1
CL-30/13	Heider, Kenneth J.	Letter	12/26/2001	P-173	O 6.1
CL-31/1	Gallagher, Michael P.	Letter	12/28/2001	P-174	O 6.5
CL-31/2	Gallagher, Michael P.	Letter	12/28/2001	P-174	O 6.5
CL-31/3	Gallagher, Michael P.	Letter	12/28/2001	P-174	O.2.3.3
CL-31/4	Gallagher, Michael P.	Letter	12/28/2001	P-174	O 2 3.4
CL-31/5	Gallagher, Michael P.	Letter	12/28/2001	P-174	O.2 3.2
CL-31/6	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.6.1
CL-31/7	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.9
CL-31/8	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.2
CL-31/9	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.3
CL-31/10	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.6
CL-31/11	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.6
CL-31/12	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1 9

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-31/13	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.9
CL-31/14	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.6.1
CL-31/15	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.1.7
CL-31/16	Gallagher, Michael P.	Letter	12/28/2001	P-175	O 6.1
CL-31/17	Gallagher, Michael P.	Letter	12/28/2001	P-175	O 6.1
CL-31/18	Gallagher, Michael P.	Letter	12/28/2001	P-175	O 2.3 3
CL-31/19	Gallagher, Michael P.	Letter	12/28/2001	P-175	O.6.1
CL-32/1	Clark, Susan	Letter	1/24/2002	P-176	O 2.2
CL-32/2	Clark, Susan	Letter	1/24/2002	P-176	O.2.3 3
CL-32/3	Clark, Susan	Letter	1/24/2002	P-176	O.1.6
CL-33/1	Nagel, Margaret	Letter	1/24/2002	P-177	O 2.2
CL-33/2	Nagel, Margaret	Letter	1/24/2002	P-177	O 6.3
CL-33/3	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.6
CL-33/4	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.6
CL-33/5	Nagel, Margaret	Letter	1/24/2002	P-177	O 2.2
CL-33/6	Nagel, Margaret	Letter	1/24/2002	P-177	O 2.2
CL-33/7	Nagel, Margaret	Letter	1/24/2002	P-177	O 2.3 4
CL-33/8	Nagel, Margaret	Letter	1/24/2002	P-177	O 4.2
CL-33/9	Nagel, Margaret	Letter	1/24/2002	P-177	O.4.8
CL-33/10	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.6
CL-33/11	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.6
CL-33/12	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.6
CL-33/13	Nagel, Margaret	Letter	1/24/2002	P-177	O.5 8
CL-33/14	Nagel, Margaret	Letter	1/24/2002	P-177	O.1.16
CL-33/15	Nagel, Margaret	Letter	1/24/2002	P-177	O.5.2
CL-33/16	Nagel, Margaret	Letter	1/24/2002	P-177	O.5.5
CL-33/17	Nagel, Margaret	Letter	1/24/2002	P-177	O.2.2
CL-33/18	Nagel, Margaret	Letter	1/24/2002	P-177	O.5 2
CL-33/19	Nagel, Margaret	Letter	1/24/2002	P-177	O.5.4
CL-33/20	Nagel, Margaret	Letter	1/24/2002	P-177	O.4.7
CL-34/1	Casten, Liane	Letter	1/24/2002	P-178	O.6.5
CL-34/2	Casten, Liane	Letter	1/24/2002	P-178	O.1 6
CL-34/3	Casten, Liane	Letter	1/24/2002	P-178	O.6 3
CL-34/4	Casten, Liane	Letter	1/24/2002	P-178	O.4.8
CL-34/5	Casten, Liane	Letter	1/24/2002	P-178	O.6.5
CL-35/1	Kim, Mary	Letter	1/25/2002	P-179	O.5.2
CL-36/1	Miller, Suzanne	Letter	1/25/2002	P-180	O.5 2
CL-36/2	Miller, Suzanne	Letter	1/25/2002	P-180	O.2 2
CL-36/3	Miller, Suzanne	Letter	1/25/2002	P-180	O 5.9

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page In Appendix P	Section of Appendix O where comment is addressed
CL-36/4	Miller, Suzanne	Letter	1/25/2002	P-180	O.2.2
CL-36/5	Miller, Suzanne	Letter	1/25/2002	P-180	O 4 8
CL-36/6	Miller, Suzanne	Letter	1/25/2002	P-180	O 2.4 2
CL-36/7	Miller, Suzanne	Letter	1/25/2002	P-180	O.4.1.1
CL-36/8	Miller, Suzanne	Letter	1/25/2002	P-180	O 6 3
CL-37/1	Nordlund, James M.	Letter	1/25/2002	P-181	O.4.1.1
CL-38/1	Woelker, Roger	Letter	1/27/2002	P-182	O 2.3.4
CL-38/2	Woelker, Roger	Letter	1/27/2002	P-182	O 5.9
CL-38/3	Woelker, Roger	Letter	1/27/2002	P-182	O.2.3.4
CL-38/4	Woelker, Roger	Letter	1/27/2002	P-182	O.5 5
CL-38/5	Woelker, Roger	Letter	1/27/2002	P-182	O.1.6
CL-38/6	Woelker, Roger	Letter	1/27/2002	P-182	O 4.3
CL-38/7	Woelker, Roger	Letter	1/27/2002	P-182	O.4 1.1
CL-39/1	Moore, Anne	Letter	1/28/2002	P-183	O.6.5
CL-39/2	Moore, Anne	Letter	1/28/2002	P-183	O.4.2.
CL-39/3	Moore, Anne	Letter	1/28/2002	P-183	O.4.1.1
CL-39/4	Moore, Anne	Letter	1/28/2002	P-183	O.4 8
CL-39/5	Moore, Anne	Letter	1/28/2002	P-183	O.2.2
CL-39/6	Moore, Anne	Letter	1/28/2002	P-183	O.1.6
CL-40/1	Runkle, John	Letter	1/28/2002	P-184	O.1.16
CL-40/2	Runkle, John	Letter	1/28/2002	P-184	O.1.6
CL-40/3	Runkle, John	Letter	1/28/2002	P-184	O 4.8
CL-40/4	Runkle, John	Letter	1/28/2002	P-184	O 4.1.1
CL-41/1	Schlau, Benjamin	Letter	1/29/2002	P-185	O 6.5
CL-41/2	Schlau, Benjamin	Letter	1/29/2002	P-185	O.4.5
CL-42/1	Ferguson, Tom	Letter	1/29/2002	P-186	O.2.3.3
CL-42/2	Ferguson, Tom	Letter	1/29/2002	P-186	O 4.4
CL-42/3	Ferguson, Tom	Letter	1/29/2002	P-186	O 2.4.1
CL-42/4	Ferguson, Tom	Letter	1/29/2002	P-186	O 6 3
CL-42/5	Ferguson, Tom	Letter	1/29/2002	P-186	O 6.3
CL-43/1	Reed, Mary S.	Letter	1/29/2002	P-187	O.2.3.4
CL-43/2	Reed, Mary S.	Letter	1/29/2002	P-187	O 4.2
CL-43/3	Reed, Mary S.	Letter	1/29/2002	P-187	O.2.3.3
CL-43/4	Reed, Mary S.	Letter	1/29/2002	P-187	O 4 8
CL-43/5	Reed, Mary S.	Letter	1/29/2002	P-187	O.1.6
CL-43/6	Reed, Mary S.	Letter	1/29/2002	P-187	O.1.6
CL-43/7	Reed, Mary S	Letter	1/29/2002	P-187	O 5.8
CL-43/8	Reed, Mary S.	Letter	1/29/2002	P-187	O.1.16
CL-43/9	Reed, Mary S	Letter	1/29/2002	P-187	O 5 2

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-43/10	Reed, Mary S.	Letter	1/29/2002	P-187	O.5.5
CL-43/11	Reed, Mary S.	Letter	1/29/2002	P-187	O 2.2
CL-43/12	Reed, Mary S.	Letter	1/29/2002	P-187	O.5 2
CL-43/13	Reed, Mary S.	Letter	1/29/2002	P-187	O.4.7
CL-43/14	Reed, Mary S.	Letter	1/29/2002	P-187	O.4.7
CL-43/15	Reed, Mary S.	Letter	1/29/2002	P-187	O.5.9
CL-43/16	Reed, Mary S.	Letter	1/29/2002	P-187	O.5.2
CL-44/1	Borchamann, Patncia	Letter	1/29/2002	P-188	O.1.16
CL-44/2	Borchamann, Patricia	Letter	1/29/2002	P-188	O.1.16
CL-44/3	Borchamann, Patncia	Letter	1/29/2002	P-188	O.1.16
CL-44/5	Borchamann, Patricia	Letter	1/29/2002	P-189	O.2.3.4
CL-44/6	Borchamann, Patricia	Letter	1/29/2002	P-189	O 4.2
CL-44/7	Borchamann, Patricia	Letter	1/29/2002	P-189	O.1.6
CL-44/8	Borchamann, Patricia	Letter	1/29/2002	P-189	O 5.9
CL-44/9	Borchamann, Patricia	Letter	1/29/2002	P-189	O 2 2
CL-44/10	Borchamann, Patricia	Letter	1/29/2002	P-189	O 5.5
CL-44/11	Borchamann, Patricia	Letter	1/29/2002	P-189	O 2.2
CL-44/12	Borchamann, Patricia	Letter	1/29/2002	P-189	O 4.7
CL-44/13	Borchamann, Patricia	Letter	1/29/2002	P-189	O.4.7
CL-44/14	Borchamann, Patricia	Letter	1/29/2002	P-189	O 2 2
CL-44/15	Borchamann, Patricia	Letter	1/29/2002	P-189	O.5 2
CL-44/16	Borchamann, Patricia	Letter	1/29/2002	P-189	O.1.9
CL-45/1	McKeown, Diana S.	Letter	1/30/2002	P-190	O.5.2
CL-45/2	McKeown, Diana S.	Letter	1/30/2002	P-190	O.1.6
CL-45/3	McKeown, Diana S.	Letter	1/30/2002	P-190	O.1.16
CL-46/1	Ferguson, Tom	Letter	1/30/2002	P-191	O.5 2
CL-46/2	Ferguson, Tom	Letter	1/30/2002	P-191	O.5.2
CL-46/3	Ferguson, Tom	Letter	1/30/2002	P-191	O 4.4
CL-46/4	Ferguson, Tom	Letter	1/30/2002	P-191	O.1.7
CL-46/5	Ferguson, Tom	Letter	1/30/2002	P-191	O 6.3
CL-46/6	Ferguson, Tom	Letter	1/30/2002	P-191	O.6.3
CL-47/1	Ritter, David	Letter	1/30/2002	P-192	O 6.5
CL-47/2	Ritter, David	Letter	1/30/2002	P-192	O 6.5
CL-47/3	Ritter, David	Letter	1/30/2002	P-192	O.6.4
CL-47/4	Ritter, David	Letter	1/30/2002	P-192	O.5.2
CL-47/5	Ritter, David	Letter	1/30/2002	P-192	O 6.4
CL-47/6	Ritter, David	Letter	1/30/2002	P-192	O.2.4 2
CL-47/7	Ritter, David	Letter	1/30/2002	P-192	O 4 3

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-47/8	Ritter, David	Letter	1/30/2002	P-192	O 2.2
CL-47/9	Ritter, David	Letter	1/30/2002	P-192	O.2.3 4
CL-47/10	Ritter, David	Letter	1/30/2002	P-193	O.5.9
CL-47/11	Ritter, David	Letter	1/30/2002	P-193	O.5.9
CL-47/12	Ritter, David	Letter	1/30/2002	P-193	O.5.2
CL-47/13	Ritter, David	Letter	1/30/2002	P-193	O.5.5
CL-47/14	Ritter, David	Letter	1/30/2002	P-193	O.2.3 4
CL-47/15	Ritter, David	Letter	1/30/2002	P-193	O.2.3 4
CL-47/16	Ritter, David	Letter	1/30/2002	P-193	O.4.1.1
CL-47/17	Ritter, David	Letter	1/30/2002	P-193	O.1.9
CL-47/18	Ritter, David	Letter	1/30/2002	P-194	O.5.4
CL-48/1	Gunter, Paul	Letter	1/30/2002	P-195	O.5.2
CL-48/2	Gunter, Paul	Letter	1/30/2002	P-195	O.2.2
CL-48/3	Gunter, Paul	Letter	1/30/2002	P-195	O.1.16
CL-48/4	Gunter, Paul	Letter	1/30/2002	P-195	O.5.2
CL-48/5	Gunter, Paul	Letter	1/30/2002	P-195	O.2.1
CL-48/6	Gunter, Paul	Letter	1/30/2002	P-195	O.5 9
CL-48/7	Gunter, Paul	Letter	1/30/2002	P-196	O.6 4
CL-48/8	Gunter, Paul	Letter	1/30/2002	P-196	O.6 4
CL-48/9	Gunter, Paul	Letter	1/30/2002	P-196	O.1.9
CL-48/10	Gunter, Paul	Letter	1/30/2002	P-196	O.4.3
CL-48/11	Gunter, Paul	Letter	1/30/2002	P-196	O.5.4
CL-48/12	Gunter, Paul	Letter	1/30/2002	P-196	O.5 4
CL-48/13	Gunter, Paul	Letter	1/30/2002	P-196	O.5.4
CL-48/14	Gunter, Paul	Letter	1/30/2002	P-196	O.1 6
CL-48/15	Gunter, Paul	Letter	1/30/2002	P-196	O 4.6
CL-48/16	Gunter, Paul	Letter	1/30/2002	P-197	O 4.6
CL-48/17	Gunter, Paul	Letter	1/30/2002	P-197	O 4.1.1
CL-48/18	Gunter, Paul	Letter	1/30/2002	P-197	O.1.9
CL-48/19	Gunter, Paul	Letter	1/30/2002	P-197	O 2 1
CL-48/20	Gunter, Paul	Letter	1/30/2002	P-197	O.1.9
CL-48/21	Gunter, Paul	Letter	1/30/2002	P-197	O.1.9
CL-48/22	Gunter, Paul	Letter	1/30/2002	P-197	O.4.10
CL-48/23	Gunter, Paul	Letter	1/30/2002	P-197	O.4.10
CL-48/24	Gunter, Paul	Letter	1/30/2002	P-197	O 1.9
CL-48/25	Gunter, Paul	Letter	1/30/2002	P-197	O.5.9
CL-48/26	Gunter, Paul	Letter	1/30/2002	P-197	O.5.5
CL-48/27	Gunter, Paul	Letter	1/30/2002	P-197	O 5.2
CL-48/28	Gunter, Paul	Letter	1/30/2002	P-198	O 2.3 2

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-48/29	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/30	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3 4
CL-48/31	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/32	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.3
CL-48/33	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/34	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/35	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/36	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.4
CL-48/37	Gunter, Paul	Letter	1/30/2002	P-198	O.4.2
CL-48/38	Gunter, Paul	Letter	1/30/2002	P-198	O.2.3.3
CL-48/39	Gunter, Paul	Letter	1/30/2002	P-198	O.1.6
CL-48/40	Gunter, Paul	Letter	1/30/2002	P-198	O.1.6
CL-48/41	Gunter, Paul	Letter	1/30/2002	P-198	O.1.6
CL-48/42	Gunter, Paul	Letter	1/30/2002	P-199	O.5.8
CL-48/43	Gunter, Paul	Letter	1/30/2002	P-199	O.5.9
CL-48/44	Gunter, Paul	Letter	1/30/2002	P-199	O.5.2
CL-48/45	Gunter, Paul	Letter	1/30/2002	P-199	O 5.5
CL-48/46	Gunter, Paul	Letter	1/30/2002	P-199	O 2 2
CL-48/47	Gunter, Paul	Letter	1/30/2002	P-199	O.5 2
CL-48/48	Gunter, Paul	Letter	1/30/2002	P-199	O 4.7
CL-48/49	Gunter, Paul	Letter	1/30/2002	P-199	O.4.1.1
CL-49/1	Greene, Eileen	Letter	1/31/2002	P-200	O.1.6
CL-49/2	Greene, Eileen	Letter	1/31/2002	P-200	O.1.6
CL-50/1	Katz, Deb	Letter	1/31/2002	P-201	O 2.2
CL-50/2	Katz, Deb	Letter	1/31/2002	P-201	O.2.2
CL-50/3	Katz, Deb	Letter	1/31/2002	P-201	O.5.8
CL-50/4	Katz, Deb	Letter	1/31/2002	P-202	O.5.4
CL-50/5	Katz, Deb	Letter	1/31/2002	P-202	O.2.2
CL-50/6	Katz, Deb	Letter	1/31/2002	P-202	O.2 2
CL-50/7	Katz, Deb	Letter	1/31/2002	P-202	O.3 0
CL-50/8	Katz, Deb	Letter	1/31/2002	P-202	O.5.2
CL-50/9	Katz, Deb	Letter	1/31/2002	P-202	O.5 2
CL-50/10	Katz, Deb	Letter	1/31/2002	P-202	O.1 6
CL-50/11	Katz, Deb	Letter	1/31/2002	P-202	O.4.6
CL-50/12	Katz, Deb	Letter	1/31/2002	P-202	O 2.1
CL-50/13	Katz, Deb	Letter	1/31/2002	P-202	O.4.6
CL-50/14	Katz, Deb	Letter	1/31/2002	P-202	O.4.6
CL-50/15	Katz, Deb	Letter	1/31/2002	P-202	O 3 0
CL-50/16	Katz, Deb	Letter	1/31/2002	P-202	O.1.6

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-50/17	Katz, Deb	Letter	1/31/2002	P-202	O.1.6
CL-50/18	Katz, Deb	Letter	1/31/2002	P-202	O.3.0
CL-50/19	Katz, Deb	Letter	1/31/2002	P-202	O 4.2
CL-50/20	Katz, Deb	Letter	1/31/2002	P-203	O.1.6
CL-50/21	Katz, Deb	Letter	1/31/2002	P-203	O.2.3 4
CL-50/22	Katz, Deb	Letter	1/31/2002	P-203	O 2.2
CL-50/23	Katz, Deb	Letter	1/31/2002	P-203	O 4.4
CL-50/24	Katz, Deb	Letter	1/31/2002	P-203	O.5.2
CL-50/25	Katz, Deb	Letter	1/31/2002	P-203	O.1.7
CL-50/26	Katz, Deb	Letter	1/31/2002	P-203	O 4.6
CL-50/27	Katz, Deb	Letter	1/31/2002	P-203	O 5.2
CL-50/28	Katz, Deb	Letter	1/31/2002	P-203	O 2.4.1
CL-51/1	Drey, Kay	Letter	1/30/2002	P-204	O 1.16
CL-51/2	Drey, Kay	Letter	1/30/2002	P-204	O 4 6
CL-51/3	Drey, Kay	Letter	1/30/2002	P-204	O 4 6
CL-51/4	Drey, Kay	Letter	1/30/2002	P-204	O.4 6
CL-51/5	Drey, Kay	Letter	1/30/2002	P-205	O.5.1
CL-51/6	Drey, Kay	Letter	1/30/2002	P-205	O 6 1
CL-51/7	Drey, Kay	Letter	1/30/2002	P-205	O.2.3.4
CL-51/8	Drey, Kay	Letter	1/30/2002	P-205	O 2.3.4
CL-51/9	Drey, Kay	Letter	1/30/2002	P-205	O.1.3
CL-51/10	Drey, Kay	Letter	1/30/2002	P-205	O.1.6
CL-51/11	Drey, Kay	Letter	1/30/2002	P-205	O.1.8
CL-51/12	Drey, Kay	Letter	1/30/2002	P-205	O.2.3.4
CL-51/13	Drey, Kay	Letter	1/30/2002	P-205	O.1 6
CL-51/14	Drey, Kay	Letter	1/30/2002	P-205	O.2.3.4
CL-51/15	Drey, Kay	Letter	1/30/2002	P-205	O 1.2
CL-51/16	Drey, Kay	Letter	1/30/2002	P-205	O.4 8
CL-51/17	Drey, Kay	Letter	1/30/2002	P-205	O 4.8
CL-51/18	Drey, Kay	Letter	1/30/2002	P-205	O 4 8
CL-51/19	Drey, Kay	Letter	1/30/2002	P-205	O.4.10
CL-51/20	Drey, Kay	Letter	1/30/2002	P-205	O.2 2
CL-51/21	Drey, Kay	Letter	1/30/2002	P-206	O.2 4.1
CL-51/22	Drey, Kay	Letter	1/30/2002	P-206	O.4.3
CL-51/23	Drey, Kay	Letter	1/30/2002	P-206	O 4.8
CL-51/24	Drey, Kay	Letter	1/30/2002	P-206	O.2 2
CL-51/25	Drey, Kay	Letter	1/30/2002	P-206	O 4 8
CL-51/26	Drey, Kay	Letter	1/30/2002	P-206	O 2.2
CL-51/27	Drey, Kay	Letter	1/30/2002	P-206	O 6 5

Table O.1. (contd)

Comment No.	Speaker or Author	Source	Date	Comment Page in Appendix P	Section of Appendix O where comment is addressed
CL-51/28	Drey, Kay	Letter	1/30/2002	P-206	O.2 2
CL-52/1	Johnsrud, Judith	Letter	2/21/2002	P-207	O.6.5
CL-52/2	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5.4
CL-52/3	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5 4
CL-52/4	Johnsrud, Judith	Letter	2/21/2002	P-207	O.2.2
CL-52/5	Johnsrud, Judith	Letter	2/21/2002	P-207	O.2 2
CL-52/6	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5 2
CL-52/7	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5.2
CL-52/8	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5.9
CL-52/9	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5.4
CL-52/10	Johnsrud, Judith	Letter	2/21/2002	P-207	O.5.4
CL-52/11	Johnsrud, Judith	Letter	2/21/2002	P-207	O.4.8
CL-52/12	Johnsrud, Judith	Letter	2/21/2002	P-207	O.1.6
CL-52/13	Johnsrud, Judith	Letter	2/21/2002	P-208	O.1.6
CL-52/14	Johnsrud, Judith	Letter	2/21/2002	P-208	O.4.7
CL-52/15	Johnsrud, Judith	Letter	2/21/2002	P-208	O 4.1.1
CL-52/16	Johnsrud, Judith	Letter	2/21/2002	P-208	O 4.1.1
CL-52/17	Johnsrud, Judith	Letter	2/21/2002	P-208	O.4.1.1
CL-52/18	Johnsrud, Judith	Letter	2/21/2002	P-208	O 4.1.1
CL-52/19	Johnsrud, Judith	Letter	2/21/2002	P-208	O.1.6
CL-52/20	Johnsrud, Judith	Letter	2/21/2002	P-208	O.1.6
CL-52/21	Johnsrud, Judith	Letter	2/21/2002	P-208	O.1.6
CL-52/22	Johnsrud, Judith	Letter	2/21/2002	P-208	O.2.4.3
CL-52/23	Johnsrud, Judith	Letter	2/21/2002	P-208	O.2.2
CL-52/24	Johnsrud, Judith	Letter	2/21/2002	P-208	O.2.2
CL-52/25	Johnsrud, Judith	Letter	2/21/2002	P-208	O.6 5
CL-53/1	Becker, Rochelle	Letter	2/2/2002	P-209	O.5.2
CL-53/2	Becker, Rochelle	Letter	2/2/2002	P-209	O.2.4.1
CL-53/3	Becker, Rochelle	Letter	2/2/2002	P-209	O.5.9
CL-53/4	Becker, Rochelle	Letter	2/2/2002	P-209	O.4.4
CL-53/5	Becker, Rochelle	Letter	2/2/2002	P-209	O.5.2
CL-53/6	Becker, Rochelle	Letter	2/2/2002	P-209	O 5.2

O.1 Impacts

O.1.1 Onsite/Offsite Land Use

Comment: Page 4-6, Section 4.3.1.2, Lines 15-16. This section defines a previously disturbed area as an area where land disturbance occurred "during construction or operation of the site." This definition may allow licensees to undertake decommissioning activities resulting in adverse environmental impacts without first performing a site-specific analysis of those impacts. For example, it might allow a licensee to disturb an area that was disturbed several decades ago during plant construction even if that area was not used during plant operation and has essentially returned to its original condition, i.e. native species have fully returned. The Supplement should define what constitutes a "previous" disturbance, e.g., by specifying a time frame, so such adverse impacts are not permitted to occur. **(CL-16/23)**

Comment: Page 4-6, Section 4.3.1.2, Lines 25-29. The following terms are too broad or too vague to provide licensees sufficient guidance about when a site-specific analysis is necessary with regard to SMALL impacts, "very little new development" and "minimal changes;" with regard to MODERATE impacts, "considerable new development" and "some changes;" and with regard to LARGE impacts, "large-scale new development" and "major change." Providing specific examples from decommissioning or decommissioned facilities would be very useful. **(CL-16/24)**

Response: *Section 4.3.1 was revised to clarify that offsite changes to land use can not be evaluated generically and would require a site-specific analysis. The concept of "previously disturbed land", "very little new development," "minimal changes," etc. no longer is the criteria for initiating a site-specific analysis.*

Comment: Page 4-6, Section 4.3.1.3, Lines 33-41. Using NUREG-1437's estimate that ~1 to ~4 ha (~2.5 to 10 ac) of land is needed for steam generator replacement activities, the document assumes that the land use impacts of major component removal during decommissioning "should be similar or less," and that the land used during major component removal "[g]enerally ... has been previously disturbed during construction of the facility." Does this mean that a licensee must perform a site-specific analysis of impacts if the land use impacts of major component removal may or will be greater than the estimated impacts of steam generator replacement, or if the land used during major component removal has not been previously disturbed during construction of the facility? **(CL-16/25)**

Response: *Section 4.1.3 was revised. A site-specific analysis of onsite land use is not required because this level of impact has already been examined within the context of the operating license and is within the land use allowed by existing zoning. The estimate of land needed for major component removal is for illustration only and does not constitute a limit.*

Comment: Page 4-7, Section 4.3.1.3, Lines 1-2. The Supplement notes that "almost all of the sites" will use land previously disturbed during construction; should one assume that a facility using land not previously disturbed will need to conduct a site-specific analysis? Similarly, under "Conclusions" on that page, it states that impacts for "offsite land use" are considered small unless "major transportation upgrades are necessary." The examples given are establishing water, rail or road transportation links. Is one to assume that any establishment of offsite transportation would require a site-specific analysis? Would impacts only be to off-site land uses or to on-site as well? Specific examples would help here. **(CL-16/26)**

Response: *Section 4.3.1 was revised. The staff has revised Section 4.3.1 to state that offsite changes in land use cannot be evaluated generically. Onsite, no additional analysis is required because no change in land use is required. A licensee should perform a site-specific analysis for all new offsite land use including major transportation upgrades because of the potential for MODERATE or LARGE impacts.*

Comment: Page 4-7, Section 4.3.1.3, Lines 10-12. Please explain the basis for the assumption that where previously disturbed areas are not large enough to support decommissioning activities, "it is likely" that the impact of disturbing previously undisturbed areas would be "temporary and SMALL." **(CL-16/27)**

Response: *Section 4.3.1 was revised. The largest land disturbances associated with decommissioning appear to be about the same size or smaller than those needed for steam generator replacement, 1 to 4 ha (2.5 to 10 acres). This amount of land, even if previously undisturbed, could be returned to a near-natural state in 1 to 5 years and represents only about 2.5% of even relatively small (400 ha) sites. While it is possible for disturbances even this minor to cause adverse ecological consequences (disturbance of a wetland, for example), it is unlikely that such ecologically valuable land would be disturbed. In addition, this amount of land does not represent an impact on overall land use.*

Comment: The Staff should visit TMI and then travel to Clinton Lake to examine how perceptions and reality affect "off site land use." The GEIS must acknowledge the potential for adverse economic impacts on a community during decommissioning. **(CL-02/47)**

Response: *Land use and socioeconomics are addressed in Section 4.3.1 of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.2 Surface and Groundwater Quality and Use

Comment: Page 3-11, Section 3.1.3, Lines 17-18. Please revise the document to clarify that Resource Conservation and Recovery Act hazardous waste disposal permits and Clean Water Act NPDES permits are administered either by EPA or, where EPA has authorized the state RCRA program or the state has assumed the NPDES program, by the state. (See NUREG 1628, Question 4.2.2) Also, the text should briefly discuss the management of PCBs and PCB-containing materials under the Toxic Substances Control Act. **(CL-16/19)**

Response: *Section 3.1.3 was revised to clarify the regulation and administration of the Resource Conservation and Recovery Act (RCRA) and NPDES permits.*

Comment: Page 4-9, Section 4.3.2.2, Lines 12-14. The Supplement should briefly describe the "common engineering practices to limit water use impacts." When describing how water impacts were evaluated (Section 4.3.2.3.), it would be helpful to include the average and maximum water usage pre- and post-operation of those plants that have ceased operation. **(CL-16/28)**

Response: *Section 4.3.2.2 was revised. The phrase "common engineering practice to limit water use impacts" was removed and estimates of the average and maximum water usage were provided.*

Comment: Section 4.3.3.3, p 4-12, line 23 – pH would not necessarily (normally) be measured per the LTP. Also, while considerable attention is placed on minimizing spills during decommissioning, hazardous spills have occurred at decommissioning sites. The same types of activities as performed at operating units, which have resulted in spills at operating units, can lead to spills at decommissioning units. The likelihood is less since less water treatment and so less bulk chemical handling is typically performed at decommissioning sites. **(CL-09/17)**

Response: *Section 4.3.3.3 was revised eliminating the implication that non-radiological groundwater parameters (such as pH) would be measured during LTP groundwater monitoring.*

Comment: Pages 4-10 through 4-12, Section 4.3.3. This section focuses primarily on the water quality impacts of nonradiological discharges from point sources to surface water (and the regulation of such discharges under the NPDES program). It should more fully discuss the water quality impacts of both nonradiological discharges to groundwater (and their possible

regulation under state programs) and non-point source pollution, and if necessary should indicate that one or both of these types of impacts require site-specific analysis. All of these types of discharges have potential water quality impacts that need to be evaluated. **(CL-16/29)**

Comment: Pages 4-10 to 4-11, Section 4.3.3.1. This subsection on water quality regulations should distinguish between "intentional" and "unintentional" nonradiological discharges to both surface water and groundwater. As currently drafted, the section blurs these distinct types of discharges and the regulatory schemes relevant to each. **(CL-16/30)**

Comment: Page 4-10, Section 4.3.3.1, Line 42. The Supplement refers to a "permitting authority" before it identifies what type of permit is at issue. As a result, the reader does not know who the permitting authority is. It would be helpful to note that "intentional releases of non-radiological discharges" to surface waters are regulated under EPA or state wastewater discharge permitting programs, and such discharges to groundwater may be regulated under state programs. **(CL-16/31)**

Comment: Page 4-10, Section 4.3.3.1, Lines 41-44 and Page 4-11, Lines 1-2. This paragraph is confusing in light of the statement on Page 4-12 "that the issue of surface or groundwater quality for all decommissioning activities is generic and that the environmental impacts for these activities will be SMALL." As currently written, it suggests that NRC will obtain a permitting authority's "environmental assessment of aquatic impacts" and "consider the assessment in its determination of the magnitude of the environmental impacts" of decommissioning activities at individual sites. It also suggests that NRC will "establish its own impact determination[s]" on a site-specific basis in the absence of such environmental assessments. Please clarify. **(CL-16/32)**

Comment: Page 4-11, Section 4.3.3.1, Lines 4-5. Please revise the Supplement to indicate that the NPDES program only regulates point source discharges to surface waters, not discharges to groundwater or non-point source pollution. (See also Section 4.3.3.4.) As noted above, the document should note that point source discharges to surface waters also may be regulated under state wastewater discharge permitting programs, and discharges to groundwater may be regulated under state programs. **(CL-16/33)**

Comment: Page 4-11, Section 4.3.3.1, Lines 7-9 and Section 4.3.3.2, Line 16. The document assumes that facilities' NPDES permit limits during decommissioning "are generally the same limits that are enforced for an operating plant," that facilities' permits "may require a monitoring program," and that "these monitoring programs are usually continued through the decommissioning period." Should the reader assume that a licensee must perform a site-specific

analysis of water quality impacts if any one of these conditions is not met? If not, why not? (See also Section 4.3.3.4: is a site-specific analysis required where discharges to surface water may or will exceed the NPDES-permitted levels? Again, if not, why not?) **(CL-16/34)**

Comment: Page 4-11, Section 4.3.3.2, Lines 17-18, 21-23. This language could be interpreted erroneously to indicate that discharges to groundwater are monitored under NPDES permits. The Supplement should address the water quality impacts of decommissioning activities on groundwater separately from the impacts on surface water. In lines 34-35, the Supplement should describe the conditions in which nonradiological impacts to groundwater and from non-point source pollution may be considered SMALL, MODERATE or LARGE. **(CL-16/35)**

Comment: Page 4.12, Section 4.3.3.4. As noted above, the NPDES program only regulates nonradiological discharges to surface waters from point sources, not discharges to groundwater. This subsection should also draw conclusions about the potential water quality impacts of nonradiological discharges to groundwater and non-point source pollution during decommissioning. **(CL-16/38)**

Comment: I cannot stress enough that the groundwater issues are not adequately addressed. **(CL-20/68)**

Response: *Section 4.3.3 was extensively revised and reorganized to address the above comments.*

Comment: The Supplement should provide a more robust discussion of ground water impacts. Further detail on EPA's concerns is found in the enclosed "Detailed comments." **(CL-16/5)**

Response: *Section 4.3.3 was extensively revised and reorganized to respond to the specific comments.*

Comment: Pages 4-11 to 4-12, Section 4.3.3.3. The discussion in this section could support a requirement for licensees to perform site-specific analyses of the potential water quality impacts of their decommissioning activities under certain circumstances; notably, language such as performing these activities in different orders can have a "significantly different impact on water quality," that the SAFSTOR option "may exacerbate water quality issues," and that certain activities "may result in changes in local water chemistry" implies the potential need for site-specific analysis.

In particular, the statement that rubblization may affect groundwater pH and thereby "affect the transport properties of radioactive and nonradioactive chemicals in the subsurface" appears to require a site-specific analysis. The document notes in other places (e.g., Page 1-7, Lines 26-33) that the nonradiological impacts of rubblization, including concrete leaching into groundwater, can be evaluated generically. Section 4.3.3.3 does not support this conclusion. **(CL-16/36)**

Response: *Although the decommissioning activities themselves and the order in which the activities are performed control the impacts to water quality the staff concluded that the impacts on the nonradioactive aspects of water quality are SMALL (neither detectable or destabilizing), easily mitigated and could be evaluated generically. The staff also concluded that if a licensee chose to dispose of slightly contaminated building debris below ground in a manner that is consistent with the radiological site release criteria and solid waste disposal requirements the non-radiological impacts on the groundwater would be easily mitigated, small, and could be evaluated generically. The staff agrees with the commentor with respect to the evaluation of the radiological impacts to groundwater. A site specific analysis would be required, see Section 4.3.3.3. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-12, Section 4.3.3.3, Lines 16-17. The Supplement states that unintentional releases of hazardous substances historically have been infrequent at decommissioning facilities, and that except for a few substances, hazardous substances spills are "localized, quickly detected, and relatively easy to remediate." Does this mean that a licensee must perform a site-specific analysis of potential water quality impacts if a hazardous substance is spilled or otherwise released to the environment during decommissioning. How is "hazardous substance" defined? Examples or a better definition of "localized," "quickly detected," and "ease of remediation" should also be provided. **(CL-16/37)**

Response: *As the commentor stated, unintentional releases of hazardous substances during decommissioning have been infrequent and when they have occurred the spills are localized, quickly detected, and remediated. The expectation is that the occurrence of such events will continue to be infrequent. A site specific evaluation of the significance and consequences of the event is appropriate at the time of the occurrence of the spill. The results of that evaluation dictate the response to the spill. Even a site specific evaluation in advance of decommissioning would not evaluate the impact of all potential hazardous waste spills under all conditions. Rather than evaluating the impact of all potential onsite hazardous spills, licensees should take specific measures to reduce the likelihood and magnitude of the spill using administrative procedures, best management practices, and training. Should a spill occur, the licensee has emergency procedures in place to rapidly respond to the spill and assess its consequences. Therefore the staff concludes that a detailed site specific assessment of potential spills before*

the commencement of decommissioning activities would be of little value in protecting the groundwater. Accidental spills are infrequent and the focus should continue to be on prevention. If a spill should occur then evaluation and remediation of the consequences of the spill are required. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Under Water Quality p.4-10, 4-11 the NRC must stop giving the impression that it is sheer chance that nuclear reactors are located on water, when in fact they require millions of gallons of water a day to operate. NRC assumes compliance with NPDES discharge permits for non-radioactive contaminants (NPDES and the Clean Water Act do not cover most radioactive contaminants, this was purposeful, so industry and the armaments crowd could do what they liked,) however, NPDES permits are often violated or bypassed. **(CL-20/28)**

Response: *The Supplement does not intentionally mislead the reader in the requirements for large quantities of water necessary for cooling. See the explanation in Section 3.1.3, "Cooling and Auxiliary Water Systems", for a detailed account of once-through and closed cycle cooling systems and water requirements. Point source discharges to surface waters are regulated by the NPDES permit system. Licensees are required to comply with the requirements of their permit. This Supplement does not evaluate the potential impacts associated with non-compliance of the NPDES permit. Radiological releases to surface waters are regulated by 10 CFR Part 20. Licensees are required to stay within the 10 CFR Part 20 Appendix B guidelines for the release of radioisotopes. Again this Supplement does not evaluate the potential impacts associated with noncompliance with the regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: On Page 4-9 the NUREG concludes (Section 4.3.2.4) that the environmental impact of water usage will be small. In the evaluation they consider the anticipated reduction in water usage for cooling in the condenser. This conclusion appears reasonable, however the analysis should also consider the environmental effects of the loss of heat provided by cooling water discharged to a closed lake or pond system that is a habitat for aquatic animals and vegetation. Many nuclear facilities are on natural or man-made bodies of water making this environmental effect generic in nature. **(CL-31/8)**

Response: *The impacts of loss heat are not within the scope of this Supplement because the impacts are caused by the cessation of operations, not by decommissioning activities. The decision to cease operations is the decision of the licensee, not the NRC. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: (4.3.2.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Water Use - Conclusions: (The discussion 4.3.1.4 is also relevant)

The GEIS stated, "The overall water use of a nuclear facility will dramatically decrease once the reactor has stopped operating and the demand for cooling and makeup water ceases." (4.9-4.10) On the surface, this statement appears to be correct. However, at Three Mile Island, a considerable amount of "cleanup water" was created after the plant was shut down:

In 1980, the Susquehanna Valley Alliance, based in Lancaster, successfully prevented Met Ed (GPU) from dumping 700,000 gallons of radioactive water into the Susquehanna River. Ten years later (December, 1990), despite legal objections, GPU began evaporating 2.3 million gallons of accident-generated radioactive water (AGW).

.... Can anyone at the NRC point to an official document that classifies 700,000 gallons of radioactive water (which later grew to 2.3 million gallons) as "SMALL"?

The people who live and work around TMI have found that the risks associated with additional cleanup water are not "SMALL." **(CL-02/48)**

Comment: (4.3.3.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS;

Water Quality - Conclusions:

"The staff concludes that the issue of surface or ground water quality for all decommissioning activities is generic and that the environmental impacts for these activities will be SMALL" (4-12). Persistent "water quality" problems continue to plague TMI, a prematurely shut down reactor:

On November 2, 1993, in a letter to the NRC, GPU Nuclear acknowledged: "During the TMI-2 accident, the cork seam located in the Auxiliary Building Seal Injection Valve Room (SIVR) was contaminated with radioactive water. Attempts to contain the contamination within the room have been unsuccessful. During the past 14 years, radioactive material has spread along the joint in one direction into the Annulus, and in the other direction into the Auxiliary Building, Service Building and Control Building West (R. L. Long, GPU Nuclear, Director, Services Division TMI-2)."

On June 4, 1998, "GPUN found several pipes penetrating the wall between the turbine building basement and the control building in Unit-2 to be open on both sides of the wall. This condition was contrary to the Unit-2 post-defueling monitored storage safety analysis report (PDMS-SAR) which requires entrances to the control building area to be watertight or provided with flood panels and openings that are potential leak baths to be sealed." (NRC Inspection Report, 50-289/98-08.) Less than a month later, on July 2, 1998, an LER was necessary due to the breaching of flood barriers "between the turbine building and the control building area due to inadequate fieldwork documents."

As recently as January 9 and 19, 1999, elevated tritium levels and potential leaks from the waste evaporator condensate storage tank for the months of January, February and March 1999 were reported.

Based on the above documented water quality problems the staff should revisit the rating of "water quality." **(CL-02/49)**

Response: *Table 1-1 of this Supplement lists activities at facilities that have been permanently shutdown by a major accident as out of scope. In addition, the problems discussed by these comments are not relevant to a generic assessment. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The water quality (Section 4.3.3) discussion does not address the potential impact of dewatering on the quality of ground water. If, for example, the ground water is a source of potable water and the facility is located near an ocean, dewatering could impact the quality (salinity) of the potable water. The NRC should revise the Supplement to clarify that the NRC will rely on the licensee's compliance with the NPDES permit for dewatering to conclude that the impact is SMALL. **(CL-01/4)**

Response: *Groundwater withdrawal, such as dewatering, is regulated by the state and not through the NPDES Permit. Furthermore, any groundwater dewatering required during decommissioning would be temporary and experience to date has revealed that it is minimal in volume and impact. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Discharges should never have been allowed without prior cleanup and should not be now. **(CL-20/29)**

Response: *The staff agrees with the comment. Discharges are only permitted within regulatory limits. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Additionally, a thorough analysis of groundwater impacts seems lacking. Given Georgia's current concern over the Floridian aquifer, it is again hard to believe that something fundamental to life, water, is being analyzed generically. **(AT-A/36)**

Comment: Additionally, a thorough analysis of groundwater impacts seems lacking. Given Georgia's current concern over the Floridan aquifer, we request that a site-specific assessment of groundwater quality be conducted prior to decommissioning. Also, we request that a more thorough analysis of groundwater issues be researched prior to issuing the final EIS. As an example, the NRC should request the most recent data from State agencies, such as the Georgia Environmental Protection Division, that are involved in negotiations regarding "water wars" between states—as in the ongoing dispute facing Georgia, Florida, and Alabama. **(CL-08/19)**

Response: *The use of groundwater is reduced significantly once the plant permanently ceases operation and is not expected to detectably change or destabilize the aquifer at any NRC licensed site. Therefore, the staff concludes that the impact to groundwater for decommissioning is SMALL and no further mitigation is required. NRC uses groundwater data from States and other agencies where NRC licensed facilities are sited to determine if changes in groundwater use at decommissioning sites are detectable or its use might destabilize groundwater sources. Furthermore, during the review of the LTP, the licensee has to demonstrate, on a site-specific basis, that operation and decommissioning of the facility has not revealed groundwater contamination in excess of the regulatory limits. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Page 1-7, Section 1.3, Lines 30-33. The document needs to explain the grounds for the determination that the environmental impacts of concrete leaching into site groundwater as the result of rubblization can be evaluated generically. See also groundwater comments below. **(CL-16/13)**

Comment: THIS GROUNDWATER CONTAMINATION ISSUE IS ANOTHER REASON WHY "RUBBLIZATION" MUST BE FORBIDDEN, THE CONTAMINATION IN WHAT THEY WANT TO RUBBLIZE AND BURY WILL LEACH TO THE GROUNDWATER AND DIRECTLY IRRADIATE SOIL AND MICROORGANISMS. **(CL-20/19)**

Comment: Would a leachate collection system be required where the rubble is stored in order

to monitor for potential impacts on the groundwater? **(CL-51/15)**

Response: *The staff has determined that long term radiological aspects of rubblization, or onsite disposal of slightly contaminated material would require a site-specific analysis and would be addressed at the time the license termination plan is submitted. The nonradiological impacts would be nondetectable (see Section 4.3.3.3). They are considered to be generic for all sites. The NRC has neither considered or approved rubblization for any plant nor provided guidance on rubblization methods or practices including the requirement for a leachate collection system. This Supplement evaluates potential environmental impacts of decommissioning. It does not set requirements for decommissioning activities or methods. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Groundwater is used by countless communities, groundwater is eventually released to surface and other water bodies and, as groundwater onsite is usually radioactively contaminated, it is a SERIOUS issue that MUST be dealt with, groundwater that is contaminated MUST be pumped out etc. **(CL-20/18)**

Response: *Groundwater in the vicinity of the facility is monitored during operation and decommissioning. Any mitigation of groundwater contamination will be evaluated at the time of the license termination plan review. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: As all landfills leak, it will go to the groundwater and migrate offsite. **(CL-20/76)**

Comment: Furthermore, the way the environmental and water issues were looked at during the time of plant licensing were often equally awful. It all needs reconsidering. **(CL-20/15)**

Response: *The comments can not be evaluated because they did not provide specific information. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.1.3 Air Quality

Comment: 4.3.4 Air Quality, (4.2.4.2) pg. 4-14, last para., last full sentence: This statement indicates that in most cases the number of shipments of other materials (non-radioactive materials) will be small compared to those for LLW. This is not necessarily the case for a plant which is removing all above grade facilities. However, this fact should not affect the conclusion that the air quality related environmental impacts for these activities will be small. **(CL-04/3)**

Response: *The statement in the Supplement is correct given sizes and contents of reactor building and other structures required for plant operation. The Supplement only addresses the impacts of the removal of radioactive structures and structures that were required for operation of the plant. It does not include removal of other structures, including training facilities and administration buildings. Table 1-1 provides a list of areas that were not considered within the scope of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.4.2, p 4-14, 2nd paragraph - not all decommissioning sites have or will have building ventilation systems, especially those that are in SAFSTOR for many years. Temporary systems will be established, as needed, for gaseous effluents during decommissioning if installed systems are no longer functional. Monitoring of air quality is not necessarily performed during the storage period, depending on activities, storage period and source term. **(CL-05/11)**

Comment: Section 4.3.4.2, p 4-14, lines 11-24 – Not all decommissioning sites have or will have building ventilation systems, especially those are in SAFSTOR for many years. Temporary systems will be established, as needed, for gaseous and particulate effluents during decommissioning if installed systems are no longer functional. **(CL-09/19)**

Comment: Monitoring of air quality is not necessarily performed during the storage period, depending on activities, storage period and source term **(CL-09/20)**

Comment: Page 4-14, Section 4.3.4.2, Lines 10-24. The Supplement states that most decommissioning activities are conducted in facility buildings with systems that are "typically maintained and periodically operated" during decommissioning to minimize airborne contamination. As a result, "materials released when systems are dismantled and equipment is removed are not likely to be released to the environment in significant quantities." Again, does the reader assume that a licensee must perform a site-specific analysis of potential air quality impacts if a certain level (definition?) of decommissioning activity may or will not be conducted in facility buildings, or if the systems used to minimize airborne contamination may or will not be maintained and/or operated according to a certain level of effort? How is "significant quantity" defined? **(CL-16/40)**

Response: *Section 4.3.4.2 was revised to address the above comments and to provide a better explanation of the process and terminology. The staff has determined that potential air quality impacts are SMALL and generic and no site-specific analysis is needed.*

Comment: Section 4.3.4.3, p 4-15 – other activities during decommissioning could result in release of particulate matter. This includes temporary suspension of particles during cutting activities and production of particulates from processing of sodium and NaK at an FBR. Such particulate matter is filtered, as necessary, prior to release, to avoid or minimize adverse air quality impacts. While this is recognized on p 4-14, it should also be included in the section on "Results of Evaluation." **(CL-09/21)**

Response: *Section 4.3.4.3 was revised to address this comment.*

Comment: Section 4.3.4.4, p 4-16, line 11 – add the following sentence to the end of the paragraph: "Particulates produced by decommissioning activities within buildings will be filtered as needed so that air quality impacts will be minimal **(CL-09/22)**

Response: *Section 4.3.4.4 was revised to address this comment*

Comment: Page 4-14, Section 4.3.4.2, Lines 6-8. The Supplement states that emissions from workers' vehicles "should be lower" during decommissioning than during plant construction or outages and are "usually lower" than during plant operation. Is there any data from decommissioned plants to support these statements? Also, does one assume that a site-specific analysis of potential air quality impacts is required if such emissions may or will be higher than during plant construction, outages or operation? **(CL-16/39)**

Response: *Assuming that the mix of vehicles driven by the decommissioning work force is the same as the mix of vehicles driven by the onsite work force during plant construction and operation, the staff concludes that total emissions from all workers' vehicles should decrease due to the decrease in the work force following cessation of plant operations, and should not be a problem during decommissioning of any plant. Section 4.3.4 was changed to address this comment.*

Comment: Page 4-14, Section 4.3.4.2, Lines 26-33. The Supplement states that fugitive dust emissions during movement of equipment outside of facility buildings are "likely ... to be confined to the immediate vicinity of the equipment," "in general ... limited to a small number of events" and "of relatively short duration." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts where one of these conditions is not met? Also, how are "immediate", "small number of events" and "relatively short duration" defined? Further, must the facility employ mitigation measures to minimize dust; if so, where are these specified? **(CL-16/41)**

Comment: Page 4-14, Section 4.3.4.2, Lines 40-43 and Page 4-15, Section 4.3.4.2, Lines 1-2.

The Supplement states that there is an average of less than one shipment per day of low-level waste (LLW) from a decommissioning plant; that, "in most cases, the number of shipments of other materials to and from a decommissioning facility will be less than that for LLW;" and that therefore emissions associated with the transportation of materials from such a plant "are not expected to have a significant impact on air quality." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts if the number of shipments of materials to or from its decommissioning facility will exceed the level of less than one shipment per day? **(CL-16/42)**

Response: *Section 4.3.4 was revised to address the above comments and to provide a better explanation of the process and the terminology. The experience to date at plants undergoing decommissioning has not resulted in air quality issues related to fugitive dust. Furthermore, the licensee must evaluate impacts resulting from decommissioning activities against previously issued environment assessments (10 CFR 50.82 (a)(b)(ii). If the evaluation determines that the impacts are greater that previously assessed then the impact is outside the envelope established by this GEIS.*

Comment: Page 4-15, Section 4.3.4.2, Lines 4-7. The definition of what constitutes SMALL, MODERATE and LARGE air quality impacts would be helped by providing specific examples from decommissioning or decommissioned facilities. **(CL-16/43)**

Response: *Section 4.3.4 was revised to address this comment. The criteria for defining destabilization and detectibility was clarified in Section 4.3.4.2.*

Comment: Page 4-15, Section 4.3.4.3, Lines 21-23. This section states that "[n]o anticipated new methods of conducting decommissioning and no peculiarities of operating plant sites are anticipated to affect this pattern" of managing fugitive dust. Is the reader to assume that a licensee who proposes using a new decommissioning method must perform a site-specific analysis of potential impacts? **(CL-16/44)**

Response: *The staff expects licensees to continue to use dust control measures appropriate for the activity being performed and the site. The staff assumes that if a new method of decommissioning is contemplated by a licensee then the licensee would evaluate the impact of the new methodology on all the environmental issues including fugitive dust. If the evaluation concludes that the amount of fugitive dust released by the new activity is significantly greater than what would be expected using the current technology and the impact would not be SMALL, then the licensee would be outside the envelope of impacts given in this Supplement. The comment did not provide new information relevant to the supplement and will not be evaluated further. The comment did not result in a change to the supplement.*

Comment: Air quality issues, Page 4-12, etc., do not address the fact the HEPA filters are

about as good as useless for radioactive particulate holdup and sand filters should be added as well. **(CL-20/31)**

Response: *Well established technology exists for filtering airborne radionuclides. Airborne releases are required to be within regulatory limits given in 10 CFR Part 20. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: On Page 4-16 the NUREG concludes (Section 4.3.4.4) the environmental impact of air emissions will be small. In the evaluation they did not consider that many sites use extraction steam to provide plant heat in the winter months. The shutdown of the reactor means that Aux Boilers will be operated for longer periods to provide heating steam. This needs to be considered in the NUREG or many facilities will need to address this issue in the PSDAR. **(CL-31/9)**

Response: *The staff has concluded that impacts on air quality, including the increased use of auxiliary boilers for heating, could be evaluated generically and is considered to be SMALL and will not require a site-specific analysis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: This is of special significance if explosives are to be used for demolition, which will generate radioactive fugitive dust. **(CL-51/9)**

Response: *Control measures will be required during demolition to keep releases, including those associated with fugitive dust, within regulatory limits regardless of the methods used during demolition. The NRC license will not be terminated until the residual radioactivity at the site is below regulatory limits. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: (4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS;

Air Quality - Conclusions:

"Fugitive dust from those activities performed outside of the building is temporary, can be controlled mitigative measures, and will generally not be noticeable off site." Once again the experience of TMI-2 is instructive:

In June-July, 1980, for 11 days, Met Ed vented 43,000 curies of radioactive Krypton-85

(10-year half-life; beta and gamma) and other radioactive gasses into the environment without having scrubbers in place. Yet in November 1980, the U.S. Court of Appeals for the District of Columbia ruled that the krypton venting was illegal.

From July 24-27, 1984, during the reactor head lift, which was delayed to brake failure on the polar crane, GPU vented radioactive gasses into the environment.

On September 25, 1989, two cleanup workers received radiation exposures while handling a "small piece of reactor core debris" in the decontamination area.

After ten years of defueling activities, 5,000 TMI workers had received "measurable doses" of radiation exposure. The NRC staff should reconsider the placement and value of the terms "temporary" and "fugitive", and rethink the adverse affects of "air quality" on workers. **(CL-02/50)**

Response: *Table 1-1 of this Supplement lists activities at facilities that have been permanently shutdown by a major accident as being out of scope. Venting of radioactive gas related to a serious accident or accidental handling of core debris are activities that would not occur at a facility that is undergoing decommissioning. The term "fugitive dust" refers to particles that are resuspended from surfaces, such as the ground as a result of wind or mechanical action. The term does not imply contamination. Construction activities of any sort have the potential to impact air quality by releasing fugitive dust. As a result, mitigation measures have been developed and are routinely used to control fugitive dust at construction sites. When used properly, fugitive dust mitigation measures are effective. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.4 Ecology

Comment: Section 4.3.5, Page 4-19, 1st paragraph - This conclusion would result in site-specific analyses for the use of areas beyond the previously disturbed areas if a potential to impact the aquatic environment exists. The vagueness of the condition "potential to impact" could result in a site-specific analysis for any potential no matter how remotely possible. The NRC should consider rewording the condition to say 'there is expected to be or likely to be an impact" Also on the previous page (Page 4-18 last paragraph in Section 4.3.5.2,) it appears that a site-specific assessment would be required merely if the aquatic environment has not been characterized. NRC should clarify that a site-specific EIS is not necessary just because the lack aquatic environment characterization, but rather, if an area beyond the previously disturbed area is to be used and no associated characterization of the aquatic environment, if applicable, exists, then such a characterization should be conducted. Then as stated above, if there is expected to be or likely to be an impact to the aquatic environment, then a site-specific

analysis should be conducted. **(CL-05/14)**

Comment: Section 4.3.6, p. 4-23, last paragraph - This section should be reworded as in section 4.3.5.4, as modified by the comment above. **(CL-05/15)**

Comment: 4.3.5 Aquatic Ecology (4.3.5.4) pg. 4-19, 1st para., last sentence. This conclusion would result in site-specific analyses for the use of areas beyond the previously disturbed areas if there is a potential to impact the aquatic environment. The vagueness of the condition "potential to impact" could result in a site-specific analysis for any potential no matter how remotely possible. The NRC should consider rewording the condition to say "there is expected to be or likely to be an impact." Also on the previous page (pg. 4-18 last para. in Section 4.3.5.2,) it appears that a site-specific assessment would be required merely if the aquatic environment has not been characterized. NRC should clarify that a site-specific EIS is not necessary just because the lack of environment characterization, but rather, if an area beyond the previously disturbed area is to be used and no associated characterization of the aquatic environment, if applicable, exists, then such a characterization should be conducted. Then, as stated above, if there is expected to be or likely to be an impact to the aquatic environment, then a site-specific analysis should be conducted. **(CL-04/4)**

Comment: 4.3.6 Terrestrial Ecology (4.3.6.4), pg. 4-23, last para. in Section 4.3.6.4, last sentence. This should be reworded to be the same as Section 4.3.5.4 as modified in the comment above. **(CL-04/5)**

Comment: Page 4-17, Section 4.3.5.2, Line 38 and page 4-18, Section 4.3.5.2, Lines 4 and 14. The term "previously disturbed" needs definition. **(CL-16/46)**

Comment: Page 4-18, Section 4.3.5.2, Lines 14-17. The Supplement should provide specific guidance on how to weigh the primary factors to be considered in evaluating the adverse impacts of decommissioning activities in "previously disturbed" areas. How much habitat can be disturbed before a site-specific analysis is required? How much time can have passed since the initial disturbance? How is a licensee to evaluate the successional patterns of the aquatic communities? **(CL-16/47)**

Comment: Page 4-21, Section 4.3.6.2, Lines 15-17. The Supplement should provide specific guidance on how to weigh the primary factors to be considered in evaluating the adverse impacts of decommissioning activities in "previously disturbed" areas. How much habitat can be disturbed before a site-specific analysis is required? How much time can have passed since the initial disturbance? How is a licensee to evaluate the successional patterns of the native communities? **(CL-16/53)**

Comment: Page 4-19, Section 4.3.5.4, Lines 4-6. This subsection appears to define a "previously disturbed area" as "within the security fences or surrounding paved, graveled, or otherwise developed areas without removal of near-shore or in-water structures." Does this definition also apply to land use activities on page 4-6, Section 4.3.1.2, Lines 15-16? Does the definition mean that a licensee who plans to remove near-shore or in-water structures in "previously disturbed areas" must perform a site-specific analysis of the potential aquatic ecology impacts? **(CL-16/49)**

Comment: Page 4-19, Section 4.3.5.2, Lines 8-11. How is "previous" defined? What is the relationship between these "previous ecological surveys that indicate a low probability of adversely affecting ecological resources" and the aquatic environment characterizations referred to on Page 4-18, Lines 17-23? This subsection suggests that the aquatic ecology impacts of decommissioning activities conducted in areas that were not "previously disturbed" will be SMALL if a previous survey has demonstrated a low probability of adverse effects on the ecosystem, while Section 4.3.4.2 suggests that the aquatic ecology impacts of decommissioning activities in such areas will be SMALL if a characterization has demonstrated the possibility of some adverse effects to "sensitive resources," but the facility will manage those resources for their protection during decommissioning activities. **(CL-16/50)**

Comment: Page 4-19, Section 4.3.5.2, Lines 11-16. The Supplement should define more precisely the circumstances under which a site-specific analysis of potential aquatic ecology impacts in previously undisturbed areas is required. How is the licensee to determine whether an activity has the potential to impact the environment? How should the magnitude of potential impacts be determined? Also, can a licensee avoid doing a site-specific analysis by implementing a protection plan to protect the aquatic environment? **(CL-16/51)**

Comment: Page 4-21, Section 4.3.6.2, Lines 1, 15 and 24. The term "previously disturbed" should be defined or examples provided. **(CL-16/52)**

Comment: Page 4-22, Section 4.3.6.2, Line 43 and Page 4-23, Section 4.3.6.2, Lines 1-5. The Supplement should better define or provide examples of circumstances under which a site-specific analysis of potential terrestrial ecology impacts in previously undisturbed areas is required. What constitutes a "potential of adverse impact to important terrestrial resources"? What is an "important" terrestrial resource? The document should provide criteria by which a licensee can determine whether an activity has this "potential," as opposed to merely a "low probability of adversely affecting ecological resources." The Supplement should also clarify whether a licensee can avoid doing a site-specific analysis by implementing a protection plan to protect the terrestrial environment. **(CL-16/60)**

Comment: Page 4-21, Section 4.3.6.2, Lines 25-29. The document states that the potential impact of disturbing areas beyond the original construction area is SMALL and can be characterized generically if "the terrestrial environment has been characterized." Moreover, a site-specific analysis is needed if "decommissioning activities occur in terrestrial environments that have not been characterized." What must this characterization consist of, and when/how recently must it have been performed, to allow a licensee to conclude that it is sufficient and can properly support the conclusion that potential impacts are SMALL? **(CL-16/55)**

Comment: Page 4-22, Section 4.3.6.4, Lines 37-39. This subsection appears to define a "previously disturbed area" as "within the security fences or surrounding paved, graveled, or otherwise developed areas." How does this definition relate to the definition provided on Page 4-6, Section 4.3.1.2, lines 15-16? **(CL-16/58)**

Comment: Page 4-22, Section 4.3.6.4, Lines 40-43. This subsection suggests that the terrestrial ecology impacts of decommissioning activities conducted in areas that were not previously disturbed will be SMALL if a "previous" survey has demonstrated a low probability of adverse effects on the ecosystem. How recent must the "previous" survey have been? **(CL-16/59)**

Comment: My question is with regard to the site-specific issues. One of the site-specific issues is threatened, I'm sorry, aquatic and terrestrial ecology. And it says, the rationale, activities occurring beyond previously disturbed areas. And I'm wondering what the definition of a previously disturbed area is. Is there a time frame, or how that is defined? **(CH-B/1)**

Response: *Section 4.3.5 Aquatic Ecology, and Section 4.3.6, Terrestrial Ecology, have been extensively revised to address the above comments and the concept of "previously disturbed land" no longer is the criteria for initiating a site-specific analysis. The concept of relying on a previous ecological survey and an environment protection plan to determine whether a site-specific analysis is needed has also been eliminated.*

Comment: 4.3.5 Aquatic Ecology (4.3.5.2) pg. 4-17, 1st para. in Section 4.3.5.2, 4th sentence, "Aquatic environment s" should be corrected. **(CL-04/18)**

Response: *Section 4.3.5.2 was changed to eliminate the typographical error.*

Comment: Page 4-16, Section 4.3.5, Lines 25-29. This section's discussion of impacts to aquatic resources following plant shutdown seems to contradict the example given on page 1-5, lines 6-7, of plant discharges post-shutdown being outside the scope of this document. Similarly, the discussion at Page 4-19, Section 4.3.6, Lines 26-29 seems to contradict page 1-5.

Note also the comment above on the page 1-5 language. **(CL-16/45)**

Response: *Section 4.3.5 was changed to eliminate the contradiction.*

Comment: Page 4-18, Section 4.3.5.2, Lines 17-23. The Supplement states that the potential impact of disturbing areas beyond the original construction area is SMALL and can be characterized generically if "the aquatic environment has been characterized," and that a site-specific analysis is needed if "decommissioning activities occur in aquatic environments have not been characterized." What must this characterization consist of, and when and how recently must it have been performed, to allow a licensee to conclude that it is sufficient and can properly support the conclusion that potential impacts are SMALL? **(CL-16/48)**

Response: *Section 4.3.5, Aquatic Ecology, has been revised to eliminate the use of an environmental characterization to determine whether a site-specific analysis needs to be performed.*

Comment: Page 4-21, Section 4.3.6.2, Lines 23-25. What is a "significant" terrestrial resource? What does "potentially" affected mean? These terms need to be defined or examples provided so that licensees understand when they are required to perform a site-specific analysis. **(CL-16/54)**

Response: *Section 4.3.6.2 has been extensively revised and the phrase "significant terrestial resource" is not used in this section in the Final Supplement. The comment is no longer relevant. The comment did not provide new information relevant to this supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Pages 4-21 to 4-22, Section 4.3.6.3. The document assumes that "[i]n most cases, the amount of land required to support the decommissioning process is relatively small and is normally a very small portion of the overall plant site." It also states that "licensees typically anticipate utilizing an area of between 0.4 ha (1 ac) to approximately 10.5 ha (26 ac) to support the decommissioning process." EPA assumes this means that a licensee must perform a site-specific analysis of impacts if the terrestrial ecology impacts of decommissioning activities may or will be greater than 10.5 ha (26 ac). If this assumption is incorrect, when is a site-specific analysis required and why? **(CL-16/56)**

Response: *The estimates of the typical area used to support decommissioning are based on the decommissioning experience to date. They are not criteria. The licensee must evaluate impacts resulting from decommissioning activities against previously issued environmental assessments (10 CFR 50.82(a)(b)(ii)). If the evaluation determines that the impacts are greater than previously assessed then the impact is not SMALL and the impact is outside the envelope*

established by this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Page 4-22, Section 4.3.6.3, Lines 27-29. The document assumes that the "activity of rubblization of construction material should not have significant nonradiological impacts beyond other decommissioning activities except for potential short-term noise and dust effects." However, on Page 4-12, the document states that rubblization may affect groundwater pH and thereby "affect the transport properties of radioactive and nonradioactive chemicals in the subsurface." Any radioactive or nonradioactive chemicals in the subsurface that are mobilized as a result of concrete leaching from rubblized material could have an adverse effect on the terrestrial ecology of a facility. For this reason, EPA recommends that the Supplement require a site-specific analysis of all of the potential environmental impacts of rubblization, both nonradiological and radiological. **(CL-16/57)**

Response: *The staff, based on the available literature and experience has determined that the impacts associated with concrete leaching from subsurface burial of uncontaminated demolition debris are SMALL, localized and can be evaluated generically. Evaluation of the long-term radiological aspects of rubblization (or onsite disposal of slightly contaminated material) would require a site specific analysis and would be addressed at the time the LTP is submitted. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: (4.3.6.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS: Conclusion - Terrestrial Ecological Resources: The NRC staff aptly stated,"...the magnitude, (i.e., SMALL, MODERATE, LARGE) of potential impacts will be determined through a site-specific study ..." These flexible barometers should be applied to all the above mentioned Conclusions. **(CL-02/53)**

Response: *The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. The staff determined for onsite terrestrial issues, that the impacts of decommissioning activities are SMALL and the analysis need not be site-specific analysis. For those impacts that have been determined to be generic, a licensee is required to evaluate impacts resulting from decommissioning activities against this Supplement or previously issued environmental assessments (10 CFR 50.82 (a)(6)(ii). If the evaluation determines that the impacts are greater than previously assessed, then a site-specific analysis is required. The comment did not provide new information relevant to this Supplement and will not be evaluated*

further. The comment did not result in a change to the Supplement.

Comment: Regarding aquatic ecology p.4-16, as touched on earlier, the environmental impact statements originally written for the plants were often very poor, and did not mention that the discharge water would be radioactively contaminated nor that sediment would be contaminated for miles etc. **(CL-20/36)**

Response: *The original Environmental Impact Statements for power reactors acknowledged that there would be routine releases of radionuclides to the aquatic environment that would be controlled to meet regulatory requirements. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Other aquatic environmental impacts also merit site-specific review. **(CL-11/5)**

Response: *The comment can not be evaluated because it did not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: (4.3.5.2) ENVIRONMENTAL IMPACTS OF DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Aquatic Ecological Resources- Conclusions: The staff found that"....the impact to aquatic ecology for all decommissioning activities is generic and that the environmental impact for these activities is SMALL." Unfortunately, the staff biologists are unfamiliar with the unique water chemistry of the Susquehanna River and historic infestations that have afflicted Three Mile Island. In February 1986, one celled organisms believed to be fungus, bacteria and algae-like creatures were discovered. These creatures obscured the view of the reactor core. And impeded the cleanup of Three Mile Island-2.

On June 23, 1999, Three Mile Island, trying to rid itself of clams, recently released too much of a potentially hazardous chemical into the Susquehanna River. State regulations allow TMI to release 0.3 parts per million of Clamtrol back into the Susquehanna River. For about an hour, the plant was releasing 10,500 gallons per minute containing twice the amount. **(CL-02/51)**

Response: *Table 1-1 of this Supplement lists activities at facilities that have been permanently shutdown by a major accident as out of scope. The microorganisms discussed in the comment were found inside the reactor vessel, and were not a result of an impact on the Susquehanna*

River. The operating unit, TMI-1, rather than TMI-2 was involved in the release of Clamtrol to control clams. Discharge of chemicals to control molluscs occurs at operating facilities and is regulated by the NPDES permit issued by the state or EPA. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: It is a proven fact - proven by the old Atomic Energy Commission and its contractors, - that migratory birds become contaminated eating seeds, drinking water and so on at radioactively contaminated sites, wetlands areas etc. and the birds carry this contamination in their bodies worldwide. NRC, DOE and licensees violate the MBT by not protecting birds from such contamination, and by spewing radioactive noble gases out that impact passing birds. This is one of the reasons I suggest that netting or similar should be placed over the sites in question, fine wire mesh set at an angle that can have leaves and other debris hosed off it, it must be small enough to keep birds out down to the size of hummingbirds. Enclosed, such an obscene site poses slightly less of a threat to birds and other wildlife, the utilities can pay for it all, it can come out the salaries of the top management and company owners. And on the endangered bird subject, let me address the Migratory Bird Treaty Act of 1918 - (p.4-20). **(CL-20/40)**

Response: *Licensees are required to take measures necessary to control the spread of contamination through the animal pathway. Studies to date have not shown that the spread of contamination by this route is in any way significant, but rather is very minor. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: (4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; On site/Off site Land Use - Conclusions:

The GEIS stated, "It is rare for decommissioning activities to affect off-site land use ..." This statement fails to recognize that most nuclear generating stations are located in close proximity to substantial water resources. The Susquehanna Steam Electric Station, Three Mile Island and Peach Bottom are located on or adjacent to the Susquehanna River which feeds the most productive estuary in America, i.e., the Chesapeake Bay. **(CL-02/45)**

Response: *Table F-2 identifies each of the licensed nuclear power plants and the cooling water source. The comment cannot be evaluated because it did not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Draft GEIS does not adequately consider the effects on aquatic ecology caused by an accidental, radioactive release. **(CL-11/4)**

Comment: NRC saying that it has not established standards to biota other than humans on the basis that limits established (by the aforementioned) for the public would provide adequate protection for other species is outrageous and contrary to what has been established for decades. **(CL-20/9)**

Comment: When thinking about exposure to plants and animals and fish, one needs to take the effects to an infant and to a child in the womb to better approximate the effects to wildlife, the smaller the non-human entity (e.g. a bird, a frog) the child in utero down to embryonic level would be appropriate. We all know what happens when an embryo is exposed - namely death or severe damage. The same happens to birds eggs. **(CL-20/10)**

Response: *The NRC established standards for radiological exposures to humans on the basis that limits established for the exposed members of the public would provide adequate protection for other species. No standards were established for radiological exposure to biota other than humans. The validity of the assumption that radiation guidelines, which are protective of the public, would also provide adequate protection to plants and animals has been upheld by national and international bodies that have examined the issue, including the National Council on Radiation Protection and Measurement (NCRP Report No. 109, Effects of Ionizing Radiation on Aquatic Organisms, 1991) and the International Atomic Energy Agency (IAEA Technical Report Series No. 332, Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards, 1992). Both of those studies were conducted in part to evaluate the original assumption presented in 1977 by the International Commission on Radiological Protection (ICRP Publication 26, 1977). In all of these cases, it has been emphasized that such radiation levels may adversely affect non-human species, but effects at the population level are not detectable. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Removal of intake/outfall structures may be the most beneficial action to the aquatic ecology, but it should not go forward without site-specific study of the environmental impacts. **(CL-11/8)**

Response: *The removal of the intake/outfall structures and other SSCs after operation of the facility is discontinued is not expected to detectably change or destabilize the aquatic environment. The removal process is expected to be conducted in a manner and at a time that will have minimal impact to the aquatic environment. In addition, it is anticipated that best management practices would be employed and the necessary permits obtained. All impacts would be, at most, a short-term impact. Therefore, the staff concluded that the impact to the aquatic environment for these decommissioning activities is SMALL and no further mitigation is required. The comment did not provide new information relevant to this Supplement and will*

not be evaluated further. The comment did not result in a change to the Supplement.

Comment: The aquatic ecology issue should also be site-specific **(CL-20/38)**

Response: *The analysis in the Supplement shows that the impacts on aquatic ecology will not be detectable. Therefore, the staff concluded that the impact to the aquatic environmental to these decommissioning activities is SMALL. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.5 Threatened and Endangered Species

Comment: 4.3.7 Threatened and Endangered Species (4.3.7.4), pg. 4-25, last para., last sentence. This conclusion indicates that the NRC will meet its responsibilities on a site-specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees. **(CL-04/6)**

Response: *The responsibilities under ESA will be met through interactions among the licensee, the NRC, and the appropriate resource agency either the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). Information required of the licensee will likely depend on the activity and the species potentially present. This process is described in Section 1.5. The staff has determined that it will conduct informal consultations after the licensee announces permanent cessation of operations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-23, Section 4.3.7, Lines 10-12. The supplement should elaborate on the basis for the statement that "the potential impacts of nuclear power facility decommissioning efforts on threatened or endangered species will normally be no greater and likely less than the effects of plant operations." **(CL-16/61)**

Response: *There are one or more threatened and endangered species in the general vicinity of virtually all licensed commercial nuclear facilities. Very few of these facilities have had documented adverse impacts on the local threatened and endangered species, and in those rare instances when there is an effect, the species that are affected are almost all aquatic species. An operating reactor can affect threatened or endangered aquatic species via water intake through the cooling system resulting in impingement or entrainment, through the heated discharge from the cooling system, or through the purposeful or inadvertent addition of chemicals or contaminants to the cooling water stream. When the plant is shut down for decommissioning the reactor cooling system is shut down, and therefore the impact on aquatic environment is much lower than the impacts of an operating reactor. Therefore, the potential*

effects on the threatened and endangered species will likely be less during decommissioning than during operations. For terrestrial species, the most common potential impacts from operating plants are due to transmission line rights-of-way maintenance activities. Most transmission lines (beyond the switchyard) are expected to remain energized even after a commercial nuclear power facility ceases operation and the right-of-way maintenance activities are expected to continue. Therefore, the potential impacts of decommissioning on terrestrial species will normally be no greater than the potential impacts of plant operation. Section 4.3.7 was revised.

Comment: Page 4-25, Section 4.3.7.2, Lines 3-7. The Supplement should provide guidance on determining the amount of habitat that can be disturbed beyond previously disturbed areas. **(CL-16/62)**

Response: *The evaluation of impacts on threatened and endangered species will be conducted on a site-specific basis. Guidance on the amount of habitat disturbed is irrelevant. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.6 Radiological

Comment: Section 3.1.4 Formation and Location of Radioactive Contamination and Activation in an Operating Plant, pg. 3-15. This description should include the activation of corrosion products as a contributor to radioactive contamination. **(CL-04/16)**

Response: *Radioactive corrosion products are the result of activation and can be considered activation products. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 3.1.4, Pg 3-15, last paragraph - clarify whether the last sentence is referring to radiation exposure during decommissioning or operation. In context, the inference is that the activation products provide the main source of radiation exposure to plant personnel in an operating plant, but typically contaminated materials provide more exposure to plant personnel during operation. **(CL-05/8)**

Response: *The sentence refers to the decommissioning process. Section 3.1.4 was revised for clarification.*

Comment: It also is not clear how, why, and how many plants were selected for Tables G-11 and G-12. Additionally, the first sentence of the fourth paragraph should indicate that the data

is estimated worker dose for major types of decommissioning activities. Actual data appeared to be listed for only one plant in the tables. **(CL-09/41)**

Comment: Section G.2.2, p G-21 – while the conclusion appears correct, it is strange that information was only available for a small sample of facilities. This data is reported to the NRC annually by licensees. **(CL-09/45)**

Comment: Table G-15 – the basis of this table should be better explained. How were the plants selected? What years are covered? **(CL-09/46)**

Comment: Table G-16 – how were the plants listed in this table selected? It appears to be a strange non-representative sample. **(CL-09/47)**

Response: *Data were used to be representative of operating plants around the country including an operating BWR and two PWRs, two different vendors, and two different location types (coastal and interior). Two shutdown power reactor facilities were also included. Data on permanently shutdown plants were used as provided by the licensee or found in references. Tables G-11 and G-12 have been revised.*

Comment: In Appendix G, I was very surprised to read of excess malignancies that have been experienced at doses of 10 REM. This is contrary to the health physics and radiological health handbook and other material that I've read over the more than 25 years I've spent in this industry. And I think that needs to be addressed and reevaluated. **(CH-D/11)**

Response: *The statement made in Appendix G related to the health effects of doses of approximately 10 rem is correct and is taken from the BEIR V report. However, the commentor's statement that the excess malignancies were "experienced" is incorrect. They were calculated based on the extrapolation of an assumed linear relationship between dose and malignancies. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: 4.3.8 Radiological (4.3.8.3), pg. 4-29, 4th full para. last sentence. Maine Yankee agrees that it is not necessary to update the estimates for exposure found in the 1988 GEIS. **(CL-04/7)**

Response: *The staff agrees with this comment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 3.1.4, page 3-15, does not reflect that alpha-emitting Transuranic radioactivity is significant at some plants. This radioactivity is formed after failed fuel releases small amounts of Uranium (as well as fission products) to the reactor coolant. Subsequent activation of the Uranium results in the formation of Transuranic isotopes of Plutonium, Americium and Curium, most of which decay with alpha radiations. For the plants where this issue is significant, the production of airborne alpha radioactivity during decommissioning activities must be carefully controlled to avoid radiation exposure from inhaled alpha radioactivity. **(CL-15/6)**

Response: *The NRC staff acknowledge that failed fuel can result in alpha contamination within the facility. However, the standards for protection of workers found in 10 CFR Part 20, "Standards for Protection Against Radiation" provide adequate protection for workers. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 3-16, Section 3.1.4, Line 1. This line notes that spent fuel comprises the largest amount of radioactive material at a shutdown facility. It would be informative to include here a summary of or reference to the data in Appendix G on the amount of radioactive material at various types of power plants. **(CL-16/20)**

Response: *The amount of radioactive material varies between facilities and is dependent on factors such as the type of facility, the size of the facility, the length of time the facility is operated and other variables. Because of the number of factors affecting the amount of radioactive material, the staff does not believe this information will be useful. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: FOR THE NRC TO HAVE USED DATA FOR SOUTHERN COMPANY'S PLANT HATCH IS SICKENING - WHEN HATCH HAD THEIR DISASTROUS SPENT FUEL POOL SPILL, DID ANYONE ADD THE EXTRA DOSES AND CONTAMINATION IN ? THIS IS THE SAME HATCH WITH OVER 1200 WORKER CONTAMINATION EVENTS IN ONE YEAR. **(CL-20/96)**

Response: *The comment cannot be evaluated because it did not provide specific information. The only place in the document where occupational dose information from the Hatch plant was included was in Table G-9, which summarized occupational dose as a total at all light water reactors for a given year. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Pg. G-21, Table G-15, Summary of Effluent Releases Comparison of Operating

Facilities and Decommissioning Facilities. The values associated with the maximum, minimum and average gaseous effluents for the Decommissioning Reactors do not add up. The Fission and Activation Gases for gaseous effluents are incorrectly all the same for the maximum, minimum and average in each category (PWR & BWR). It appears that the minimum category for Decommissioning PWR's is Maine Yankee. If so, the minimum value for Fission and Activation Gasses for gaseous effluents should be "none detected." Making this correction appears to make the table add up assuming a PWR population of two. **(CL-04/12)**

Response: *The average, maximum, and minimum values for this radionuclide category are identical because the licensees of only one reactor of each type reported emissions. Others either did not report or were reported as below detection limits and therefore could not be included in the calculation. A footnote was added to Table G.15 for clarification.*

Comment: Pg. G-22, Table G-16, Summary of Public Doses from Operating and Decommissioning Facilities. This table is not well formatted and difficult to interpret. The table mixes the collective dose in person-rem with the individual dose in mrem. The years of concern are assorted. We suggest that the table be simplified and either further discussed in Section G.2.2. Text or eliminated. The following is Maine Yankee's data on individual public doses from Maine Yankee's effluents for 1998, 1999 & 2000. (chart followed). **(CL-04/13)**

Response: *Table G-16 was deleted and general information was added to the text.*

Comment: In order to ensure that the radiological aspects of this activity are assessed consistently, NEI recommends that standard dose modeling assumptions be documented directly through the Q&A process associated with the NRC guidance consolidation project. **(CL-05/2)**

Response: *Dose modeling assumptions are not within the scope of this Supplement. Information related to dose modeling assumptions, that are currently in NUREG-1727, will be documented with the NRC guidance consolidations project. In addition, and to the extent possible, the results of NEI's quality and assurance effort will also be included in the consolidation project. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table 4-1 provides estimates of cumulative occupational dose for decommissioning reactors (comparisons of the 1988 GEIS to new estimates compiled for draft Supplement 1). In order to reflect the conclusions of Section 4.3.8, it is recommended that a note be added to Table 4-1 to clarify that these estimates of cumulative occupational dose are generic and are not intended to be site-specific limits. **(CL-06/1)**

Response: *While these are not site-specific limits, this document is providing an envelope that licensees can use in the future to compare impacts from their decommissioning activities. If the licensee is within the values listed for cumulative occupational dose in this Supplement then the impact is expected to be SMALL. As stated in Section 1.5, licensees must make sure they are within the envelope or must perform a site-specific analysis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: After the meeting in Atlanta, we are increasingly concerned about the safety of the workers that will be involved in decommissioning. Will a more specific analysis of worker effects be dealt with in the final EIS or is there a separate report that will research health impacts? Georgians for Clean Energy requests that all worker exposures that have occurred at nuclear power plants that are currently being decommissioned be made available to the public and listed in the final GEIS. **(CL-08/25)**

Response: *NRC licensees, including permanently shutdown reactors, are required to provide reports as specified in 10 CFR Part 20, Subpart M. These reports are publicly available. The potential health impacts to workers are discussed in Section 4.3.8 and Appendix G of the Supplement. A more specific analysis of worker health impacts will not be provided in Section 4.3.8. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section G.1.1.4.1, Pg. G-5 – delete or revise fourth bullet. Conditions typically encountered in exposures from normal facility operations result in external dose, rather than internal dose. Internal deposition of particles can occur, but this is less common than external dose. Also, clarify last bullet. **(CL-09/37)**

Response: *Occupational doses are typically from external exposure; however, environmental exposures to members of the public would be a result of an internal dose largely from radionuclide intake. Section G.1.1.4.1 was revised and the last bullet referenced above has been deleted.*

Comment: Section G 1.1.4.3, p G-8, lines 13-22 – this somewhat explains selection of the occupational nominal probability coefficient in Table G-4 for fatal cancers, but does not explain selection of hereditary coefficient. **(CL-09/38)**

Response: *Section G.1.1.4.3 was revised and provides a source for the hereditary coefficient used in Table G-4.*

Comment: Table G-6, p G-11 – the table per its title covers dose limits for an individual member of the public under 10 CFR 20. The ALARA air emission dose constraint listed in the

table is not a 10 CFR 20 limit. **(CL-09/39)**

Response: *Table G-6 was revised and a footnote added stating that the value is not a 10 CFR Part 20 dose limit but is given to ensure consistency with air emission standards for Federal facilities in 40 CFR Part 61.*

Comment: Section G.2.1, Pg. G-13, lines 26-45 – the conclusion in the first sentence of the third paragraph is misleading. The main reason that the occupational doses at reactors undergoing decommissioning are a small fraction of dose accumulated at operating facilities, as shown in Table G-9, is that there are many more operating plants than decommissioning plants. The average for decommissioning plants shown in the table is less than the operating plant, but not only a small fraction. **(CL-09/40)**

Comment: Table G-12, Page G-17 – the two numbers listed for San Onofre should be explained. **(CL-09/42)**

Response: *Table G-12 is revised. The estimate of Bequerel's has been corrected and the extraneous personnel exposure estimate was removed.*

Comment: Table G-14 it appears strange that only 26-34 operating plants were listed as reporting dose from gaseous effluents each year, since all plants are required to report. Also, the selection of the years 1985-1987 appears strange for an update report. **(CL-09/44)**

Response: *The information cited was taken from a published report, and is limited to information contained in that report. More recent information from operating facilities is also included in Appendix G. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 3-10, Section 3.1.3, Lines 34-37. The supplement states that "the amount of liquid and gaseous radioactive waste generated is usually lower for decommissioning plants." Must the plant's waste remain within the limits established during operations to be bounded by this GEIS? **(CL-16/18)**

Response: *Liquid and gaseous waste releases must meet the requirements in 10 CFR Part 20, Appendix B, Table 2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.8.2, Potential Radiological Impacts from Decommissioning Activities, fails to adequately consider the potential for decommissioning activities to spread or hide radiological contamination. The presumption is that accidents or mistakes will not take place, when experience at decommissioning plants shows that they do. The report fails to draw from this experience. For example, early in the decommissioning of one site and prior to complete radiological survey, a trench was dug across an impacted area to lay an electrical cable to power equipment no longer serviced through the plant. The trench was left open to the weather for a few days, then backfilled with loose material and thus could permit rainwater to carry contamination deeper and spread it further. Individually, such activities may not provide what are termed significant doses, but they have the potential to add incremental to the dose of future site occupants and overall risk and may violate ALARA principles. The potential environmental impacts of such activities should be evaluated. Incidents have occurred in which workers left the site with contaminated clothing and in which train car loads of class A waste were permitted to languish for weeks on a siding in a residential community. Although radiation levels in these instances were extremely low, the potential for greater exposures existed. Such scenarios should be considered, worst case, in preparing the GEIS. **(CL-13/14)**

Response: *Decommissioning experience related to characterization of radiological contamination and decontamination was obtained from many of the permanently shutdown reactors currently in decommissioning. This experience is summarized in Section 4.3.8 and Appendix G of the Supplement. Potential radiological accidents for all permanently shutdown plants were characterized and presented in Section 4.3.9 and Appendix I of the Supplement. The scenarios considered in Appendix I are considered appropriate for evaluating the environmental impacts from decommissioning. Furthermore, accidental releases of radioactive contamination are investigated on a site-specific basis. Such investigations focus on the potential and actual exposure of workers and the public. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-28, Section 4.3.8.3. This discussion in this section indicates that public and occupational dose comparisons were made with the facility's EIS for normal operations and with the 1988 GEIS. This statement appears to contradict earlier statements about the assessment of impacts being based on NRC regulatory limits for worker protection. Please clarify how the comparisons were made. **(CL-16/64)**

Response: *The comparisons of public and occupational doses were made to identify whether the envelope for radiological impacts to workers and the public needs to be adjusted from the 1988 GEIS. The level of significance was determined using the regulatory limits in 10 CFR Part 20, "Standards for Protection Against Radiation." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-29, Section 4.3.8.3. Line 14 indicates that the data used in the evaluation are those presented in Appendix G. Appendix G uses units of collective dose equivalent; however, as also outlined in the appendix, the radiation protection standards are in units of annual individual dose. The Supplement should use consistent units and provide data on population densities for nuclear power plants.

Appendix G.2 (page G-19) provides the average public dose within a 50 miles radius of a facility. The Supplement should clarify if facilities which fall outside this analysis (e.g., have denser populations yielding more person-rem than indicated in the appendix) must complete a site-specific analysis. **(CL-16/65)**

Response: *Appendix G provides a general discussion on radiation protection to assist the reader in understanding the basis for the analysis and conclusions in Chapter 4. The information in Appendix G is abstracted from a variety of published documents making consistency in units difficult. The staff chose to report the units as given in the referenced document.*

The discussion in 4.3.8.3, Evaluation, addresses public dose and states that both the average individual dose and the collective doses attributable to decommissioning activities are not substantially different from those experienced by the public during operation and are much lower than from natural background radiation. The NRC regulations do not establish collective dose limits to the population surrounding a nuclear plant but rather address limits to individual dose. The individual dose limits were established to assure that the radiological impact to the public from the nuclear facility would be SMALL. Even if the anticipated collective public dose attributable to a specific facility decommissioning exceeded the collective dose values given in Table G-13 of the Supplement no site-specific analysis would be required. A site specific assessment would not be required for decommissioning activities as long as the highest dose to an individual member of the public from sources under the licensee's does not exceed the limit in 10 CFR Part 20 of 1 mSv/yr (0.1 rem/yr) and effluent concentrations do not exceed the levels specified in 10 CFR Part 20,Appendix B, Table 2, at the unrestricted boundary. In addition, the dose from external sources in an unrestricted area should not exceed 0.02 mSv(0.002 rem) in any given hour or 0.5 mSv (0.05 rem) in 1 year. If these limits are not exceeded, the radiological impacts, regardless of the collective dose to the population within the 50 mile radius, are inconsequential. The comment did not provide new information related to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Page 4-31, Section 4.3.8.4. While the overall worker health impact is SMALL,

Appendix G shows data from some decommissioning facilities where worker exposure is higher during decommissioning than during operations. The Supplement should clarify how these

higher exposure levels compare with the radiation protection standards. Also, this section should clarify whether an analysis was done of the normal wastewater streams produced during decommissioning that are contaminated with radiation. **(CL-16/66)**

Response: *Annual collective doses at decommissioning facilities vary widely with time depending on the nature of the activities taking place during the year and the number of workers involved in those activities. Similar variations can also occur at operating facilities during periods of major maintenance. Although the annual average collective dose for decommissioning facilities is generally lower over the long-term than during active operations at the same facility, the maximum collective dose during any given year may be comparable to, or higher than, the annual dose during a typical year of operation. No individual workers at decommissioning (or operating) facilities have exceeded the regulatory dose limit of 0.05 Sv/y (5 rem/y) since the late 1980s.*

Decommissioning activities are typically planned to minimize generation of liquid waste, which is ultimately solidified and managed with other solid radioactive waste. Because the facility cooling systems are shut down during decommissioning, these activities would not generate large volumes of liquid effluents to which members of the public might be exposed. Nevertheless the licensee is required to submit an effluent release report to the NRC on an annual basis that summarizes radioactive releases over the previous 12 months. The procedures and results of the monitoring programs are inspected and reviewed by the NRC staff to ensure requirements are being met. The wastewater streams do contain measurable amounts of radiological contaminants, however they have consistently been within regulatory limits. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: On Page M-2 it says, under the glossary, under Background Radiation, that "the typically quoted United States average individual exposure from background radiation is 360 mrem per year." It may be typically quoted, but it is a blatant LIE. For example, typical background radiation in Georgia is 42 mrem year according to the state (which recently upped it a notch probably due to the radioactive fallout on the state from nuclear power plants and the Savannah River Nuclear Site on its borders.) **(CL-20/103)**

Response: *Background radiation from various sources differs depending on the location within the United States. The value quoted in this document is an average for the United States, including cosmic radiation, terrestrial sources, natural radon, and artificial exposures (largely for medical purposes). The value was taken from the National Council on Radiation Protection and Measurements (NCRP's) Report No. 94 issued December 30, 1987. The dose quoted for*

Georgia probably did not include the component from radon, which is the largest contributor overall. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: On Page 4-29 the NUREG (Section 4.3.8.3) concludes that it is not necessary to update estimates for collective dose due to decommissioning activities. This is an important conclusion that is supported by the current range in collective dose that decommissioning plants have experienced. Any change to this conclusion needs to be well supported by actual data and needs to be thoroughly studied to identify all potential impacts. **(CL-31/10)**

Response: *The staff agrees with this comment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table 4-1 on page 4-30 is misleading. The totals given include 100 rem of transportation dose that is not tracked by the facility undergoing decommissioning. It also does not include dose incurred during construction of a Spent Fuel Pool Island or in support of a dry cask storage campaign. A footnote should be added explaining these differences. **(CL-31/11)**

Response: *Section 4.3.8 of the Supplement indicates that the estimates in the table do not represent dose estimates for the same activities. Some of the estimates include doses from transportation of radioactive material, while others do not. Table 4-1 only provides a comparison of occupational dose estimates. Section 4.3.17 provides information on transportation impacts from decommissioning.*

Comment: The Draft even says during licensing the applicants commit to implement ALARA programs. The combination of ICRP, NRC, NCRP, and ALARA standards is, and has been a recipe for premeditated murder and/or illness, genetic damage and great suffering as it is. **(CL-20/8)**

Comment: R.M. Sievert (after whom the unit the Sievert is named) pointed out that there was no level below which radiation did not cause damage, no threshold that must be exceeded for damage to occur, yet NRC says a threshold must be exceeded for effect to occur, I believe Sievert. The ICRP standard of 5 rem per year is based on a principle called risk/benefit that allows a one in five thousand chance of contracting cancer. In other words, the death or cancer risk is the workers and the publics', the benefits are the dollars flowing to the industry and the NRC (from the industry in return for NRC services and licenses etc.). **(CL-20/7)**

Comment: The exposure allowed by regulation is, in fact, slow death, and furthermore, worker doses can't always be trusted because of faulty measuring equipment, horror stories of workers being told not to wear their dosimeters periodically, and so on. The dose received also has a

different effect on each person depending on age, sex, current and past health status and many other factors, plus each organ is affected differently. **(CL-20/55)**

Comment: Regarding Occupational Dose and nuclear power plant exposure data (Page. G 12, etc.). The regulatory limits for exposure were not set based on medical reasons but were set in order to enable the industry to operate - that is historic FACT because what people are being exposed to is either not found in nature (i.e., it is man-made) or found in nature at far, far lower levels. **(CL-20/54)**

Comment: To add to these levels by deliberately ignoring the dangers of radiation exposure is wantonly criminal. Those who do so will go down in history as villains of the worst sort: smug, obtuse, shrivel-hearted, deceiving, opportunistic, self-serving, cowardly, corrupt people who really ought to know better. **(CL-33/4)**

Comment: Environmental and health risks from improper decommissioning are very high, particularly to neighboring communities. **(CL-45/2)**

Comment: Health problems in the community must be determined and taken into consideration when decommissioning plans are being established since continued exposure to radiation through routine decommissioning releases and the inadvertent release of hot particles can jeopardize the health and safety of the public. **(CL-50/10)**

Comment: The direct gamma radiation coming off the plants to the public is the equivalent of a continuous x-ray emanating from their midst. No x-ray is "negligible." **(CL-20/94)**

Comment: That no one asked to be exposed to ANY dose of radiation, and most people in surrounding communities don't even know they are being exposed, or if they know, they think they are being protected because they think there is a safe level of radiation. **(CL-20/98)**

Comment: There are no "acceptable levels" - the public does not accept any level of radioactive contamination - plutonium, cobalt-60, Strontium-90, etc. or tritium, radioactive iodine and so on and on - **(CL-20/105)**

Comment: Most of us also realize that the immune systems of every living thing on this planet – human systems included – are becoming intolerably stressed by mounting (and synergistically interacting) levels of pollution of all sorts. **(CL-33/3)**

Comment: You are insuring the further deterioration of health for innocent civilians and this planet. **(CL-34/2)**

Comment: Underlying these failures of the agency's responsibility for the facilities and activities that it had sanctioned by granting an operating license and through its regulatory actions and inactions is the failure of the NRC - and of EPA - to set radiation protection standards that recognize the great varieties of adverse effects of low-level radiation on human beings. **(CL-52/12)**

Comment: But it is also increasingly important to incorporate into radiation protection standards low-dose effects. **(CL-52/20)**

Comment: One problem here is that the only non-stochastic effects considered in the GIS—GEIS are those related to above threshold doses which cause such things as cataracts or other high dose morbidities. This is unacceptable. There are many morbidities which are associated with low dose radiation which do not rise to the level of effects on cataracts, such as the effect on the human immune system and many other non-cancer effects. This is missing from the generic statement. **(AT-F/6)**

Comment: Even the NRC admitted back in the late '70's that there was no safe level. **(CL-20/99)**

Response: *The NRC's primary mission is to protect the public health and safety, and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations (International Commission on Radiological Protection [ICRP], National Council on Radiation Protection and Measurements [NCRP], and the National Academy of Sciences [NAS]) and are conservative to ensure that the public and workers at nuclear power plants are protected. The NRC radiation exposure standards are presented in 10 CFR Part 20, "Standards for Protection Against Radiation," and are based on the recommendations in ICRP 26 and 30. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: In addition to onsite worker doses, decommissioning exposure calculations must capture and include doses incurred by workers involved in offsite reactor decommissioning activities i.e. shipping, decontamination, smelting, recycling etc., of all radioactive materials and components. **(CL-50/16)**

Comment: The NRC must incorporate offsite contamination in all evaluations of environmental impacts. **(CL-25/8)**

Comment: I utterly oppose [that] NRC should incorporate offsite contamination into all evaluations of environmental impacts. **(CL-33/12)**

Comment: I ask that the NRC incorporate offsite contamination into all evaluations of environmental impacts. **(CL-26/9)**

Comment: The contamination of soil, land and property beyond the station boundary line must be included in the decommissioning analysis and plan. Offsite migration of radioactive materials has occurred through both deliberate and inadvertent removal of materials originally contaminated onsite (tools, concrete construction blocks, etc.). For example, concrete cinderblocks used to construct a shield wall at the Connecticut Yankee's Haddam Neck nuclear power station were inappropriately distributed to affected communities as construction materials for buildings including a children's daycare facility. We believe the Connecticut Yankee incident is not an isolated case. The scope of the current definition does not provide for the investigation, analysis and mitigation of radioactive materials, equipment and components originating from a nuclear facility that have been deliberately or inadvertently released to affected communities. **(CL-48/14)**

Comment: NRC ignores radiation offsite and permits utilities to ignore it in decommissioning planning. NIRS calls on the NRC to incorporate offsite contamination into all evaluations of environmental impacts. **(CL-48/41)**

Comment: One does not want radioactive and chemical particulate matter getting offsite if possible. **(CL-20/34)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC ignores radiation offsite. **(CL-26/7)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC permits utilities to ignore it [radiation offsite] in decommissioning planning. **(CL-26/8)**

Comment: I utterly oppose ignoring offsite radiation and permitting utilities to ignore it in decommission planning. **(CL-33/11)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC ignores radiation offsite and permits utilities to ignore it in decommissioning planning. NIRS calls on the NRC to

incorporate offsite contamination into all evaluations of environmental impacts. **(CL-43/6)**

Comment: The extent to which radioactive contamination levels that are permitted to be released from regulatory control for decommissioning would result in the release of radioactive materials routinely. **(CL-38/5)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow offsite radiation to be ignored, and permits utilities to ignore it in decommissioning planning. It is imperative to include offsite contamination into all aspects of decommissioning planning and evaluation of environmental impacts. **(CL-44/7)**

Comment: I am hopeful that you will act in the interest of the public, & listen to the concerns of all of the communities that will be affected by the by-products of nuclear energy. Offsite radiation is something that must not be ignored. **(CL-49/2)**

Comment: There are right now already elevated levels of some radioactive contaminants nearly 100 miles downstream of Plant Hatch and Plant Vogtle. **(AT-A/33)**

Response: *All nuclear power plants were reviewed and licensed with the expectation that there would be routine very low-level releases of radioactivity to the environment through airborne and liquid releases from the facility and that these releases would be detectable offsite. Gaseous and liquid releases to the environment must be monitored and meet the requirements of 10 CFR Part 20, Appendix B, Table 2. Therefore, contaminants may be present and detectable offsite, however the release limits have been designed and proven to be protective of the health and safety of the public and environment. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: As techniques of research and analysis in complex biological systems improves, it is becoming more apparent to thoughtful, careful scientists and regulators that it is imperative to include the impacts of low-level radiation exposures on all forms of living beings, not merely on humans. **(CL-52/19)**

Comment: Page 4-27, Section 4.3.8, lines 17-21. The Supplement should clarify the statement about the "relatively lower sensitivity of non-human species to radiation." Is this statement based on scientific studies or is the impact to non-humans not known? Why were decommissioning's radiological impacts on ecological receptors defined as outside the scope of the Supplement? **(CL-16/63)**

Response: *The effects of ionizing radiation on non-human biota have been studied since at least the 1940s. Radiological impacts on ecological receptors are not within the scope of this Supplement because the NRC does not maintain radiation protection guidelines for non-human organisms because they are assumed to be protected by the radiation protection standards for humans. The validity of the assumption that radiation guidelines, which are protective of the public, would also provide adequate protection to plants and animals has been upheld by national and international bodies that have examined the issue, including the National Council on Radiation Protection and Measurement (NCRP Report No. 109, Effects of Ionizing Radiation on Aquatic Organisms, 1991) and the International Atomic Energy Agency (IAEA Technical Report Series No. 332, Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards, 1992). In both of those studies, it was emphasized that non-human species may be adversely affected by such radiation levels, but effects at the population level are not detectable. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Contamination means: that some thing/someone etc., has been brought into contact with something that defiles or pollutes it etc., - go look the word up - NRC must stop redefining words and lying about their meaning. **(CL-20/106)**

Comment: The definition of CONTAMINATION is also a LIE, in that it states that something is contaminated if its in excess of "acceptable levels." **(CL-20/104)**

Response: *The definition for contamination used in the Supplement is "undesired radioactive material or residual radioactivity that is deposited on the surface of or inside structures, areas, objects or people in excess of acceptable levels (e.g., for a release of a site or facility for unrestricted use)." This word is defined in Appendix M for clarification as used in this Supplement and is generally accepted by radiation protection experts. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The radioactive material releases is not released in stringently controlled conditions, technical specifications are often violated, monitoring is only done at select locations and frequently monitors don't work. **(CL-20/91)**

Response: *The NRC sets limits on radiological effluents, requires monitoring of effluents and foodstuffs to ensure those limits are met, and has set dose limits to regulate the release of radioactive material from nuclear power facilities. The regulations are intentionally conservative and provide adequate protection for the public, including the most radiosensitive members of the population. All reactor licensees monitor their effluent and calculate offsite doses caused by radioactive liquid and gaseous effluents. These calculations are performed to demonstrate the*

licensee's compliance with its technical specifications and NRC regulations. Requirements for redundancy in monitoring as well as the monitoring of various pathways that could result in the release of radiation to the environment ensure that unmonitored and unplanned releases are avoided. The licensee's Offsite Dose Calculation Manual (ODCM) provides for collection and analysis of a variety of samples such as soil, water, plants, and animals. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions. **(CL-48/40)**

Comment: I am very concerned that children, who are much more susceptible to the effects of radiation, may not be being looked at in the Environmental Impact Statement. This is a very serious issue, & if left unaddressed, would not only be morally wrong, but could lead to a horrible name in history for the NRC, & possibly legal action. **(CL-49/1)**

Comment: I utterly oppose ignoring radiation exposures to children and other vulnerable members of the population and creating a fictitious highest exposed "critical group" based on unsubstantiated assumptions. **(CL-33/10)**

Comment: All decommissioning activities need to consider the impacts of radiation exposure to workers and the public. Radiation exposures to children and other vulnerable members of the population should be separately and realistically addressed with all pathways to exposure closely examined. Assumptions about off-site exposure should be substantiated with full peer-review from neutral parties, i.e. not employees of the nuclear utilities. The risk to public health cannot be minimized or discounted. **(CL-40/2)**

Comment: Affected populations are composed of many individuals who are not close to being that "standard man" in whom the NRC places so much faith. **(CL-52/13)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions. **(CL-43/5)**

Comment: Using an adult male as the average member of the critical population for dose calculations in site release criteria does not establish effective cleanup standards. The adult male assumptions address workers during reactor operation; however when reactor sites are released for unrestricted use the "average member" of the critical population requires the inclusion of children since they bear the greatest burden of the effects of ionizing radiation as

described in the Biological Effects of Ionizing Radiation (BEIR) V report. **(CL-50/17)**

Response: *The NRC's primary mission is to protect the public health and safety, and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations (the International Commission on Radiological Protection [ICRP], the National Council on Radiation Protection and Measurements [NCRP], and the National Academy of Sciences [NAS]) and are conservative to ensure that the public and workers at nuclear power plants are protected. The NRC radiation exposure standards are presented in 10 CFR Part 20, "Standards for Protection Against Radiation," and are based on the recommendations in ICRP 26 and 30. The assumptions used for the critical group are not fictitious or unsubstantiated. The "critical group" means the group of individuals reasonably expected to receive the highest exposure to residual radioactivity within the assumptions of a particular scenario. The average dose to a member of the critical group is represented by the average of the doses for all members of the critical group, which in turn is assumed to represent the most likely exposure situation. For example, when considering whether it is appropriate to "release" a building (allow people to work in the building without restrictions) that has been decontaminated, the critical group would be the group of regular employees that would work in the building. If radiation in the soil is the concern, then the scenario used to represent the maximally exposed individual is that of a resident farmer. The assumptions used for this scenario are "prudently conservative" and tend to overestimate the potential doses. The added sensitivity of certain members of the population, such as pregnant women, infants, and children, are accounted for in the analysis. However, the most sensitive member may not always be the member of the population that receives the highest dose. This is especially true if the most sensitive member (for example, an infant) does not participate in specific activities that may provide the greatest dose or if he/she does not eat specific foods that cause the greatest dose. These comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: ALARA is not a sufficient basis for judging proper methods. **(CL-10/11)**

Comment: NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability. **(CL-48/39)**

Response: *The Commission has established a dose of 0.25 mSv (25 mrem) per year total effective dose equivalent to an average member of the critical group as an acceptable criterion for release of any site for unrestricted use. The licensee will be required to demonstrate that the site can meet this criterion before the license will be terminated for unrestricted use. In*

addition to the dose criteria, the regulations state that the licensee must show that residual radioactivity left on the site have been reduced to levels that are as low as is reasonably achievable (ALARA). The concept of ALARA means that doses must be reduced to the lowest possible level considering economic and societal factors. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: All sites should have audible (sirens) alarms that are triggered during decommissioning, and after decommissioning, when monitors exceed the EPA levels EPA allows, but reduced below what EPA allows to give an advance warning. Such audible alarm systems are absolutely vital also during the time radioactive spent fuel is still on the site, these alarms should be at various locations onsite, including next to the spent fuel pool and one above it, and next to an ISFSI/cask area and suspended on a wire or pole above it. The alarms should be audible miles of site via relay loudspeakers. **(CL-20/89)**

Response: *Requirements for emergency response at nuclear facilities are provided in 10 CFR Part 50 and their application to decommissioning facilities is stated. This Supplement does not (1) establish or revise regulations, (2) impose requirements, or (3) provide relief from requirements. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Clear methodologies should be established for the clean up of transuranics and hot particles. Yankee Rowe failed to include transuranic measurements in its LTP and currently Connecticut Yankee intends to avoid doing direct alpha measurements (and beta measurements) through less expensive surrogate measurements of easier-to-detect radionuclides...Surrogate measurements must not be allowed at sites where consistent ratios of radionuclides do not exist. **(CL-50/20)**

Response: *The purpose of this Supplement does not include establishing methodologies for decommissioning or measurement of radionuclides. The information that should be presented in the LTP is not included as part of this GEIS. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: DOESN'T NRC UNDERSTAND THAT ONE CANNOT DECONTAMINATE SOMETHING RADIOACTIVELY CONTAMINATED IN THE TRADITIONAL SENSE, UNLIKE WITH A CHEMICAL OR OTHER CONTAMINANT, WHATEVER IS DONE TO SOMETHING RADIOACTIVE DOES NOT CHANGE THE CHARACTER OF THE RADIATION, IT CONTINUES TO EMIT ITS DEADLY ALPHA, BETA, GAMMA, NEUTRON ETC. RADIATION THROUGH THE FULL RADIOACTIVE HAZARDOUS LIFE. **(CL-20/70)**

Response: *The definition of decontamination is the removal and appropriate disposal of radioactive materials to ALARA levels. The NRC has prescribed specific radiological criteria for license termination. Radioactive materials removed during decontamination are appropriately disposed of just as any other chemical material would be. Subpart K of 10 CFR Part 20 provides the requirements for the disposal of licensed material, including low-level waste. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And to ignore radiation concerns to the unsuspecting public health is criminal. It is outrageous to allow the reactors to be liability-free. **(CL-32/3)**

Response: *NRC's actions do not in any way eliminate the liability of licensees of nuclear power reactors. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: An EIS must also consider the effects of the synergies between and among ionizing radiation and the multitude of hazardous materials also released into the environment. **(CL-52/21)**

Response: *The levels of radiation and amounts of radioactive material that are released offsite as considered in this document, are so low that synergies between radiation and hazardous materials are not an issue. This document does not look at the synergies between ionizing radiation and hazardous materials released into the environment. At the levels of radioactive releases from decommissioning plants there has been no documented cases of harmful synergistic interactions with hazardous waste that could pose a public health and safety concern. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I do not think it's outside of the scope of this particular document to have some regulations about the speed, let's say, of how the total amount of radiation on a given site was reduced. I think that would be perfectly within the scope of this document. **(SF-C/7)**

Response: *The mission of the NRC includes ensuring that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner. NRC regulations currently require that all decommissioning activities be completed within 60 years after a nuclear power plant permanently ceases operations, unless exemptions are granted on a case-by-case basis. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The potential threat of a release along the shoreline or into the lake of radioactive material during decommissioning or storage of spent fuel requires special consideration. **(CL-11/3)**

Response: *The licensee is allowed to release gaseous and liquid effluents to the environment, but the releases must be monitored and meet the requirements of 10 CFR Part 20, Appendix B, Table 2; therefore, contaminants may be present and detectable offsite. However, the release limits have been designed and proven to be protective of the health and safety of the public and environment. Although long-term storage of spent fuel is not within the scope of the Supplement, as described in Section 1.3, "Scope of This Supplement," NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. The NRC has stated in its regulations that "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact of at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such a reactor and generated up to that time. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Third, the Draft GEIS does not explain at what point in time radioactive decay of the material will make it sufficiently safe to proceed with any further dismantling. NRC should shorten the acceptable time period for SAFSTOR and link it to the timeframe that would make the material safer. NRC should encourage licensees to go forward with dismantling the facility under DECON as soon as appropriate, even if they start with placing the facility in SAFSTOR. **(CL-11/11)**

Response: *NRC regulations currently require that all decommissioning activities be completed within 60 years after a nuclear power plant permanently ceases operations, unless exemptions are granted on a case-by-case basis. The purpose of the Supplement is not to discuss acceptable time periods for decommissioning activities or provide or suggest to licensees when they should undergo decommissioning activities. The Supplement describes the potential environmental impacts from decommissioning activities and provides an envelope of the impacts that the licensee can compare to prior to undertaking a decommissioning activity. The purpose of the Supplement is described in Section 1.1, "Purpose and Need for This Supplement." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The area being worked in should be covered to contain dust if it means covering the whole site with a tent with an adhesive inner surface to capture particulates. **(CL-20/33)**

Response: *The use of enclosures (such as plastic "tents") during decommissioning to contain airborne contamination is a common practice. However, the enclosures are limited in size to the area that is being worked on in order to contain contamination and not allow it to drift to areas that are not contaminated. Covering the whole site with a tent would not be an appropriate or realistically feasible method of containing contamination. In addition, the specification of methods to use during decommissioning is not within the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: For the Draft to take the attitude of "well, the doses at plants being decommissioned are generally only a small fraction of doses at operating plants," p. G 13 is no comfort, and all the charts show, concerning Occupational doses (P. G 14 and on), is thousands upon thousands of contaminated workers. **(CL-20/56)**

Response: *The connection between occupational doses and contaminated workers is incorrect. Although some occupational dose is associated with contamination, most is from direct radiation (radioactive sources in piping or other components, including activation products). The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations (the International Commission on Radiological Protection [ICRP], the National Council on Radiation Protection and Measurements [NCRP], and the National Academy of Sciences [NAS]) and are conservative to ensure that the public and workers at nuclear power plants are protected. The NRC radiation exposure standards are presented in 10 CFR Part 20, "Standards for Protection Against Radiation," and are based on the recommendations in ICRP 26 and 30. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: "Dose to members of the public" Pg. G-19, and following pages, the doses to the public are listed in the usual deceptive and inaccurate manner. **(CL-20/90)**

Response: *The comment cannot be evaluated because it did not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: WHEN YOU CALCULATED THE RADIO-IODINES, DID YOU ADD IN THE HUGE RADIO-IODINE RELEASE OFF PLANT FARLEY THAT WENT OVER GEORGIA? **(CL-20/97)**

Response: *It is not clear what calculation the commenter is referring to. The NRC sets limits on radiological effluents, requires monitoring of effluents and foodstuffs to ensure those limits are met, and has set dose limits to regulate the release of radioactive material from nuclear power facilities. The regulations are intentionally conservative and provide adequate protection for the public, including the most radiosensitive members of the population. All reactor licensees monitor their effluent and calculate offsite doses caused by radioactive liquid and gaseous effluents. These calculations are performed to demonstrate the licensee's compliance with its technical specifications and NRC regulations. The licensee's Offsite Dose Calculation Manual (ODCM) provides for collection and analysis of a variety of samples such as soil, water, plants, and animals. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The degradation that will occur due to the constant bombardment of radiation could affect how the plant is dismantled and how the radiation exposures will be for workers and could easily add new accident scenarios. For instance, Plant Hatch has a cracked core shroud, and I know other plants do, too. But I don't know—that's question, I guess, have any of those been dismantled? How will that deficiency affect decommissioning? These factors, among others, must be incorporated in addressing the decommissioning of individual facilities. **(AT-A/27)**

Response: *The reactor fuel will be removed from the reactor core before any major decommissioning activities take place. A reactor with a cracked core shroud will not pose any additional difficulty in decommissioning. The industry has considerable experience in the removal of damaged components (e.g., the cleanup at Three Mile Island, Unit 2). Decommisioning can be accomplished efficiently and safely with minimal radiation exposure to the workforce. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Okay, we searched the document to determine what the actual acceptable risk is to the public for the activities addressed in your process. And what we determined is that it's a pretty wide range, from three to 21 person rems. Okay, yeah. What is the absolute level of acceptable risk -- and I know it ranges in the experiences that the NRC has had at different decommissioned power plants. And so there were different doses identified at different plant locations and I know some of the variables that went into that. What is the absolute level of acceptable risk that NRC will allow for decommissioning activity in general? That's number one. **(AT-B/1)**

Response: *This Supplement does not establish acceptable risk levels; it lists reported doses for individuals and populations and provides estimates of potential impacts. NRC and EPA regulations contain permissible dose limits for individuals. Neither agency has established*

permissible population doses. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: I don't think the long-term radiological impacts [from entombment] are being addressed and the scope of this document is inadequate as it relates to radiological impacts. I think in generic terms, that should be addressed. **(CH-C/6)**

Response: *Entombment was addressed in this Supplement at the request of the Commission. Although Entombment, as described in this Supplement, does not result in unrestricted release at License Termination, the environmental impacts from the activities for preparing for Entombment can be evaluated and that was within the scope of this Supplement. In October 2001, the Commission published, for public comment, an advance notice of proposed rulemaking (ANPR) on Entombment Options for Power Reactors (66 FR 32551). The NRC's regulatory limits for radiological protection are set to protect workers. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC is charged to protect the quality of the human environment and we ask that they all can uphold that charge. The current draft GEIS is not protective and needs major improvement. **(CL-08/33)**

Response: *The NRC's mission includes ensuring that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner. This comment cannot be evaluated because it did not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The U.S. Environmental Protection Agency (EPA) and most state agencies that set radiation exposure standards employ measures, limits, or goals expressed in terms of risk. NRC Radiological Site Release Criteria appear to yield a higher risk to the public than those risk levels acceptable to EPA under CERCLA. If this is so, then the GEIS should contain the comparisons (risk to risk, nuclear to chemical, one in ten thousand to one in a million) in plain language. The presentation of risk in Appendix G is unnecessarily obtuse and murky. It appears not to contain a comparison to permissible or target risks from non-radiological pollutants, which in all fairness, it should. **(CL-13/2)**

Response: *Although licensees may be required to meet state and other Federal regulations during decommissioning, this Supplement evaluated environmental impacts from decommissioning activities using, where appropriate, NRC regulations and guidelines as part of the evaluation. The statement is made that the GEIS should contain the comparisons (risk to*

risk, nuclear to chemical, one in ten thousand to one in a million). NEPA requires Federal agencies to consider every significant aspect of the proposed action. NEPA requires that the agencies inform the public that it has considered environmental concerns in its decision-making process and it requires agencies to take a hand look at the environmental consequences of an action. It does not require comparisons between technologies , or comparisons of risks between the various technologies. Appendix G provides a summary of risks from radiation exposure. Section G.1.1.4.3, "Risk Coefficient Selection," discusses the use of the BEIR-V risk coefficient of 8 x 10^{-4} fatalities per 0.01 person-Sv (1 person-rem). The Supplement provides a range of occupational doses experienced in permanently shutdown reactors for a number of decommissioning activities. The staff concludes that the occupational and public health impact from radiological dose for all decommissioning activities is generic and the impact will be SMALL. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Water quality should continue to be tested for radioactive contaminants for at least 600 years which is the full radioactive hazardous life approximately for cesium-137, which is a contaminant of concern in fish and shellfish as it migrates to muscle in particular. **(CL-20/37)**

Response: *There are regulations in place concerning the release of any material from a nuclear power facility. The plants were licensed with the expectation that there would be routine releases to the air and water due to normal operations and that these releases would be detectable offsite. The releases are limited to ensure public health and safety. Liquid releases to the environment must be monitored and meet the requirements of 10 CFR Part 20, Appendix B, Table 2. Therefore, contaminants may be present and detectable offsite, however the release limits have been designed and proven to be protective of the health and safety of the public and the environment. No offsite decontamination efforts or additional monitoring procedures are warranted. The Supplement does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: NRC MUST MAKE LICENSEES, CONTRACTORS, SUBCONTRACTORS AND ANYONE WHO WORKS ON DECOMMISSIONING TAKE THE EFFECTS OF RADIOACTIVE "DAUGHTER" PRODUCTS INTO CONSIDERATION AS THEY MAY HAVE VERY DIFFERENT PHYSICAL, CHEMICAL AND RADIOACTIVE PROPERTIES THAN THE RADIOACTIVE "PARENT." THIS MUST BE PART OF DECOMMISSIONING STANDARDS. **(CL-20/52)**

Response: *The NRC radiation exposure standards are presented in 10 CFR Part 20 and take into account daughter products. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Emissions are allowed to be averaged out to make them appear less, and there is no independent monitoring and utilities do and say whatever they please. **(CL-20/92)**

Response: *Emissions are reported as total for a given period, not as averages. The NRC sets limits on radiological effluents, requires monitoring of effluents and foodstuffs to ensure those limits are met, and has set dose limits to regulate the release of radioactive material from nuclear power facilities. The regulations are intentionally conservative and provide adequate protection for the public, including the most radiosensitive members of the population. All reactor licensees monitor their effluents and calculate offsite doses caused by radioactive liquid and gaseous effluents. These calculations are performed to demonstrate the licensee's compliance with its technical specifications and NRC regulations. The licensee's Offsite Dose Calculation Manual (ODCM) provides for collection and analysis of a variety of samples such as soil, water, plants, and animals. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I know that I am not alone in asking you to protect our citizens from radioactivity on such a large scale and hope that you will live up to your responsibility by not lessening the requirements that utility companies face when decommissioning takes place. **(CL-39/6)**

Response: *The NRC's primary mission is to protect the public health and safety, and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC has and will continue to live up to the responsibility to protect the citizens of the United States from the harmful effects of radiation resulting from the use of licensed material. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: How could the NRC, with its limited surveillance staff, make certain that each licensee would search conscientiously for contamination on the interior as well as the exterior surfaces of pipes, drain lines and ductwork? **(CL-51/10)**

Response: *Included in the license termination plan is a site characterization, which is based on radiological surveys made throughout operation of plant and decommissioning process. The purpose of the site characterization is to ensure that the final radiation surveys are conducted to cover all areas where contamination existed, remains, or has the potential to exist or remain as well as to provide data for planning further decommissioning activities. The site*

characterization contains a description of (1) the radiological contamination on the site before any cleanup activities associated with decommissioning took place, (2) a historical description of site operations, spills, and accidents, (3) a map of remaining contamination levels and contamination locations, and (4) a description of the survey instruments and supporting quality assurance practices used in the site-characterization program. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: How can the radioactive content of this structure be accurately estimated? **(CL-51/13)**

Response: *Discussion of method for estimating the radioactive content of structure is outside the scope of the Supplement. There are several methods by which the total activity could be estimated. These methods include taking core samples through the containment vessel and determining the variation of activity as a function of the location of the sample and position in the sample. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Tritium can't be contained. **(CL-20/93)**

Response: *Tritium is water with an extra neutron in the nucleus. It can be contained in the same manner as water, for instance in bottles, tanks, etc. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.7 Decommissioning Accidents

Comment: Section 4.3.9 and Appendix I discuss the potential of, and consequences of, postulated radiological accidents. On page I-2 of Appendix I, the text states, "As a result of improvements in the technology used for decommissioning, several of the accidents listed in Table 1-2 may now be considered to be of a much lower probability or, at the least, to result in much-reduced consequences." It is recommended that the text be revised to identify typical technology improvements. For example, some of the plants currently undergoing decommissioning intend to use single failure proof cranes to preclude the potential for certain postulated spent fuel cask drop or heavy load drop accidents. **(CL-06/3)**

Response: *Appendix I was revised to include reference to specific technological improvements such as the upgrading to a single failure proof crane.*

Comment: Section 4.3.9.3, page 4-35, lines 19-21 – the category of hazardous (non-radiological) chemical related accidents is listed here, which is appropriate since such accidents are possible during decommissioning. The description only mentions potential for injury to the public. However, in Section 4.3.9.2, which describes the classification of accidents as small, moderate and large, effects on workers are also discussed. This should be clarified since it appears to be inconsistent. **(CL-09/24)**

Response: *Section 4.3.9 is a discussion of offsite impacts to members of the public. The commenter is referred to Section 4.3.10 for an assessment of impacts to workers, including chemical hazards.*

Comment: I think the document needs to address fires, chemical hazards, particulates, spills. I just think there are more issues that need to be addressed in the document. **(CH-D/8)**

Response: *Appendix I of the Supplement evaluates a large number of potential accidents for plants undergoing decommissioning including fires, chemical hazards and spills. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table I-5, page I-20 – add fire and hazardous materials to associated accidents for removal of contaminated pipe and tubing. **(CL-09/51)**

Comment: Table I-5, page I-21 – add fire and hazardous materials to associated accidents for metal component dismantlement, intact removal or partial segmentation of large components and the first three subcategories of removal of reactor pressure vessel and internals. **(CL-09/52)**

Comment: Table I-5, page I-22 – add fire to associated accidents for cut piping attachments. Add fire and hazardous materials to associated accidents for decontamination, segmentation and disposal of RCS and other larger bore piping. **(CL-09/53)**

Comment: Table I-5, page I-23 – add fire to associated accidents for deactivate systems, disposal of nonessential structures and systems; establish a permanent reactor coolant system vent path; establish a permanent containment vent path; remove dedicated safe-shutdown diesel and generator; and remove unused equipment during SAFSTOR. Add hazardous materials to deactivate systems; disposal of nonessential structures and systems; drain and flush plant systems; process, package, and ship liquid and solid radioactive wastes; remove dedicated safe-shutdown diesel and generator; dispose of non-radioactive hazardous waste; and limited decontamination of selected structures and systems. **(CL-09/54)**

Comment: In general, any activities that involve cutting or welding could lead to a fire. Precautions are implemented to minimize the possibility and respond quickly if a fire starts. Depending on the materials in the systems during operation or during earlier decommissioning activities, a hazardous materials accident is possible when removing systems, handling waste or using decontamination materials. Again, precautions are planned to minimize the possibility. **(CL-09/55)**

Response: *Table I-5 was revised and "fire" was added as a potential accident for a number of decommissioning activities.*

Comment: Page 1-8, Lines 10-13. EPA agrees that inadvertent releases resulting from an accident should be handled on a site-specific basis. We would like to see an explanation of how the analysis of impacts from an accident would be handled. **(CL-16/14)**

Response: *As stated in the Supplement, the discussion of environmental impacts from reactors that were permanently shut-down due to a major accident is outside the scope of this document and would require a site-specific analysis. In response to EPA's request, the staff recommends that EPA examine NUREG-0683, as supplemented. NUREG-0683 is a Programmatic EIS related to the decontamination and disposal of radioactive wastes resulting from the March 28, 1979 accident at Three Mile Island, Unit 2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Perhaps most disgusting is that under "Consequence of Potential Accidents" p. I-16 the impression given is that spent fuel pool accident risks are low, when in fact NRC's own cited document shows, hundreds upon hundreds would die and also many spent fuel pools were highly vulnerable to catastrophic accident due to earthquakes and a lot more besides - spent fuel pool accidents would have terrible consequences. **(CL-20/100)**

Response: *The level of risk is the result of the probability of occurrence and the consequences of the accident. The risk associated with spent fuel pools is low because the probability of an accident is low. Furthermore, the accident could be mitigated before a release occurs. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table I-3 incorrectly lists site flooding as the only accident analyzed for Peach Bottom Unit 1 in the documents referenced in Appendix 1 for Peach Bottom Unit 1. The additional accidents analyzed for Peach Bottom Unit 1 that should be added to Table I-3 are:

-- Release of helium coolant under containment breach (open penetration to containment) for accidents involving radioactive materials (non-fuel-related) on page I-9.

-- Fire inside reactor vessel under fire for accidents involving radioactive materials (non-fuel-related) on page I-10. **(CL-31/15)**

Response: *The additional accidents identified above for Peach Bottom Unit 1 were added to Table I-3.*

Comment: Appendix 1, Summary of Accidents For PWR and BWR Plants Undergoing Decommissioning Operations; Table 1-3 lists accidents considered in various individual plant evaluations but lists no potential consequences and no probabilities. So what good is this list except to show the random and will-nilly cafeteria approach to individual plants picking out and designing bounding accident scenarios? At one plant the limiting scenario is fuel handling accident; at another it is a fire in the low-level waste storage building. Case in Point: No fire scenarios are listed for Maine Yankee under Table 1-3, yet recently a fire occurred in a low-level waste dewatering unit and burned at several hundred degrees for more than an hour. A local volunteer fire company approached the fire without respirators and without advice from radiation protection personnel. A GEIS should contain a comprehensive generic list of potential accidents (scenarios) together with probabilities and potential consequences. **(CL-13/3)**

Response: *Potential consequences are shown in Table I-4 of Appendix I. Probabilities for accidents other than those related to the spent fuel pool have not been calculated primarily because of the low risk associated with the accidents and the potential for mitigation of the accident consequences. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Presenting licensee estimates of consequences without comment or qualification as in Table 1-4, Highest Offsite Doses Calculated for Postulated Accidents in Licensing Basis Documents, provides an incomplete picture of real potential consequences. For example, Maine Yankee asserts that loss of spent fuel pool heat sink will result in the same offsite dose as a liquid waste spill, that of .23 REM. Other than a reference to another study, NRC does not bother to explain what sort of dose spent fuel pool drain down might result in if remedial action is not taken. As dose consequences can be rather large, the actual figures should be included in he GEIS. **(CL-13/4)**

Response: *The event scenarios that lead to a spent fuel pool drain-down and subsequent large offsite radiological release are beyond design basis. While the consequences from such a postulated event can be large, the likelihood of the event is very small. The overall risk to the public is well within the quantitative health objectives of the NRC. To more accurately quantify the risk, several figures have been added to Appendix I of the Supplement and the discussion on spent fuel pool drain-down events has been appropriately modified.*

Comment: A serious accident or terrorist act could be catastrophic. Such an occurrence could result in large numbers of human fatalities, injuries and illnesses and vast areas of land uninhabitable for years. **(CL-46/4)**

Comment: Given the recent experience with wild fires at the Los Alamos and Hanford Nuclear Reservation and now the potential for flooding and massive soil erosion, the NRC should re-evaluate risk assessments and dose calculations for decommissioning reactors. **(CL-50/25)**

Response: *Once the reactor shuts down permanently, the risk to the public is greatly reduced; however, there are still accidents that may occur that could have consequences offsite. Licensees are required to examine their sites and plans for decommissioning to identify postulated accidents that could occur during decommissioning. An analysis of these accidents is required in their Final Safety Analysis Report, or equivalent document, which is part of the licensing basis for the plant. Possible accidents, such as the ones mentioned above, and many other possible scenarios, have been considered in this analysis. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Wherever human beings are involved, there are bound to be errors and accidents. The human element cannot be removed, as we found out at Three Mile Island and Chernobyl. **(CL-10/5)**

Response: *Radiological accidents during decommissioning are considered in Appendix I of this Supplement. The comment is not specific and did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I challenge any licensee and any NRC staffer, to walk into the area where the spent fuel pool is after the water has drained from the spent fuel pool, and try and refill the spent fuel pool with a garden hose (that is what they thought they'd do at the Georgia Institute of Technology Reactor) and see how well they can "mitigate" the situation before "offsite dose consequences could occur" - they'd be dead before they could pick up the hose. To say that such an accident could be mitigated is the height of deception. **(CL-20/101)**

Response: *The NRC staff considers loss of water from the spent fuel pool to be a very low probability accident because of design features required at all spent fuel storage pools that minimize the possibility of losing all the spent fuel coolant. Obviously, what the NRC staff had in mind as mitigation of a loss of inventory accident at a spent fuel pool was not manual refilling with a garden hose. Technology exists and it is routinely employed to work effectively in very high radiation fields. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: THE NRC SHOULD READ ITS OWN DOCUMENTS AND THE FAMOUS "CRAC 2" REPORT DONE BY SANDIA LABS, THE NRC AND THEN CONGRESSIONAL OVERSIGHT BECAUSE TO PRESENT DATA TAKEN FROM LICENSING-BASIS DOCUMENTS WHICH HISTORICALLY HAVE DOWNPLAYED ANYTHING THAT COULD HAPPEN IS OUTRAGEOUS, AND IF THERE IS STILL FUEL IN THE REACTOR AND A LOSS OF WATER COOLANT HAPPENS, EVEN IF THE REACTOR HAS BEEN SHUTDOWN RECENTLY, THERE WILL BE A MELTDOWN. **(CL-20/102)**

Response: *The staff is aware of the information that is present in the documents it publishes. This comment is general in nature and does not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.9.2, page 4-34 – it is not clear whether the physical injuries discussed in this section are only those due to radiological impacts or due to non-radiological aspects of an accident. The section is on radiological accidents so the former is implied, but the wording is not clear. **(CL-09/23)**

Response: *Section 4.3.9.2 was revised to refer specifically to radiological accidents. Information that could be misconstrued pertaining to nonradiological accidents has been removed from the section.*

O.1.8 Occupational (Nonradiological) Impacts

Comment: I'm going to have comments on the details of my facility, Fermi I, ranging from the status of our decommissioning since we are inactive, the final act of decommissioning...(comments on the details of my facility, Fermi I) what kind of fuel the plant used, the type of containment, some of our systems. We are cleaning up sodium residues. I'd like that stated in the report. It is one of the type of chemical activities and chemical hazards that are being done as part of decommissioning. **(CH-D/2)**

Response: *Section 4.3.10.1 was revised to include removal of sodium residues.*

Comment: There are some additional hazards that have to be addressed in the discussion of the hazards. I don't think these would affect the overall conclusions of the document. But I think there is more detail, and to some extent, some hazards that are not fully addressed in the document. And some of these are in the areas of occupational hazards. **(CH-D/7)**

Comment: Section 4.3.10.1, page 4-37 – the hazard of flames and fires should be addressed in the section on physical hazards. **(CL-09/25)**

Response: *Section 4.3.10 was extensively revised. The hazard of flames and fires are addressed in Section 4.3.10.3.*

Comment: Section 4.3.10.1, page 4-39 – the following items should be added to the list of activities that expose workers to chemical hazards:

"Removal of chemical containing systems, such as demineralizers, and acid and caustic containing tanks," "Removal of sodium and NaK residues." **(CL-09/26)**

Response: *Section 4.3.10.1 was extensively revised. The chemical hazards identified above are addressed in Section 4.3.10.3.*

Comment: Tables E-3 and E-5 The issue of occupational hazards applies to activities in addition to those indicated in Table E-3. Since Table E-5 is based on Table E-3, it also needs to be revised to reflect the following.

Such additional activities that can affect or involve occupational issues are as follows. A brief explanation of why follows each item.

Adjust site training (Industrial safety type training needs to be continued and revised based on job hazards to ensure workers are trained for activities or areas [e.g., confined spaces] involved in decommissioning)

Establish a reactor coolant system vent pathway (Depending on specific method, this could involve cutting, welding and working at heights)

Establish containment vent pathway (Depending on specific method, this could involve cutting, welding and working at heights)

Do preventive and corrective maintenance on SSCs (Maintenance activities at an operating plant or decommissioning plant can involve industrial hazards, some more so than others. There can be energized systems, pressurized fluids, rotating equipment, etc.)

Chemical decontamination (Occupational hazards include chemicals and pressurized fluids)

High pressure water sprays of surface (High pressure sprays are themselves a hazard due to energy involved. Precautions need to be taken to use them safely)

Cut out radioactive piping (Cutting typically involves torches or cutting wheels, creation of fumes or particles, and rigging)

Remove large and small tanks or other radioactive components from the facility (Careful rigging is needed to maintain control and prevent injury. If this activity also involves cutting the equipment free, the hazards of cutting are also involved)

LLW packaging and storage (Handling the LLW and packages needs to be performed ergonomically safe to prevent injuries)

Large component transportation (The transportation issues all involve lifting of materials to remove them or bring them onto the site. Care also is needed if vehicle is backing up during the evolution.)

LLW transportation

Equipment into site transportation

Backfill tracked into site

Non-radioactive waste transportation

Complete final radiation survey (The survey will involve working at heights if buildings remain, and possibly accessing hard to reach locations.) **(CL-09/33)**

Comment: Tables H-1 and H-2 – as addressed under comments on Tables E-3 and E-5, other activities involve occupational hazards. Occupational issues do not seem to belong as an environment issue category. Safety of workers is considered as a separate category when planning work. From a regulatory perspective, OSHA and state agencies typically promulgate regulation on worker safety, not the EPA or state environmental agencies. The environmental issues typically are impacts to the air, water, or land both on and off site, while other environmental issues that impact people are evaluated for the public. The type of review is also different for occupational issues than other environmental issues. As each work package is planned, the hazards of the job need to be addressed in the planning and appropriate methods, engineering controls and protective equipment planned and workers briefed for each activity. This is an immediate, short-term (for the duration of the activity) type of review, while most environmental issues have longer term implications. However, if occupational issues are to be included in this environmental review, the additional activities discussed earlier also need to be included. **(CL-09/48)**

Response: *Tables E-3, E-5, H-1 and H-2 were revised as appropriate in response to the above comments.*

Comment: (4.3.10.1) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Occupational Issues - Conclusions:

Labor relations is an essential component, and potential impediment to prompt decommissioning activities. For example:

On August 12, 1982, William Pennsyl, a cleanup worker, was fired for insisting he be allowed to wear a respirator while undressing men who entered highly radioactive areas. Pennsyl filed a complaint with the U.S. Department of Labor. William Pennsyl settled out-of-court two days before an administrative law judge was scheduled to hear his case

On March 22,1983, JM 1-2 senior-safety engineer Richard Parks publicly charged GPU and Bechtel Corporation with deliberately circumventing safety procedures, and harassing him and other workers for reporting safety violations.

On July 31,1990, the NRC announced "that an allegation that a shift supervisor on duty at Three Mile Unit 2 control room, during defueling operations in 1987, had sometimes slept on shift or had been otherwise inattentive to his duties, was true ..."

Also, in February 1991 an operator "inadvertently flooded the vaporizer" and several days later an operator was discovered "apparently sleeping.

Based on the experience at Three Mile Island, the SMALL and MODERATE evaluations need to be upgraded to "LARGE." **(CL-02/54)**

Response: *Consideration of worker safety and health, training, and experience with nuclear facilities was included in looking at occupational health and safety issues in this Supplement. Instances of worker misconduct occur, and the licensee and NRC have been diligent in identifying such instances and will continue to do so in the future. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I noticed that the Draft blabbers on about OSHA standards YET FAILS TO MENTION THAT OSHA DOES NOT COME ON SITE AND IS NOT ALLOWED TO ACCORDING TO OSHA, EVERYTHING IS UNDER NRC. So let's print the truth shall we? **(CL-20/24)**

Response: *OSHA has jurisdiction for non-radiological safety hazards. NRC inspectors have jurisdiction over radiological safety hazards. OSHA has access to licensed facilities, however, because of NRC inspector presence onsite during decommissioning activities, the NRC has entered into a Memorandum of Understanding with OSHA. NRC inspectors are required to be*

alert for conditions of non-radiological safety hazards. NRC inspectors are also required to follow up on identified non-radiological safety hazards to include reporting requirements to OSHA. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: To what extent will chemical decontaminants be used? **(CL-51/11)**

Response: Chemical decontamination, the use of chemicals to decontaminate structures, systems, and components is conducted and will be conducted at all decommissioning sites to varying degrees. Chemical decontamination of the primary system has been conducted at a number of facilities including Maine Yankee and Big Rock Point. Chemical decontamination of the primary system is a determination that is made by the licensee. When available, data on chemical decontaminants were factored into the evaluation of environmental impacts from decommissioning activities presented in this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

O.1.9 Cost Impacts

Comment: Table 4-3 lists the decommissioning cost of Peach Bottom Unit 1 to be 54 million dollars (in January 2001 dollars). In our letter submitted on March 30, 2001, in accordance with 10 CFR 50.75 the decommissioning cost estimate for Peach Bottom Unit 1 reported in beginning of year 2001 dollars is 65.4 million dollars. Table 4-3 should be changed to reflect the latest cost estimate. **(CL-31/12)**

Comment: Table 4-4 lists the decommissioning cost of the high-temperature gas-cooled reactor in SAFSTOR (Peach Bottom Unit 1) to be 54 million dollars (in January 2001 dollars). In our letter submitted on March 30, 2001, in accordance with 10 CFR 50.75 the decommissioning cost estimate for Peach Bottom, Unit 1 reported in beginning of year 2001 dollars is 65.4 million dollars. Table 4-4 should be changed to reflect the latest cost estimate. **(CL-31/13)**

Response: *The revised decommissioning cost estimate for Peach Bottom Unit 1 was included in Tables 4-3 and 4-4.*

Comment: No, I think my main issue is just, you know, having the costs on the table and having the costs be understood, and I think there's got to be some explicit discussion of those sorts of economic issues, and it seems like they're not really out there. **(AT-C/6)**

Response: *This Supplement does not discuss cost-estimation techniques or the economic factors, which may or may not enter into those estimates. The regulations (10 CFR 50.82) require periodic submittals to the NRC on estimates associated with decommissioning. 10 CFR 50.75 requires biannual submittal of the status of the licensee's decommissioning trust fund. Guidance for the cost estimates is found in Draft Regulatory Guide, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors" (temporarily identified as DG-1085) and Draft NUREG 1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: For example, the specific formula for the decommissioning cost. Not that we don't have to have plant's decommissioning fund and have to look to the adequacy because the regulations do require that and we do that. But the formula doesn't apply to non-light water reactors. **(CH-D/6)**

Response: *The decommissioning funding requirements for plants involving other than light water reactor designs (Fermi I and Peach Bottom 1) currently undergoing decommissioning were evaluated on a site-specific basis. All of the United States commercial nuclear power plants currently operating use light water reactor designs and the formulas in 10 CFR 50.75 apply. It is anticipated that most future plants will be light water reactor designs, so the formulas will apply to these reactors also; if other than light water reactors are licensed to operate, then the decommissioning funding requirements will be established on a site-specific basis or the regulations revised to include other reactor designs. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: An Associated Press news article from December 5, 2001, "Japanese power company begins dismantling country's oldest nuclear reactor," highlighted the enormous financial and technical concerns that Japan is facing regarding decommissioning. "Japan Atomic Power Co., which took the Tokaimura plant off line in 1998, won't begin taking apart the reactor for another 10 years because extremely high levels of radiation remain inside, said spokesman Eichi Miyatani. It will completely dismantle the plant by 2017 and spend an estimated 92.7 billion yen (US$748 million), Miyatani said." These monetary figures exceed those that were mentioned as average decommissioning cost estimates at the NRC's public meeting in Atlanta. **(CL-08/11)**

Response: *Decommissioning and environmental requirements differ significantly in the United States from elsewhere in the world. Additionally, economic (societal, design, etc.) and other factors (labor, inflation, etc.) vary from country to country, and, thus make decommissioning*

costs incomparable. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: On Pg. 3-19 the discussion of the SAFESTOR option assumes that there is a savings associated with less Solid RW disposal costs. However, they do not consider that the current NRC guidance for release of material includes a no detectable criteria. In order for the reduction of Solid RW to be achieved, significant quantities of plant materials would need to be released from the site. The current regulations do not support this assumption. **(CL-31/7)**

Response: *Discussion of cost estimates for the Supplement did consider current regulations for release of materials from a decommissioned plant. The assumption made in the GEIS for developing cost estimates did assume the no detectable criterion for release of solid waste. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The cost of decommissioning nuclear facilities can vary according to the size of the facility and the degree of contamination. **(CL-48/21)**

Response: *The variables of size, location, operating history, and others are considered when evaluating the cost impacts. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: A lot of my work has been based on concern about the cost of these facilities relative to the amount of electricity or other benefits they provide on a life cycle basis, and that seems to be something that's a subtext of this statement. **(AT-C/4)**

Response: *The societal benefits, or the lack of benefits, from plant operations is outside the bounds of the Supplement. This comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including: Cost Estimates for Radiological Decommissioning; **(CL-02/3)**

Response: *Decommissioning costs are discussed in Section 4.3.11. Two other documents that address decommissioning costs are or were available for public comment. One is a draft guide, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," temporarily identified as DG-1085. This guide is being developed to assist licensees*

in determining financial assurance and for preparing the various cost estimates required for different stages and methods of decommissioning nuclear power reactors. A related document, Draft NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," is also available. The NRC staff plans to use Draft NUREG-1713 in their review of licensees' cost estimates for decommissioning that are submitted to the NRC. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:]Rate payer Equity. **(CL-02/7)**

Comment: We are tired of being unknowingly treated as an entity from whom the industry can escape the obligation of full disclosure, and "used" as the entity upon whom the industry dumps the real long-term costs, and as the entity who absorbs the costs. **(CL-44/16)**

Comment: Public Citizen is opposed to any policy that would shift the financial burden of decommissioning to ratepayers. The cost of properly decommissioning (including thorough decontamination) a reactor site can vary widely, depending on the size of the facility, the amount of time in which it was operational, and the degree of contamination. As the NRC itself stated in the Supplement, the lack of adequate decommissioning funds can potentially result in delays and/or unsafe and improper decommissioning. Further, with utility deregulation and the attendant shuffling of corporate ownership, much uncertainty has developed regarding the ability of the owning and operating utilities to pay for proper decommissioning of their facilities. Public Citizen insists that site-specific reviews are necessary so that the public has an opportunity to ensure that the utility will be able to pay for the entire, thorough decommissioning process. **(CL-47/17)**

Comment: Georgians for Clean Energy requests that all decommissioning costs be borne by the parent company of the licensee in perpetuity. The parent company should not be allowed to recoup the cost of decommissioning from the ratepayer or federal government through the taxpayer. Ratepayers and taxpayers in Georgia have already had to pay far beyond their share of promised cheap nuclear power that has brought one of the largest rate hikes in the history of Georgia. Furthermore, private landowners, whether residential or commercial, farms, federal, state, county, city, community properties or others should not be responsible for the costs of monitoring, containment or cleanup. **(AT-A/29)**

Comment: THE COSTS MUST NOT BE PASSED ON TO THE RATE PAYERS **(CL-20/47)**

Comment: I think going back 25-30 years, the notion was well, we're going to build these things, we're going to run them and then we're going to cover them up in concrete and post guards around them and they'll be safe. Well, now we have rubblization. Suddenly entombment was the floor, now it's become the ceiling, we won't see it because it's too expensive. Money moves too fast and, you know, how can we do it cheap, how can we do it quick. And of course, our concern is, you know, it may be quick and cheap for the licensee, but for people in the immediate area, people downstream, people on the Savannah River, on the Altamaha River, my concern is that they not be unduly saddled with costs that should be taken into account and that those local concerns be maintained in this process. **(AT-C/2)**

Comment: The most troubling aspect of this section is the assertion that, "The cost of decommissioning results in impacts on the price of electricity paid by rate payers." Due to deregulation, additional decommissioning recovery is either limited or "under-funding" is the sole responsibility of the "electric utility," e.g., Three Mile Island Unit-1. The "hostage rate payer" is being replaced by the shareholder who is not likely to advocate paying for the "under-collected" portion of the fund after the plant is permanently shut down. This section needs to be redrafted and include the following variables: Cost Estimates for Radiological Decommissioning (20); Planned Operating Life of Nuclear Generating Stations; Spent Fuel Isolation; Low-level Radioactive Waste Isolation; Rate Payer Equity; Plant Valuation; Joint Ownership; and Regulatory Ambiguity. **(CL-02/57)**

Response: *The missions of the NRC include the protection of public health and safety, and protection of the environment. NRC requirements established a framework to ensure that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner, and that funding will be available for this purpose. NRC regulations regarding the methods used to ensure that funds will be available to cover the decommissioning process are in 10 CFR 50.75. NRC does not prescribe how the funds are to be raised. The license holder for the facility funds decommissioning costs. Equitability of investment decisions is outside of the regulatory authority of the NRC and thus is not within the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Power reactor licensees continue to rely heavily on nuclear decommissioning projections provided by the industry consultant, Thomas LaGuardia and TLG, Inc. Furthermore, TLG continues to base decommissioning estimates on flawed and specious "Yield" studies extrapolated from small, minimally contaminated, and prematurely shutdown nuclear reactors. No reasonable, sound or prudent financial officer operating outside of the nuclear industry would accept funding formulas and that rely on so many fluid caveats and assumptions.

The wild fluctuation in the cost estimates for radiological decommissioning are attributable to the lack of actual decommissioning experience at large nuclear generating stations (over 1,000 MWe), or at plants that have operated for their full and planned lifespan. The largest commercial nuclear power plant to be fully decommissioned, Shippingport, is a 72 megawatt (MWe) light-water breeder reactor and is substantially smaller than the Susquehanna Steam Electric Station-1 & 2 (1,050 Net MWe for each unit).

Several other nuclear reactors are being prepared for decommissioning but provide little meaningful decommissioning experience that could be used reliably to predict decommissioning costs.

TLG's are specious and depend on: 1) The development of nonexistent technologies; 2) Anticipated projected cost of radioactive disposal; and, 3) The assumption that costs for decommissioning small and short lived reactors can be accurately extrapolated to apply to large commercial reactors operating for forty years.

The industry "leader", Exelon, has filed comments attesting to the imprecise and speculative nature of radiological decommissioning estimates. **(CL-02/17)**

Comment: TLG provided nuclear waste storage and nuclear decommissioning costs estimates for all Pennsylvania utilities regulated by the Public Utility Commission. However, TLG's testimony during the 1995 PP&L Base Rate Proceeding discredits their projections. Mr. LaGuardia based his cost estimates for low-level radioactive waste (LLW) disposal on the assumption that the Appalachian Compact would be available when the SSES closes. He concluded that the disposal of LLW is the most expensive component in the decommissioning formula. Furthermore, Mr. LaGuardia conceded that it may be necessary to recompute cost estimates for disposal because it now appears imminent that Barnwell will open for seven to ten years for all states except North Carolina. However, the Company has not yet taken the step of reconfiguring costs of LLW disposal now that Barnwell has been open since July 5, 1995. **(CL-02/28)**

Response: *Cost estimates are simply estimates. The adequacy or inadequacy of site specific cost estimates is outside the scope of this Supplement. Draft Regulatory Guide DG-1085, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors" and Draft NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors" contain additional information on cost estimates for decommissioning. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Experience at large commercial nuclear power plants over 200 MWe has clearly demonstrated that TLG's assumption that nuclear units will operate for 40 years, contradicts existing nuclear reactor experience.

The Company reconfirmed the 40 year assumption in the 1997 Rate Case.

Mr. LaGuardia's and Mr. Jones's acknowledgments are confirmed by empirical data contained in the GEIS. **(CL-02/19)**

Comment: Obviously, there are chronic shortfalls between "targeted" funding levels and actual costs for nuclear decommissioning. The burden of proof rests squarely on the shoulders of power reactor licensees, their partners and the NRC to demonstrate that a 40 year operating life, which they predicate their financial planning upon, is realistic. Furthermore, the nuclear industry has exacerbated this problem by resolutely refusing to put aside adequate funds for non-radiological decontamination and decommissioning. **(CL-02/20)**

Response: *NRC recognizes that each reactor that has been decommissioned or that is now being decommissioned was permanently shut down prior to the end of its expected operating life. Operating life is based on the reactor design life, i.e., on the plant remaining structurally safe for a certain period of time. For financial planning purposes, operating life is a reasonable period of time. Utilities that have decommissioned their reactor plants prematurely have done so because of political, economic, or other unforeseeable factors. Since energy planning decision factors have diverse options, decommissioning funding requirements are linked to operation for the license term. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Cost projections by "electric utilities" must be revised to necessarily include funding scenarios that anticipate premature closure. **(CL-02/27)**

Response: *The impacts of the cost of decommissioning generally occur over the life of the facility as the decommissioning fund is being collected. Most power generators are diversified and are able to continue to add funds to their decommissioning trust funds as part of their continued business. In the event that a facility shuts down prematurely, the licensee is still required to fully fund the decommissioning. Further, licensees are required to demonstrate throughout the operational period that the finances are available by one of several methods outlined in 10 CFR 50.75. The licensees submit the status of decommissioning funding to the NRC on a biannual basis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The cost estimates for non-radiological decommissioning (an imprecise term) are not mandated by the NRC. "For PECO Energy Company and ComEd, the costs for 'Greenfield' are included in the cost estimates and in the funding streams established for decommissioning." However, Greenfield, i.e. the original environmental status of nuclear generating station prior to construction of the nuclear power plant, has never been achieved by an operating nuclear generating station. Moreover, this site status is unattainable if a station is placed in delayed-SAFSTOR, DECO, or ENTOMB. **(CL-02/36)**

Comment: Since 1999, Rancho Seco has embarked on an extended DECON process scheduled for completion in 2008 (including license termination). After license termination, SMUD will, depending on its business needs, embark on site restoration currently estimated at ~$45-80 million. This approximate estimate dollar figure was never a part of the decommissioning trust fund. (We assume your number in Table 4-3 includes all the costs of dismantlement, fuel storage and non-radiological site restoration.) **(CL-18/2)**

Response: *Decommissioning activities continue until the licensee requests termination of the license and demonstrates that radioactive materials have been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed, the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC authority. As a result, activities performed after license termination (to meet other requirements, e.g., additional state requirements, are not subject to NRC authority) and the resulting impacts are outside the scope of this Supplement. Site restoration or the return of the site to greenfield conditions is specifically stated to be out of scope of the Supplement (Section 1.3, Scope). Most power generators are diversified and are able to be flexible in case of a change in plans (such as a change in decommissioning method). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: All references to Three Mile Island-2 as a "decommissioned reactor" are in error. The plant has not been decommissioned or decontaminated. TMI-2 was placed in Post-Defueling Monitored Storage in December, 1993. **(CL-02/66)**

Response: *Three Mile Island Unit 2 was not considered as one of the decommissioned reactors in the Supplement. Table 1-1 of the Supplement specifically lists activities at facilities that have been permanently shutdown by a major accident as out of scope. References to Three Mile Island will be revised for clarification.*

Comment: The GAO report also highlights several uncertainties relating to the costs of decommissioning: "Varying cleanup standards and proposed new decommissioning methods introduce additional uncertainty about the costs of decommissioning nuclear power plants in the

future. Plants decommissioned in compliance with NRC's requirements may, under certain conditions, also have to meet, at higher cost, more stringent EPA or state standards. New decommissioning methods being considered by NRC, which involve leaving more radioactive waste on-site, could reduce short-term decommissioning costs yet increase costs over the longer term. Moreover, they would raise significant technical and policy issues concerning the disposal of low-level radioactive waste at plant sites instead of in regulated disposal facilities. Adding to cost uncertainty, NRC allows plant owners to wait until 2 years before their license is terminated—relatively late in the decommissioning process—to perform overall radiological assessments to determine whether any residual radiation anywhere at the site will need further cleanup in order to meet NRC's site release standards. Accordingly, GAO is recommending that NRC reconcile its proposed decommissioning methods with existing waste disposal regulations and policies and require licensees to assess their plant sites for contamination earlier in the decommissioning process." **(CL-08/14)**

Response: *The commenter raises a number of issues that will be responded to in the approximately same order as they were asked. Cost estimates are precisely that: estimates. For the facilities that are currently decommissioning the monies available for the radiological decontamination and license termination appear to be sufficient. Once the reactor license is terminated no additional decontamination of the facility or site would be required so additional funds would not be needed (see Table 1-1 and Section 4.3.11.2). The NRC is using dose-based criteria for termination of the license. There was never the expectation that all radiological contamination resulting from operation of the power reactor would be removed from the site. Rather, the cleanup of the site would result in an acceptable dose (0.25 mSv/yr or 25 mrem/yr) to the average member of the critical group, or that group of individuals reasonably expected to receive the highest exposure to residual radioactivity within the assumptions of a particular future site use scenario. This type of site release criteria assumes some residual radioactivity onsite. This residual radioactive contamination is not waste, and therefore the site would not be considered an unregulated disposal facility. Additional requirements placed upon the licensee by State and local jurisdictions are clearly outside the scope of this Supplement. Licensees make measurements of contamination throughout the life of the plant. A systematic survey of contamination for the purposes of decommissioning most properly should be made during decommissioning. At the time of cessation of operations, the licensee knows where the majority of the contamination is located at their site. Towards the end of the decommissioning process a characterization study is performed to focus the remainder of cleanup activities and to assist in the design of the final site survey. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: If the costs of the decision to shutdown are included, then the cost of the immediate alternative, repair and continued operation, ought to be included as well as comparative environmental impact and comparative risk. **(CL-13/7)**

Response: *A licensee's decision to shut down its reactor is outside the scope of this Supplement, as is the cost to repair or refurbish a plant to keep it operating during its initial term or for license renewal. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.11.2 Potential Impacts of Decommissioning Activities on Cost correctly points out that there are many variables in decommissioning that affect cost; among them are the size and type of reactor, the extent of contamination, property taxes and so on. However the GEIS does no more than list these variables without any attempt to assign the weight which any of them contribute. The GEIS correctly points out that only three commercial power reactors have successfully completed decommissioning, but does not say that they can hardly be considered typical of those plants under and entering decommissioning. Fort St. Vrain was a modest sized plant of oddball High Temperature Gas design and decommissioned on a fixed price, loss-leader price by a large manufacturing firm; Shoreham only ran the equivalent of one full power day, and Pathfinder was a 59MWe peanut of a plant. Thus it would be instructive to look at how costs are apportioned among today's more representative plants currently under decommissioning and from this base, knowing which are sensitive to scale and which are sensitive to choice, project final costs. These costs should be broken down and compared in the GEIS. **(CL-13/15)**

Response: *The NRC does not expect that the costs of Fort St. Vrain, Shoreham, and Pathfinder decommissioning represent the costs of typical reactors currently operating. However, the decommissioning costs for Trojan, comparable to a typical operating reactor, falls within the estimated cost range. Table 4-3 provides estimates of cost associated with the decommissioning of facilities that have permanently ceased operations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Generic Environmental Impact Statement needs to specify inappropriate uses of decommissioning funds:

A. Using funds for temporary procedures, such as SAFSTOR, is inappropriate.
B. Using funds for the maintenance and monitoring of temporary procedures, such as SAFSTOR, is inappropriate.
C. Transferring funds from PSC/PUC control to licensee control is inappropriate.
D. Using funds for the temporary storage of spent fuel, such as ISFSI or PFS, is inappropriate.
E. Using funds for the settlement of bankruptcy claims is inappropriate.
F. Using funds as collateral is inappropriate.

G. All other uses of funds that do not directly result in the permanent cleanup of contaminated nuclear plant sites, is inappropriate. Since the funds were obtained as an extra fee from ratepayers for the purpose of safely decommissioning nuclear plants, all of the funds need to be used for that purpose. **(CL-14/5)**

Response: *The requirements for use of decommissioning funds are provided in 10 CFR 50.75. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements or (4) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Furthermore, the most expensive estimate should always be assumed for everything as a wise precaution. NRC lists the decommissioning costs in MILLIONS as estimated by the utilities - however, NRC WELL KNOWS THE COSTS ARE IN THE BILLIONS WHEN EVERYTHING FROM SPENT FUEL ON DOWN IS FACTORED IN, AND THAT MUST BE REFLECTED, PLUS THE NRC INSPECTOR GENERALS OFFICE SHOULD GO OVER ALL ESTIMATES MADE BY UTILITIES TO SEE HOW TRUSTWORTHY AND ACCURATE THEY ARE. **(CL-20/48)**

Response: *The NRC staff has reasonable assurance that the radiological decommissioning costs at facilities that have permanently ceased operation will be within the range of predicted amounts as described in 10 CFR 50.75. The NRC staff recognizes that there are additional costs associated with other activities including disposal of high-level waste and local requirements to refurbish a site to greenfield. Those costs are outside the scope of this Supplement, which is concerned with the radiological decontamination of the site. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Paying the full costs for long-term monitoring and isolation of radioactive wastes. Decommissioning should not end up as a new set of public subsidies for nuclear power by allowing the long-term costs (economic, health, resource, etc.) to be denied, ignored or defined away by NRC with no recourse for the local community or state and federal taxpayers that will end up with the costs by default. **(CL-48/9)**

Response: *There are no requirements for further measurement of radiation levels or long-term monitoring for those sites that have been determined to be acceptable for license termination for unrestricted use. For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are only required for sites that have residual radioactivity in excess of 1 mSv/yr (100 mrem/yr), but less than 5 mSv/yr (500 mrem/yr). These measurements are to be made by a responsible government*

entity or independent third party, including a governmental custodian of a site. Long-term monitoring and isolation following the termination of the license is specifically stated to be outside the scope of the Supplement (Table 1-1). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: NRC AND INDUSTRY FAILURE TO RELIABLY ESTIMATE THE REAL COST OF DECOMMISSIONING AND REASONABLY ASSURE THE AVAILABILITY OF ADEQUATE DECOMMISSIONING FUNDS DOES NOT JUSTIFY OR SUPPORT GENERIC TREATMENT OF ENVIRONMENTAL IMPACT STATEMENTS.

The NRC GEIS does not adequately address the historic inability by the NRC and industry to accurately assess the final and actual costs associated with decommissioning and the associated underestimation of the rate of accrual for funds set-aside by electrical utilities. The final cost for decommissioning remains highly speculative and therefore likely to continue to be significantly underestimated. As NRC has stated in the DGEIS Supplement the unavailability of adequate decommissioning funds potentially can result in delays and /or unsafe and improper decommissioning. Therefore, our organizations contend that site-specific reviews are necessary for public review and disclosure of the availability of adequate decommissioning funds assigned to an adopted decommissioning plan. **(CL-48/18)**

Response: *Insufficient decommissioning funds at time of reactor shutdown generally are not the result of inadequate cost estimates; rather, they are the result of a power generator deciding to prematurely shut down its reactor for economic reasons or other factors generally beyond its control. A premature shutdown may result in insufficient funds having been accumulated at the time of shutdown, thus preventing the licensee from beginning major decommissioning activities. In some instances, funding shortfalls have resulted in decommissioning decisions, such as choosing SAFSTOR instead of DECON as a method of decommissioning. Such decisions are made to ensure that funds can be obtained or can accrue to levels sufficient for proceeding with decommissioning. However, these delays have not resulted in unsafe and improper decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It therefore appears that 300 years of decommissioning experience without a single license termination plan approval does not suggest that NRC is prepared to treat the issue of cost to adequately decommission generically. **(CL-48/20)**

Response: *Three power reactor facilities have had their licenses terminated. In addition the license termination plan for Trojan was approved on February 12, 2001. While the process for decommissioning nuclear power facilities is now well established, the cost of decommissioning*

varies from one nuclear facility to the next. That variability is due to the major factors listed in the Supplement (Section 4.3.11.2). Cost estimates (made at the time of licensing, at 5 years before anticipated shutdown, with the Post-Shutdown Decommissioning Activities Report submittal, at 2 years following shutdown, and at 2 years preceding the anticipated termination of the license) are site-specific and provide a method of re-evaluating the decommissioning costs at various times and stages in each facility's life. The regulations to ensure the availability of decommissioning funds were originally established in 1988, and site-specific decommissioning cost estimates are required by 10 CFR 50.75 and 10 CFR 50.82. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: The Yankee Rowe nuclear power station is a clear example of the inability to accurately assess the final cost of decommissioning. Originally decommissioning estimates ran under $100 million dollars while the current expenditures are estimated to be just under $500 million for the small 170 megawatt pressurized water reactor. The Shoreham nuclear power station can not be relied upon as an accurate gauge for decommissioning costs as it never reached full power operation. **(CL-48/24)**

Comment: The cost is one thing. It was awful, very high cost [Yankee Rowe], up in the millions. I don't remember how much. **(AT-D/1)**

Response: *Cost estimates are highly variable and estimates are precisely that: estimates. As experience increases with decommissioning, improved criteria will be developed to more accurately predict decommissioning costs. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Regarding economics, the NRC needs to pay attention to decommissioning costs proposed by Georgia nuclear utilities during rate cases and other proceedings so there is not a situation created where much needed monitoring and maintenance is ignored simply because there was no regulatory attention to the real cost of decommissioning. **(AT-A/31)**

Response: *The NRC regulations (10 CFR 50.75) require licensees to establish a decommissioning trust fund for each power reactor. The amount of money required in the fund at the time of permanent cessation of operations is based on formula given in 10 CFR 50.75(c). The funds are specific for the radiological decommissioning of the facility. The staff recognizes that State rate case proceedings may provide a more detailed site specific estimate of decommissioning costs; however based on our experience to date the amount of money required by 10 CFR 50.75(c) is adequate to assure radiological decommissioning of the facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And the other is, isn't this fund built through rates, so what happens if it goes off line or even if the company is no longer billing. There seems to be a couple of vulnerabilities. **(AT-G/7)**

Response: *If a facility shuts down prematurely before the decommissioning trust is fully funded, or if it unexpectedly finds itself having to shift to a more costly decommissioning option, the facility license holder is still obligated to fund the entire cost of decommissioning. Most power generators are diversified and are able to continue to add funds to their decommissioning trust fund. To date, none of the license holders of prematurely shutdown power reactor facilities have defaulted on their decommissioning funding obligation. Bankruptcy does not necessarily mean that a power reactor licensee will liquidate. To date, the NRC's experience with bankrupt power reactor licensees has been that they file under Chapter 11 of the Bankruptcy Code for reorganization, not liquidation (for example, Public Service Company of New Hampshire, El Paso Electric Company, and Cajun Electric Cooperative). In these cases, bankrupt licensees have continued to provide adequate funds for safe operation and decommissioning, even as bondholders and stockholders suffered losses that were often severe. Because electric utilities typically provide an essential service in an exclusive franchise area, the NRC staff believes that, even in the unlikely case of a power reactor licensee liquidating, its service territory and obligations, including those for decommissioning, would revert to another entity without direct NRC intervention.*

Additionally, an NRC-licensed facility undergoing decommissioning or a site that is not under license but is undergoing decommissioning under NRC's regulations may also warrant remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (referred to as "CERCLA" or "Superfund"). These statutory provisions might become particularly relevant at sites for which funding is inadequate for cleanup. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: When, and if, spent fuel storage is increased at the above mentioned facilities, the additional upward "adjustments" will have a significant impact on decommissioning funding. This cost, which was omitted from TLG's estimate, "None of the estimates we have prepared include the cost of disposal of spent nuclear fuel" is the main contributing factor to the escalation of decommissioning costs at Yankee Rowe. **(CL-02/22)**

Response: *As discussed in Table 1-1 of the Supplement, issues related to spent fuel maintenance and storage (including costs) are outside the scope of this Supplement. Appendix D provides additional information on spent fuel. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Inflation must also be added to costs. **(CL-20/49)**

Response: *The cost estimates provided in the Supplement reflect constant dollar costs (e.g., January 2001). However, the funding assurance for decommissioning trust fund accumulation does reflect inflation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. This comment did not result in a change to the Supplement.*

Comment: Three Mile Island Alert (TMIA) and the EFMR Monitoring Group (EFMR) do not dispute the contention of "electric utilities" (I) and the Nuclear Regulatory Commission (NRC) that radiological decommissioning and radioactive waste isolation expenses are subject to change and likely to increase. **(CL-02/1)**

Response: *This comment is a statement of agreement and did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.10 Socioeconomics

Comment: Georgians for Clean Energy is also concerned about economic impacts to the local communities associated with decommissioning. Currently, according to the NRC relicensing documents on Hatch, Appling County; where the plant is located, receives an unhealthy 68 percent of its tax revenue from Southern Nuclear. Provisions for environmental staff and maintenance staff be established in perpetuity and all costs then be borne by the parent company of the licensee. The local community should not have to shoulder these costs. In the case of Appling County, after they lose their tax base, they would not even be able to remotely afford any type of monitoring. Again, it is apparent that communities are left dealing with tremendous problems and little or no resources to address them properly. **(AT-A/30)**

Response: *NRC does not require monitoring or maintenance at facilities once the license is terminated for unrestricted release. NRC acknowledges that communities typically experience a large decrease in tax revenue once a plant permanently ceases operation. However, this issue is clearly outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: J. 1 2. and Table J-3. All relevant information is provided on pages 45-46. **(CL-02/68)**

Response: *The staff does not understand the comment which was provided in bullet format. The reference to "pages 45-46" is unknown. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table J-4 should incorporate data provided in F. Nuclear Plant Valuation pages 26-27 and pages 44-45. **(CL-02/69)**

Response: *Data on impacts to local public services associated with plant closure for Three Mile Island Unit 2 (TMI-2) was included for information. Because TMI-2 closure was the result of a major accident the staff had difficulty separating out which impacts were due to plant impacts and which impacts were due to the accident and the public's perception of impacts associated with the accident. The staff concluded that the impacts on public services from TMI-2 closure were SMALL. Although, the staff recognizes that impacts on the community due to the accident were significant. Since Supplement 1 deals with plant closures not as a result of a major accident, inclusion of the commentor's information would be inappropriate. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The draft Supplement discusses the economic impacts of decommissioning, including the fact that the Barnwell Low-Level Radioactive Waste Management Disposal Facility in South Carolina, the last remaining facility to dispose almost all classifications of LLW, is scheduled to stop accepting LLW from all NRC licensees except those in the Atlantic Compact, by 2009. Id. at 4-43. Yet, decommissioning of most nuclear power reactors is not expected to occur until after 2009. The existence of the EnviroCare disposal facility in Utah, which can accept Class A wastes for disposal, mitigates the economic impact of losing Barnwell, but nuclear power plant operators still are expected to incur significant waste disposal costs. The Supplement discusses how these costs are passed on to electricity customers. The Supplement also analyzes the socioeconomic impacts of decommissioning with respect to the communities surrounding power reactors. These impacts include direct and indirect job losses, losses in tax revenues and reductions in local governments' ability to pay for public services. Id. at 4-47 - 4-53. Yet, the draft Supplement does not discuss the economic and socioeconomic impacts on the metals industries related to the release of radioactively contaminated scrap metal into the economy. **(CL-03/5)**

Comment: MIRC urges NRC to look at all of the economic consequences (i.e., lost sales, employment reductions, and losses in sales by suppliers of equipment, materials, and services to metals industries) to be incurred by the metals industries and allied sectors, as well as the losses in tax revenues to be incurred by governmental entities. **(CL-03/7)**

Response: *The Supplement assumes that licensed burial sites would be available for the disposal of all categories of low-level waste at the time burial capacity is needed. The reader correctly identifies potential problems in the future disposal of low-level waste but the staff is confident that sufficient burial capacity will be available when needed.*

Currently, licensees at power reactors undergoing decommissioning are prohibited from releasing any solid material that has any detectable contamination. A discussion on the impacts of the release of contaminated scrap metal on the scrap metal industry is highly speculative. Furthermore, the release of contaminated scrap metal is prohibited under current regulations and clearly outside the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Page. J-2, Table J-1, Impact of Plant Closure and Decommissioning at Nuclear Power Plants Currently Being Decommissioned. Maine Yankee's Post Termination Work Force should be 360 rather than 246 resulting in a Maximum Work Force Change of 121 rather than 235. **(CL-04/14)**

Response: *Table J-1 was changed to include the revised work force numbers.*

Comment: Georgians for Clean Energy is also concerned about economic impacts to the local communities. **(CL-08/15)**

Response: *Socioeconomic impacts on communities near decommissioning facilities are discussed in Section 4.3.12 of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: As we have stated in earlier comments, adequate attention to issues surrounding economic justice and the long-term negative economic implications of decommissioning plans in the community have not been thoroughly studied. Reactor sites are often contaminated and made undesirable and unsafe for future economic development. **(AT-A/40)**

Response: *The NRC acknowledges that communities typically experience a large decrease in tax revenue once a plant permanently ceases operation. However, this issue is clearly outside the scope of this Supplement. The staff believes that Section 4.3.12 adequately addresses the socioeconomic implications of decommissioning. The staff has determined that the impact is SMALL and that no site-specific analysis is necessary. With respect to future economic*

development of the site, the established site release criteria will ensure that any future use of the site is adequate to ensure public health and safety and protection of the environment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: This "revised" document also failed to adequately address and factor the socioeconomic impact of "Greenfield" on the revenue base of local municipalities. **(CL-02/34)**

Response: *The NRC is responsible for ensuring the radiological decontamination of the facility. The socioeconomic impact of "Greenfield " is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: There are changing community conditions at these reactors....Last night the Mecklenburg County Board of Commissioners approved a 4,000-plus home development by Crescent, which is, of course, Duke, around the Catawba reactor. So there are changing conditions at these nuclear power plants that deserve your attention and will not fit into any generic environmental impact statement. **(AT-B/14)**

Comment: (4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Socioeconomics - Conclusions:

> The staff concludes that shutdown and decommissioning of nuclear facilities produces socioeconomic impacts that are generic. The impacts occur either through the direct effects of changing employment levels on the local demands for housing and infrastructure or through the effects of the decline of the local tax base on the ability of local government entities to provide public services.
>
> There can be no generic measure of the socioeconomic impact of any community without an in-depth study of a number of driving variables. Nuclear plants are subject to various regulations and tax codes based on location, plant history, levels of corporate investment, composition of work force, state and municipal legislation, economic diversity, and municipal relationships.
>
> Any further cuts in tax revenues, community giving or employment levels, i.e. "SMALL 10%" or "MODERATE 10-20%", create undue economic hardships. **(CL-02/58)**

Response: *The Supplement examined the issue of socioeconomic impacts generically at facilities undergoing decommissioning activities and concluded that the impacts were generic*

and SMALL for all plants. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: In 1986, the TMI-2 defueling work force peaked at 2,000. Today less than a dozen AmerGen employees police Unit 2. **(CL-02/55)**

Response: *Table 1-1 of this Supplement specifically lists an evaluation of impacts at facilities that have been permanently shutdown by a major accident as outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Before TMI reaches decommissioning, the community has already lost 250 jobs, and over $220,000 in tax revenues. Pennsylvania is not similar to Connecticut (22) whereby the difference in pre- and post-deregulation revenues are made up by the state. These jobs and revenues are lost forever. Most local and state taxing authorities classify "Greenfield" as non-commercial, tax-paying status. Moreover, TMI and Peach Bottom are located in rural areas that are sensitive to seasonal fluctuations. Farm revenues in the 1980s were sharply down due to drought, avian flu epidemics, and an informal boycott by consumers who did not want to purchase TMI-tainted produce, dairy products, or beef and poultry. **(CL-02/59)**

Response: *Differences between pre-and post-regulation tax revenues are discussed extensively in Section 4.3.12.2. The impacts generally are proportionate with the percentage of total revenue in local jurisdictions (with rural jurisdictions generally more dependent on the lost revenues). The section notes that the impact on the community also depends on manner in which the state and locality treat the plant for tax purposes and whether the state shares the burden with local government. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The draft supplement attempts to reflect the impact of plant closure on jobs, community tax revenues, and population. The impact of reactor shutdown must be considered apart from decommissioning. The decision to shutdown, to lay-off workers, to devalue the plant for tax purposes and so on, is not automatically a decision to decommission the plant. It may be a shutdown for a long-term repair or upgrade period. Or it may be intended to mothball the facility with the decision to decommission or not delayed a decade or more. In any case, if work force reduction at shutdown is a part of decommissioning, then work force replenishment because of fuel storage or enforcement of administrative site release conditions should also be considered. **(CL-13/5)**

Response: *The impacts of work-force reduction and increase related to closure and decommissioning were handled on a net basis—the difference between the decommissioning work force and the (usually much larger) operational work force. The possibility of a long delay between shutdown and active decommissioning is specifically discussed in Section 4.3.12.3. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table J-1 Impact of Plant Closure and Decommissioning at Nuclear Power Plants Currently Being Decommissioned includes three plants that have already passed from decommissioning to license termination. Maximum work force and post termination work force figures are scant, incorrect, misleading, and more or less, useless for the purpose of gaining usable information. Maine Yankee currently has more than 400 workers on site; not 295 as listed. Without a reference date, maximum work force numbers mean what? During outages? During major repairs and retrofits? Of twenty-two plants listed, work force figures are given for only seven. **(CL-13/8)**

Response: *A footnote was added to Table J-1 to note the three plants whose licenses have been terminated. Regarding work force, the staff relies on information provided by the licensee. The staff recognizes that staffing levels fluctuate over time. The numbers were provided to give the reader some understanding of the magnitude of the changes. Table J-1 was revised.*

Comment: Table J-2 Impact of Plant Closure and Decommissioning on Population Change shows no causal relationship between closure, decommissioning and population change. Of twenty-one plant locations listed, all save two show population increases in the host county following plant closure. Did Rainer County, Oregon increase its population by 16.5 percent as an impact of the Trojan Nuclear Plant shutdown? It is even harder to credit that the impact of the closure of 65 MWe Humbolt Bay is an increase in the population of California of 25.8 percent. This may be the stupidest table ever presented in an NRC document. **(CL-13/9)**

Response: *The title of Table J-2 was revised to "County and State Population Changes During Plant Closure and Decommissioning." The population changes provided in the table are simply those that occurred at about the same time as plant closure. These were almost all increases and many were fairly substantial but did not result from decommissioning. The population increases occurred despite the effects of plant closure. However, the population increases did mitigate the effects of plant closure. The intent of the table was to show that any negative effects of plant closure on county population were not so large as to actually result in a net population decrease. Rainier County, Oregon, and Humboldt County, California, both grew for reasons independent of plant closure.*

Comment: Table J-3 Impact of Plant Closure and Decommissioning on Local Tax Revenues does not show any impacts of decommissioning activities on tax revenues there fore the table is incorrectly titled. There could be some small near term impact of decommissioning on tax revenues, for example, taxes levied on capital equipment purchased by local vendors working on decommissioning and taxes on spent fuel storage facilities. **(CL-13/10)**

Response: *The title of Table J-3 was revised.*

Comment: No effort is made to determine if marketability of local homes is increased by nuclear plant close. Marketability would determine price and ultimately impact tax-base. **(CL-13/11)**

Response: *It was not possible to isolate the effects of nuclear plant closure on marketability. There likely were three effects, which appear to be inextricably linked: (1) loss of labor force as a result of closure (reduced marketability), (2) perception of an improved environment for some people (increased marketability), and (3) other unrelated economic and demographic changes in the community (either direction). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: At sites considered for re-powering, no consideration is given to the tax worth of the re-powered site. Haddam Neck, for example, has applied for early partial site release so that the construction of a gas-fired plant may begin even before decommissioning is completed. Fort St. Vrain hosts a gas-fired plant. If impact of closure is to be considered in a GEIS on decommissioning, so then should reuse be considered. **(CL-13/12)**

Response: *Repowering is a separate decision from decommissioning and should be analyzed separately. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In Maine, utility ratepayers are entitled to share in moneys recovered from the sale of plant components and commodities, such as pipe and cable, as well as real estate and unspent decommissioning funds. While not taxes, per se, these are funds or credits added to the general public revenue. **(CL-13/13)**

Response: *Section 4.3.12.3 was modified to reflect this additional income stream.*

Comment: Regarding the loss of local tax revenues due to "decommissioning." The utility must be required to notify the local government as far in advance as possible that they will lose taxes. **(CL-20/50)**

Response: *Although the NRC staff agrees with the comment that the licensee should notify the local government as far in advance of the permanent cessation of operation as possible, a requirement to do so is not within the scope of current NRC regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The nuclear industry - the entire industry - (from nuclear plant owners to uranium enrichment plants to users of radiation for medical experiments posing as "therapy" etc) should have a tax levied on it by NRC to be paid into a special account to go towards compensating the communities. An additional tax can be levied on them yearly in the form of a small, flat fee which would help pay for the NRC and the EPA to do quarterly inspections at facilities, in perpetuity. **(CL-20/51)**

Response: *Consideration of a special "tax" to compensate local communities is outside the scope of this Supplement. NRC's core mission is public health and safety and protection of the environment with respect to the use of by-product and special nuclear material. Based on the requirements in 10 CFR Part 171, "Annual Fees for Reactor Licenses and Fuel and Material Licenses," licensees are charged fees to defray the cost of NRC's activities including inspections. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: If decommissioning is to be risk-informed and the impacts of shut down are to be considered, then the cost and environmental and risk impacts of continued operation should also be compared. Maine Yankee shutdown rather than face the costs of steam generator replacement and correction of a host of safety defects, including system-wide cable separation issues, inadequate high energy line break protection, inadequate containment volume, marginal emergency diesel generator capacity, 95 percent of fire seals defective, undersized atmospheric steam dump valves, and on and on. Haddam Neck had similar problems. Just prior to the closure of Yankee Rowe, NRC staff was arguing internally about the sanity of permitting the plant to run one more fuel cycle with a badly embrittled reactor vessel. **(CL-13/6)**

Response: *The licensee's decision to permanently cease operations is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.11 Environmental Justice

Comment: Facilities included in the NRC's review of information during preparation of the draft supplement should be able to use the NRC's conclusions on socioeconomic impacts instead of performing an additional assessment along with a license-amendment request. In Section 4.3.13, the results of the evaluation stated (page 4-56, lines 30-32) that "in the

21 decommissioning case studies observed, it is concluded that facility decommissioning should have a SMALL socioeconomic impact on low-income and minority populations." At the same time, given that populations differ near each reactor site, the staff concluded that environmental justice was a site-specific issue. The NRC should revise the GEIS Supplement to clarify that licensee of a plant that was one of the case studies can refer to the staff's assessment that this was a SMALL impact instead of having to perform a site-specific evaluation and submit a license amendment request. **(CL-01/6)**

Response: *Section 4.3.13 was revised. It cannot be concluded from the general indicators in Table J-5 that any of the specific plants would not have an environmental justice issue; rather, that it would be unlikely. Therefore, a site-specific analysis of environmental justice is necessary.*

Comment: Table J-5 fails to acknowledge that the "white" population is not monolithic. In the case of Three Mile Island a "special white population", i.e. the Amish does not utilize electricity, telecommunications, or mechanical transportation, and lives in close proximity to the plant. **(CL-02/70)**

Response: *Executive Order 12898 on Environmental Justice explicitly identifies three populations: minority, low income, and Native American. The low-income Amish would meet the criteria for consideration under the Presidential Executive Order. The Amish do not otherwise qualify as a special population group. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: 4.3.13 Environmental Justice (4.3.13.4), page 4-57, last para., last sentence. This conclusion indicates that licensees will need to provide appropriate information related to environmental justice as part of the environmental portion of the PSDAR, but it does not specify what kind of information is needed or what evaluation criterion should apply. **(CL-04/8)**

Comment: Section 4.3.13, p 4-57, last paragraph - This conclusion indicates that licensees will need to provide appropriate information related to environmental justice as part of the environmental portion of the PSDAR, but it does not specify what kind of information is needed or what evaluation criterion should apply. **(CL-05/17)**

Response: *Section 4.3.13, Environmental Justice, has been revised. The text now states that at the time of the PSDAR submittal, the staff will consider the impacts of environmental justice. The supplement does not specify the kind of information received. The staff will address information needs in an update to Regulatory Guide 1.184, Decommissioning of Nuclear Power Reactors, July 2000, and Regulatory Guide 1.185, Standard Format and Content for Post-Shutdown Decommissioning Activities Report, July 2000.*

Comment: (4.3.1 3.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS Environmental Justice - Conclusion: The NRC made the appropriate demarcation and concluded,"...the issue of environmental justice requires a site-specific analysis." **(CL-02/60)**

Response: *The comment agrees with a conclusion from the Supplement but did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.12 Cultural Resources

Comment: 4.3.14 Cultural, Historical and Archeological Resources (4.3.14.4), pg. 4-61, last paragraph in section 4.3.14.4, last sentence. This conclusion indicates that the NRC will meet its responsibilities on a site-specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees. **(CL-04/9)**

Response: *The staff's responsibilities are further described in Section 1.5. The staff is committed to conduct appropriate consultations as needed. This Supplement is not a guidance document or a review document. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-58, Section 4.3.14. EPA appreciates that, on the whole, decommissioning is not likely to affect previously undisturbed archeological resources potentially located near the facilities, but is concerned about the potential loss of these facilities as a body of engineering work. The Supplement mentions that a few facilities may be eligible for listing on the National Register of Historic Places individually and that those facilities would then be the subject of mitigation based upon consultation with the SHPO. Eventually, however, a substantial number of facilities may be decommissioned. While the facilities themselves may not be fifty years old nor require physical in situ preservation, the processes and engineering they employed may merit inclusion in the Historic American Engineering Record (HAER). The HAER is designed to provide uniform documentation standards so future scholars can look back at our achievements and study them for a multitude of purposes. Rather than make this determination on a case-by-case basis, the NRC may want to consider working with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers to achieve a programmatic agreement or other programmatic treatment for these facilities. **(CL-16/69)**

Response: *Section 4.3.14.2 was modified to include a reference to the Historic American Engineering Record. The NRC staff is considering working with the National Conference of State Historic preservation Officers on the appropriate actions to be taken for the preservation of significant historic or engineering achievement that might be applicable to a specific facility undergoing decommissioning.*

Comment: (4.3.1 4.2) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS Cultural Resources; Conclusions: The NRC properly concluded,"...the magnitude, (i.e., SMALL, MODERATE, LARGE) of potential impacts will be determined through a site-specific analysis." **(CL-02/61)**

Response: *The comment agrees with a conclusion from the Supplement for activities beyond the operational area. It did not, however, provide new information relative to the Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: One issue that needs to be factored into the equation is what happens when the object of decommissioning has been declared a historical marker, i.e. Three Mile Island-2? **(CL-02/62)**

Response: *Section 4.3.14.2 has been revised to address this comment.*

O.1.13 Aesthetics

Comment: Public opposition to a facility is not an objective criterion for determining the impact of decommissioning on aesthetics. In Section 4.3.15.2, the magnitude of potential impacts on aesthetics is described as proportional to how vigorously the plant is opposed by the host community. Opposition to a facility if frequently expressed by a few vocal individuals or groups who do not necessarily reside in the area, but who are philosophically opposed to the peaceful use of nuclear power. These individuals will continue to speak in opposition against a facility as a matter of principle, even when the facility begins decommissioning and site restoration. Since aesthetic issues are a function of each individual's perception, opposition to the facility should not be used as a criterion for assessing environmental impact. A more objective and justifiable approach would be to apply the other criteria described in this section (the facility's impact on the skyline, noise, land disturbance, traffic) or to consider recreational use, if any, in determining the magnitude of decommissioning impacts. **(CL-01/7)**

Comment: Decommissioning and decontamination tasks affect people's perception, especially when these visibly intrusive and audibly offensive activities are in close proximity to their homes and recreational areas. Peach Bottom and Three Mile Island are located next to prime water

skiing and boating areas on the Susquehanna River. Dozens of summer cabins are located less than 100 yards from TMI on Sholley. Fishing takes place on a daily basis, and Boy Scout badges are available by completing outdoor activities on Three Mile Island. **(CL-02/46)**

Response: *The staff has generically determined that the aesthetic impacts of decommissioning activities are SMALL (Section 4.3.15.4 of the Supplement). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The GEIS could have looked more closely at TMI-2, and considered the following "visual scenarios":

On August 5, 1992, GPU "declared an event of potential public interest when the Unit-2 west cooling tower caught fire." The fire lasted for ten minutes. This was the third fire at TMI-2 during the cleanup. The Department of Environmental Resources subsequently instructed GPU to dismantle the wooden paneling and waffling at the base of the cooling towers. The cooling towers now serve as a nesting ground for "fugitive" swallows. **(CL-02/64)**

Response: *The aesthetic issues that were considered in the Supplement on Decommissioning of Nuclear Facilities are of a longer term than would be considered for a small fire of short duration, such as that referred to in the comment. Any visual intrusion (such as dismantlement of buildings or structures) would be temporary and would serve to reduce the aesthetic impact of the site. The use of building structures by nesting birds would not be considered a criterion for determining aesthetic impacts. In addition, Table 1-1 indicates that activities at facilities that have been permanently shut down by a major accident are outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.14 Noise

Comment: Section 4.3.16.2 Potential Impacts of Noise from Decommissioning Activities seems to deal with noise as significant only at hearing-loss levels, however the admission is made that noise can be annoying. It can also degrade the general environment, and the aesthetic environment, lead to sleep loss, diminished creativity, and lost sales of goods and property. Where decommissioning schedules require night work, large pneumatic hammers can be heard miles distant from the site. The GEIS should also consider noise from explosive demolition. **(CL-13/16)**

Response: *Section 4.3.16 was revised. This Section discusses levels of noise that are used by government agencies to describe levels of environmental noise. In general, the noise created by decommissioning activities will be similar to noise associated with construction and*

industrial activities. This noise may be heard offsite, but because of the duration of decommissioning activities, it is unlikely that the noise associated with most decommissioning activities, will be of sufficient strength to be environmentally detectable or to destabilize the environment. Some decommissioning activities may involve demolition methods (e.g., pneumatic drills or explosives) that produce significantly higher noise levels. Use of these methods is limited to relatively short periods or isolated events during decommissioning. The environmental effects of these activities may be minimized by properly scheduling the activities, for example, by restricting the use of pneumatic drills and restricting explosives to day shift or by restricting explosive demolition during nesting season.

O.1.15 Transportation/Transportation Dose Impacts

Comment: Now, again, the document here outlines the fact that most—the major impact from radiation would be from low-level radioactive waste transport of the reactor itself, the vessel, to a low-level radioactive waste site. People living all along the waste site, primarily people living in town around that reactor, and all along the transport route along the way to—if it's South Carolina or Nevada or whatever ultimate destination this reactor vessel would have, amounts to many thousands of people, if not hundreds or thousands or millions of people. This level of human carnage cannot and should not be considered as quote, too small to be detectable. **(AT-F/7)**

Response: *Although many people may be potentially exposed to radiation during transport of radioactive materials, transportation regulations limit the dose rate from shipments including the shipment of the reactor vessel and internals, such that the dose to a given individual is very small and would represent a negligible risk to human health. The NRC is committed to preventing detrimental health impacts to the public. NRC has regulations covering the packaging and transport of radioactive material. These regulations are found at 10 CFR Part 71. NRC regulations related to exposure to the public are found at 10 CFR Part 20. In addition, the U.S. Department of Transportation and the U.S. Environmental Protection Agency have regulations to protect the public from health effects associated with radiation. U.S. Department of Transportation regulations related to transportation of radioactive material are found at 49 CFR Part 173, and the Environmental Protection Agency regulations related to radiation are found at 40 CFR Parts 190 through 194. Licensees are required to comply with these regulations during decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: VIII. TRANSPORTATION Please refer to (4.3.1 7.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Transportation - Conclusions: Please refer to the Enclosure which features articles highlighting problems with transporting spent fuel from TMI to Idaho. **(CL-02/71)**

Comment: (4.3.17.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Transportation - Conclusions: Please refer to the Enclosure which features articles highlighting problems with transporting damaged fuel from TMI to Idaho. **(CL-02/65)**

Response: *The comments refer to transporting the TMI-2 core debris resulting form the 1979 accident to the Idaho National Environmental and Engineering Laboratory in Idaho. Section 1.3, "Scope of This Supplement," specifically excludes decommissioning activities following shutdown of a facility after a major accident because they would require site-specific review. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: This section does not seem to give sufficient attention to licensees that are removing all above grade structures from the site and transporting all of the above grade concrete offsite. The volume of concrete for PWR DECON is much too low for this situation by a factor of three or four. Provided below is Maine Yankee's License Termination Plan Revision 2. This waste volume is greater than that assumed in the GEIS. However, even with the increased LLW Volume associated with the removal of all above grade concrete, Maine Yankee's estimates of public dose is still less than that assumed in the draft supplement or the 1988 GEIS because of the extensive use of rail transportation. **(CL-04/10)**

Comment: Section 4.3.17, pg. 4-68 - This section does not seem to give sufficient attention to licensees that are removing all above grade structures from the site and transporting all of the above grade concrete offsite. The volume of concrete for PWR DECON is much too low for this situation by a factor of three or four based recent experience. **(CL-05/19)**

Response: *Additional shipments of uncontaminated waste from a site in response to State or local requirements to remove all above ground structures would not affect the dose estimates to the public because the material is not contaminated. The additional shipments could result in an increase in nonradioactive fatalities due to an increase in trucking or rail accidents. However, the accident rate is so small that even a three or four fold increase in the nonradioactive accident rate would still result in a small impact. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Appendix K Transportation Impacts, pg. K-2, Table K-1 Low-Level Waste Shipment Data for Decommissioning Nuclear Power Facilities {LLW Volume for Maine Yankee is indicated as 5920 cubic meters. The Maine Yankee LTP Rev. 2 states: 31,924 cubic meters for transport and 26,920 for disposal after processing}. **(CL-04/15)**

Response: *Appendix K was changed to include the revised number for LLW volume.*

Comment: Section 4.3.4, pg. 4-14, last paragraph - This statement indicates that in most cases the number of shipments of other materials (nonradioactive materials) will be small compared to those for LLW. This is not necessarily the case for a plant that is removing all above grade facilities. However, this fact should not affect the conclusion that the air quality related environmental impacts for these activities will be small. **(CL-05/13)**

Response: *Section 4.3.4 was revised and the comparison of the amount of contaminated to noncontaminated material was eliminated.*

Comment: Page 4-68, Section 4.3.17.1. This section should address regulations governing the transportation of hazardous and mixed wastes as well as of low-level waste. **(CL-16/70)**

Response: *Section 4.3.17.1 was revised to include a reference to the regulations regarding the transportation of hazardous, mixed waste and radioactive material.*

Comment: Table 4-6 Radiological Impacts of Transporting LLW to Offsite Disposal Facilities is something of a puzzle. Waste volumes and radiological impacts in the table are much greater for the SAFSTOR decommissioning option (45,000 cubic meters/78 person-rem) than for the DECON option (10,000 cubic meters/48 person-rem). Same plant, if you let the radiation dissipate with time, you wind up with more waste. With all due respect, this makes no readily apparent sense. **(CL-13/17)**

Response: *Data on the volume of waste to be shipped and the number of shipments was obtained from licensees undertaking decommissionings. Waste volumes vary considerably from facility to facility and depend on many factors including State and local requirements for the disposal of solid waste. Rather than present the data by decommissioning option the staff revised the text in Section 4.3.17 and Table 4-6 providing potential impacts associated with the shipment of waste from a hypothetical facility. The number of shipments represents a reasonable number of shipments from a facility undergoing decommissioning and is based on existing data and projections provided by licensees. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Draft shows the awful DOT and NRC regulations for transport and radiation levels allowed page 3-14, these should be changed to be massively lower, this can be done by better shielding and more shielding and the transport of fewer assemblies per cask or fewer rods per cask, and shielding that is thick enough that anti-tank weapons would not penetrate

through to the fuel. Disguising the shipments is not an option due to the size of the casks, therefore far stricter security i.e., military escorts and the sealing off of roads ahead of transports would be a must. **(CL-20/85)**

Comment: The NRC needs to pass rules on these issues, and put out orders for more and better transport casks and vehicles. All shipments of LLW should also fall under these better packaging and shielding standards. If the NRC does not address all these issues as part of decommissioning, future generations (that means YOUR children and grandchildren) are going to die due to NRC's lack of actions today. **(CL-20/86)**

Comment: If you're going to cut apart a plant and pack it and ship it, everybody along the route is exposed to the danger and whatever is left is an exposure to the people who still live there. **(AT-D/6)**

Response: *The NRC is committed to preventing detrimental health impacts to the public. NRC has regulations covering the packaging and transport of radioactive material. These regulations are found at 10 CFR Part 71. NRC regulations related to exposure to the public are found at 10 CFR Part 20. In addition, the U.S. Department of Transportation and the U.S. Environmental Protection Agency have regulations to protect the public from health effects associated with radiation. U.S. Department of Transportation regulations related to transportation of radioactive material are found at 49 CFR Part 173, and the Environmental Protection Agency regulations related to radiation are found at 40 CFR Parts 190 through 194. Licensees are required to comply with these regulations during decommissioning. The regulations are sufficiently protective to assure the safety of the public. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. As noted in Chapter 1, the transport of spent fuel is outside the scope of this document. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Georgians for Clean Energy does not promote the idea of shipping nuclear waste all over the country. **(CL-08/21)**

Response: *The comment is general in nature and did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In addition, many reports of lost shipments of nuclear waste and materials, including fuel rods, in various parts of the country come to light, another hazard of transporting radioactive materials. **(CL-10/4)**

Response: *The only missing fuel rods known to NRC are those at the Millstone Nuclear Plant. Although the location of the two missing fuel rods has not been determined, the staff has concluded that the fuel rods were not lost during transportation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.1.16 Conclusions

Comment: It is hard to believe that decommissioning activities will have a small impact on water quality or air quality. Construction and demolition sites across Georgia, most of which do not have nuclear contaminants fortunately, contribute to the degradation of our rivers and air. How can an enormous project such as decommissioning an entire nuclear plant, which will involve the handling of nuclear contaminated materials, have a small impact? **(AT-A/34)**

Comment: We are still concerned that the NRC mistakenly poses that decommissioning activities will have a small impact on water quality or air quality. Construction and demolition sites across Georgia, most of which do not have nuclear contaminants, contribute to the degradation of our rivers and air. Georgians for Clean Energy would like to know how the NRC determined that an enormous project such as decommissioning an entire nuclear plant, which will involve the handling of nuclear contaminated materials, would have a SMALL impact or air and water quality. We have already requested a copy of the analysis that was done to make this determination, and since we have not received that analysis yet we continue to urge that the NRC make this available to the general public and us. **(CL-08/18)**

Response: *Decontamination and dismantlement of structures, systems, and components are conducted under highly controlled conditions. Impacts of construction and deconstruction activities are mitigated by best management practices. A discussion of the analysis for all the environmental issues addressed in the Supplement can be found in Chapter 4 (see 4.3.3, "Water Quality," 4.3.4, "Air Quality," and 4.3.8, "Radiological"). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: We request a copy of the analysis that was done to make this determination. **(AT-A/35)**

Response: *The staff's analysis can be found in the Supplement. A discussion of the analysis for all the environmental issues addressed in the Supplement can be found in Chapter 4 (see 4.3.3, "Water Quality," 4.3.4, "Air Quality," and 4.3.8, "Radiological"). No separate analysis is available. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Finally, considering the importance of the Great Lakes to the world and to this region, we think that the impact should be addressed specifically. It is not appropriate to lump them under a generic impact analysis. **(CH-A/10)**

Comment: Considering the importance of the Great Lakes, which represent 20% of the world's freshwater supply, the NRC should prepare a site-specific impact analysis for the 18 nuclear facilities located on the United States side of the Great Lakes. **(CL-11/2)**

Response: *The variability between a commercial nuclear plant located on the Great Lakes versus one located on the ocean, a man-made impoundment, or a river was carefully considered in evaluating the environmental impacts from decommissioning activities. The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to do a site-specific analysis before undertaking any decommissioning activity to determine whether the impacts fall within the generic envelope. If they are outside the bounds of the generic envelope, the licensee must seek approval from the NRC (see Section 1.5) The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC staff correctly concluded,"...the magnitude, (i.e., SMALL, MODERATE, LARGE) of potential impacts will be determined through a site-specific study ..." This flexible barometer should be applied to all of the above mentioned Conclusions. **(CL-02/52)**

Response: *The comment agrees with the staff's conclusions in the GEIS. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I am strongly opposed to the attempts to designate many issues as generic instead of site-specific and thus to remove these issues form public review and comment. **(CL-26/1)**

Comment: I also strongly oppose and object to the proposed supplement to the "Generic" E.I.S., and the deliberate and inappropriate exclusion of "site-specific" issues, which should be an imperative part of any analysis, for any form of an E.I.S. Supplement. **(CL-44/2)**

Comment: We are deeply concerned about the NRC's proposal to treat almost all decommissioning issues in a generic EIS rather than in an individual EIS for each plant. As we have seen in many of the licensing proceedings, nuclear plants have a wide variety of dissimilarities, even with other plants owned by the same utility and constructed by the same

companies. These differences are compounded when it comes to decommissioning as the different work plans for each plant may have considerably different impacts on workers onsite and the public offsite. **(CL-40/1)**

Comment: Labeling certain issues "generic" and making them unchallengable is a disservice to those communities and citizens around the country who may be exposed to radioactive waste during the transport and disposal process. **(CL-45/3)**

Response: *The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to do a site-specific analysis to determine whether the impacts fall within the generic envelope. If they are outside the bounds of the generic envelope then the licensee must seek approval from the NRC. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Reactor sites are often contaminated to the extent that the location is made undesirable and unsafe for future economic development. As we stated at the public meeting in Atlanta, Georgians for Clean Energy urges that site-specific studies be conducted. For example, the economy of rural Georgia is much different from that of urban New York. How can these impacts be treated generically? Some nuclear power plants are in urban settings where economic impacts could be much different that in rural areas that have little or no other major employer in the region. **(CL-08/26)**

Response: *In evaluating the environmental impacts from decommissioning activities, the staff took into consideration that there are wide varieties of types of plants, for example, size and location of plants, operating conditions, and levels of contamination. Even for those issues that are considered generic, each licensee, before they conduct a decommissioning activity, must determine that they are within the envelope of those environmental impacts. Most impacts were determined to be of SMALL significance, which meant that the impacts were not detectable in the environment or were so minor as not to destabilize or noticeably alter an important attribute of the environment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Any work on or removal of an intake/outfall structure should trigger site-specific analysis. Indeed, the Draft GEIS explains that the removal of near-shore or in-water structures could result in the establishment of nonindigenous species to the exclusion of native species.

DGEIS, 4-17. It also explains that in some cases wetlands will develop in areas where the construction of the facility alters surface drainage patterns. DGEIS, 4-18. The Draft GEIS suggests that site-specific analysis is appropriate in certain circumstances when the impact is beyond the previously disturbed area and when there is a potential to impact the aquatic environment. DGEIS, 4-19. The above examples of establishment of nonindigenous species or wetlands are exactly the types of impacts that require site-specific analysis. Yet, the site-specific analysis recommended may not cover these examples because they may occur within the previously disturbed area. **(CL-11/7)**

Response: *The comment resulted in a change to the Supplement. Sections 4.3.5 and 4.3.6 were revised. Intake/outfall structures and other SSCs that will be removed after operation is discontinued are not expected to detectably change or destabilize the aquatic environment. As stated in Section 4.3.5.2, impacts associated with removal of the intake and outtake structures are not expected to adversely affect the aquatic environment. The staff concluded that the impact to the aquatic environment for these decommissioning activities is SMALL and of short duration and no further mitigation is required. A site-specific analysis is required if there are disturbances outside of the security fences (protected areas) or the adjoining gravel, the paved or maintained landscape areas, or the intake or discharge structures (see revised Section 4.3.5 and 4.3.6). The issue of non-indigenous species, and creation of wetlands is a valid concern. The assumption in this analysis is that licensees would use best management practices to mitigate for potential impacts to areas adjacent to the intake/discharge structure.*

Comment: The evaluation of each nuclear plant site for radioactive contamination can only be done on a site-specific basis. Data of site contamination from Shoreham with zero years of operating experience cannot be compared with 33 years of operation at Big Rock Point and either of those sites can not be compared with a potential 120 years of Calvert Cliff operation or a potential 180 years of Oconee operation. Stating that, generically, all impacts of radioactive contamination from all sites are similar (P. 4-28), is simply wrong. The important concept underlying the Environmental Impact Statement for decommissioning nuclear plants is the health and safety of the public. The Nuclear Regulatory Commission Staff (NRC) is writing an EIS based on an unsupported assumption. The impacts of a nuclear plant site contaminated with radioactivity can be SMALL or MODERATE or LARGE, but the impacts are site-specific and are not similar nor generic. **(CL-14/1)**

Comment: The evaluation of each nuclear plant site for radioactive contamination can only be done on a site-specific basis. The liquid low-level radioactive waste dump for St. Lucie 1 and 2 is the Atlantic Ocean, whereas the dump for liquid low-level radioactive wastes at Turkey Point 3 and 4 is a closed cooling canal system. The northern end of the canal system, Lake Warren, is the designated dump. If the sediments of Lake Warren and the cooling canals contain levels of radioactivity above those levels that are deemed safe for unrestricted human activity, then Lake Warren is one of the "safety-related structures, systems, and components" that needs to

be decontaminated and dismantled. Lake Warren and the canals are also safety related as they function to mitigate the effects of a design basis accident by collecting and concentrating radioactive spills, dumped liquids, leachates, and site runoff. Other nuclear plants that dump their liquid radioactive wastes into closed waters will also require site-specific evaluations. **(CL-14/2)**

Comment: The evaluation of each nuclear plant site for radioactive contamination can only be done on a site-specific basis. In NUREG-0743, page 4-11, Turkey Point units 3 and 4 averaged 340 curies of radioactive solid waste per year. Twenty two years later NUREG-1437, Supplement 5, page 2-12 states that in 1999, units 3 and 4 shipped solid waste containing 834.3 curies per year, an increase of 145%, yet Turkey Point is only 47% through its potential operational life. Projections concerning the amounts of radioactivity in solid waste, gaseous waste, liquid waste, and site contamination appear to be pure guesswork with a potential operational life of 60 years per unit. For the NRC Staff to conclude that site contamination for all nuclear plant sites is generically similar and that the impacts to the human environment are SMALL, has no basis in fact. The NRC Staff needs to present the reasoning behind its projections to the scientific community for scientific scrutiny. **(CL-14/3)**

Response: *NRC staff recognizes that there is wide variability among nuclear power plants in the quantity and distribution of radioactive contamination at a specific site. One of the primary purposes of decontamination is to reduce residual activity to levels permitting termination of the license. The NRC regulations (CFR 50.82) require a site-specific license termination plan to be submitted by licensees for NRC review and approval. Part of the license termination plan submittal is a detailed site characterization study that characterizes remaining radioactive contamination. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Surface and groundwater quality, p.4-12, should NOT be considered a generic decommissioning issue - climate zone can also create unique problems, terrain likewise, it should be site-specific. **(CL-20/30)**

Response: *Variables such as climate zones were considered in evaluating environmental impacts on groundwater from decommissioning activities. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to do a site-specific analysis to determine whether the impacts fall within the generic envelope. If they are outside the bounds of the generic envelope, the licensee must seek approval from the NRC. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I support the designation of environmental justice and endangered species issues as site-specific, NOT generic. **(CL-24/3)**

Comment: I support the designation of environmental justice and endangered species issues as site-specific (not generic) and designation of rubblization as site-specific. **(CL-25/6)**

Response: *The comments are supportive of conclusions in the Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: ...what a sham it all is, and how industry writes it's own ticket. For example, p. xii, [xiii] the Commission has concluded (says the Commission) that impacts that do not exceed permissible levels in the Commission's regulations are considered small. **(CL-20/5)**

Comment: Two site-specific environmental issues were identified, threatened and endangered species and environmental justice, with four other issues listed as quote, conditionally site-specific. That is ludicrous. **(AT-A/21)**

Response: *The comments are not specific, did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I also utterly oppose making most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites. **(CL-33/14)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC makes most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites. **(CL-43/8)**

Response: *There are several methods by which the public can formally raise issues related to decommissioning. If the licensee has requested an action requiring a license amendment, then the process for intervening in this action is by requesting or participating in a hearing. The process is set forth in NRC's regulations in 10 CFR Part 2, Rules or Practice of Domestic Licensing Proceedings and Issuance of Orders. If the action of concern does not involve a license amendment, any member of the public may raise potential health and safety issues in a petition to the NRC to take specific enforcement action against a licensed facility. This provision is contained in the NRC's regulations and is often referred to as a 2.206 petition in reference to its location in the regulations (Chapter 2, Section 206 of 10 CFR). Additionally, the*

licensee is required to submit a license termination plan (LTP) for NRC review and approval approximately two years before anticipated license termination. The LTP is submitted as an amendment to the facility license. As such, interested members of the public can request intervention in the amendment process. The request for intervention could lead to an adjudicatory hearing. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: "Site specific" issues are of vital importance, especially at San Onofre Nuclear Generating Station (SONGS) where Unit 1 is currently being decommissioned. It is imperative that NRC evaluate and analyze SONGS Decommissioning on a "site-specific" basis instead of a "Generic" basis, due to the very unique physical site characteristics at SONGS, which other existing nuclear plants in United States do not possess. The distinctions, and physical characteristics which make conditions at SONGS so different and unique are vitally important, and are of utmost importance in any analysis of Decommissioning at SONGS, in order to ensure the level of public health and safety will be assured, and provided without compromise to citizens in communities surrounding SONGS. As SONGS Unit 1 is currently being Decommissioned, the site-specific analysis must include both short-term and long-term effects, and must also analyze effects of offsite contamination, effects of cumulative contamination and exposure, and must provide realistic mitigation measures. A Summary of the "site-specific" physical characteristics and conditions at SONGS, which should justify "site-specific" analysis (as opposed to a Generic E.I.S. Supplement) include the following: - SONGS is located in a highly populated area, with dense populations in both Orange County and San Diego County, where citizens may be exposed to potentially significant offsite effects. - SONGS is located in a highly active seismic zone, where seismic activity is speculated by some geological experts to generate quakes up to 7.6 Magnitude on the Richter Scale (by new evidence of local off-shore blind thrust faults, which cause a greater extent of groundshaking and acceleration than the manner in which quakes are traditionally studied). SONGS was only designed and constructed to withstand a maximum quake of 7.0 Magnitude. - SONGS is located in an area immediately on the southern California coastline, with most facilities elevated only to a level of 20 ft. above mean sea level. These facilities are highly exposed and vulnerable to effects of rising sea levels, and tsunamis, and are insufficiently protected. **(CL-44/3)**

Response: *NRC staff recognizes that there is wide variability among nuclear power plants. However, based on the results of our analysis, the impacts resulting from decommissioning are similar regardless of plant characteristics, including site-specific information from San Onofre. The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to do a site-*

specific analysis to determine whether the impacts fall within the generic envelope. If they are outside of the bounds of the generic envelope, the licensee must seek approval from the NRC. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: (4.3.10.3) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Costs - Conclusions: TMIA and EFMR object to the absence of a Conclusion in this section. **(CL-02/56)**

Response: *As stated in Section 4.3.11, "Cost," an assessment of decommissioning cost is not required by NEPA; however, for completeness the staff included an analysis of decommissioning cost in the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: We contend that decommissioning practices on nuclear facilities and its environmental impacts as major federal actions must be conducted under public review with full disclosure and documentation of the amount of radioactivity, the location of residual contamination and the types of radioactive contamination that remain onsite and offsite and are subject to site-specific public hearings. **(CL-48/3)**

Response: *NRC has determined that decommissioning is not a major Federal action. NRC chose to update the 1988 GEIS to further the purposes of NEPA (see Section 1.1, "Purpose and Need for This Supplement"). With the exception of some physical security activities and requirements, all NRC activities associated with decommissioning are conducted in a manner that assures full public disclosure. If the licensee has requested an action requiring a license amendment, then the process for intervening in this action is by requesting or participating in a hearing. The process is set forth in NRC's regulations in 10 CFR Part 2, "Rules or Practice of Domestic Licensing Proceedings and Issuance of Orders." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The primary reason I am submitting the following comments is to urge the Nuclear Regulatory Commission to maintain its commitment to study the operating history and resulting contamination of each reactor on a site-specific, not generic basis - in its effort to design appropriate decontamination and decommissioning requirements for each site. Only in this way can there be any hope of achieving the requisite, long-term isolation of the contaminants from the human environment. **(CL-51/1)**

Response: *NRC takes a serious and specific overview of the decommissioning of each site. The contamination levels of each site are looked at on a site-specific basis by the NRC regional inspectors throughout the decommissioning process and again during the license-termination phase, when the licensee is required to submit a site characterization showing the amount of contamination that remains on the site. See the explanation in revised Section 3.3.3. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I am very strongly opposed to the regulatory changes sought by NRC to further relax decommissioning requirements for nuclear power reactors, as proposed by the 1998 "Generic" E.I.S. on Decommissioning Nuclear Facilities (NUREG-0586), with new "updated" information on nuclear power reactor decommissioning. The Proposed regulatory changes sought by NRC are an insult to the public interest. **(CL-44/1)**

Comment: The only rules changes that I want to see until spent rods are removed to Yucca Mountain are to stricter rules. **(CL-25/2)**

Response: *The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.2 NRC Experience, Role and Regulations

O.2.1 NRC Experience with Decommissioning

Comment: We're familiar with some of the decommissioning models that they, NRC, are using. Believe me, Yankee Rowe, Connecticut Yankee and Maine Yankee are not good models for anyone to follow for subsequent decommissioning. **(AT-B/10)**

Response: *Overall decommissioning of Yankee Rowe, Connecticut Yankee, Maine Yankee and Haddam Neck have been conducted safely and without endangering the public. Applicable lessons learned at these and other decommissioned sites are evaluated for subsequent decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And so much of what is in this document depends on the skills and the experience level, which are lacking, because decommissioning is new, just like plutonium fuel is new. NRC does not know what it's doing, the people who are on these reactor sites don't know what

they're doing and so if safety depends on human capability, it does too much by the way in this document, then you know, that's not very reassuring and I'm glad I've got the last word. **(AT-B/22)**

Response: *Since the 1988 GEIS was written, the NRC and the industry have gained over 200 facility-years' worth of additional decommissioning experience. This Supplement addresses new decommissioning technologies and approaches that the 1988 GEIS did not address. Decommissioning work is typically done by experienced contractors in conjunction with staff who have worked at the plants and are very familiar with the facilities. The operations associated with decommissioning are also similar to those performed during routine maintenance or major system replacements, which have been carried out routinely since the plants began operating. In addition, all commercial reactor fuel contains some plutonium at the end of its life cycle, so handling the material is not a new experience. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The GEIS stated, "Based on the number of reactors shut down and the date that they permanently ceased operations, over 200 facility-years' worth of decommissioning experience have accumulated since the 1988 GEIS." (Executive Summary, xi). However, based on this statement, and NRC's inability to grasp the "exponential nature" of radiological decommissioning estimates, it appears that the Commission has had the same experience 200 times. Moreover, the GEIS's sophomoric tone in declaring vast decommissioning experience is similar to the NRC's rhetoric at the time of the 1988 GEIS. On May 26, 1988, in Harrisburg, Pennsylvania, the Commission confidently stated they have "considerable experience [decommissioning] with reactors that have not had a significant accident before the end of their useful lives." **(CL-02/18)**

Response: *The staff believes that there is significant value in 200 facility years' worth of decommissioning experience. The staff is not aware of the concept of the "exponential nature" of radiological decommissioning estimates. The staff endeavored to write the Supplement using plain language that would be understood by a wide audience, despite the highly technical nature of the subject. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The fact is that decommissioning has a long and significantly checkered regulatory history. The draft supplement to NUREG-0586 does not address or acknowledge these repeated oversight failures including numerous decommissioning experiences where licensees did not adequately decontaminate their facilities. These failures include but are not limited to: the NRC does not know the types, amount and location of buried radioactive waste at some of its decommissioned facilities; -many licensee decommissioning records are nonexistent or

incomplete; -ground water contamination is higher than federal drinking water standards allow and-the long standing failure of the responsible federal regulatory agencies to prevent and prohibit radiation contamination that can remain after the NRC terminates a nuclear facility license. (The Environmental Protection Agency is on record requiring more protective cleanup levels than NRC, evidence that NRC's requirements are inadequate.) **(CL-48/5)**

Response: *This Supplement updates information provided in the 1988 GEIS by considering decommissioning experience gained since 1988 and changes in the U.S. Nuclear Regulatory Commission regulations and, where appropriate, other agency regulations. This Supplement is intended to be used to evaluate environmental impacts for facilities currently undergoing decommissioning and those that will decommission in the future. The four "failure areas" identified in the comment above are addressed in detail during the licensee's site-specific, license termination plan review. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: While the Executive Summary of NUREG-0586 Supplement 1 claims that the NRC and the industry have over 300 years of decommissioning experience with 22 nuclear reactor facilities permanently shut down, the fact remains that the process is still relatively new and NRC has yet to complete a single radiological decommissioning operation to a license termination plan for a typical large United States commercial reactor that operated for any significant length of time. As stated by Mr. Michael Masnik with the NRC at the Public Scoping Meeting on Intent to Prepare Draft Supplement To Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities in Boston, Massachusetts, May 17, 2000 with regard to a question on how many license termination plans have been accepted by NRC, he responded, "none have resulted in a license termination." **(CL-48/19)**

Response: *The commenter is correct that not a single license has been terminated under the Commission's 1996 revised regulations. The NRC has, however, terminated three licenses at three facilities: Shoreham, Ft. St. Vrain, and Pathfinder. None of the decommissioning challenges facing licensees of reactors that are currently undergoing decommissioning are substantially different from those experienced by the industry in the past 50 years. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Although the NRC claims numerous successful decommissionings of nuclear sites, few large-scale reactors that operated for decades have completed successful decommissioning. Decommissioning remains experimental. Resources and time required for decommissioning a site have been routinely underestimated. More importantly, worker doses have been repeatedly underestimated. Safe decommissioning is about radiological control and the need to limit exposures to the workers. Nuclear corporations have failed to do this because of

inexperience and a lack of enforcement by the NRC. With over 100 nuclear reactors yet to be decommissioned in this country, cutting decommissioning exposures by 200-300 person-rem per reactor will reduce the nation's nuclear work force exposures by 20,000-30,000 person-rem. **(CL-50/12)**

Response: *Trojan, Maine Yankee, and Haddam Neck are a few examples of large-scale reactors that operated for decades and are successfully undergoing decommissioning with worker radiological exposure levels at or below estimates. This is discussed in Table F-1 of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Nor does the NRC have any experience decommissioning nuclear power plants that used plutonium bomb fuel, also known as mixed-oxide fuel (MOX). **(CL-08/9)**

Response: *None of the plants being decommissioned or operated at this time have used MOX fuel. The use of MOX fuel is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.2.2 NRC Role

Comment: [There is a] discrepancy or debate between the EPA and the NRC standard for site cleanup or license termination and I think that has been an obstacle to public understanding and acceptance of decommissioning. While it's not unexpected, if you gave two different regulators authority over the same activity that they might develop different approaches towards regulating that activity—and in fact that is the case....The reality is, as was noted in a GAO report on the EPA and NRC standard, that the results actually are very similar, of the two approaches, that they both protect public health and safety....In other words, you can leave more radioactivity behind under the EPA standard, by the way it's designed, for light water reactors than you can under the NRC standard. **(AT-E/2)**

Comment: Former Senator John Glenn and the General Accounting Office announced in November 1994, that it is time for the Environmental Protection Agency (EPA) and the NRC to coordinate radiation protection standards which are based on risk-assessment. Eight years later, the agencies have been unable and unwilling to settle their conflicting regulatory standards. As it stands, how would the nuclear industry determine what levels constitute "Greenfield?" Worker exposures remain decidedly liberal. The Commission has already approved a 1-in-285 lifetime cancer, or 100 mR/year and rejected the Staff's recommendation of 3 mR/year of residual radiation. **(CL-02/37)**

Response: *EPA and NRC have elected to establish separate radiation dose criteria for licensee termination. Licensees must meet the NRC criteria for license termination in order for NRC to terminate their reactor license. The NRC staff is working with EPA to resolve any differences in site release criteria. The commenter is correct in that either standard is sufficiently protective to assure public health and safety and protection of the environment after termination of the license. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Within the same paragraph it talks about the non-radiological impacts following license termination that are related to activities performed during decommissioning are considered in this supplement. We are considering in this supplement the non-radiological impacts following license termination, not the radiological impacts after a license termination. This is a radiological device, a nuclear reactor. I cannot understand how that could even be in the executive summary to describe the document which is under review. **(AT-F/1)**

Response: *The radiological consequences occurring after termination of the license were considered in the NRC staff's environmental assessment of the rulemaking that established the criteria for license termination. That assessment is contained in the Environmental Impact Statement found in NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." No environmental assessment of the nonradiological impacts occurring after license termination associated with the decommissioning process for power reactors exists prior to this Supplement. Such impacts are considered in the Supplement for completeness. Hence, post-license nonradiological impacts are considered in this Supplement, and radiation-related consequences are excluded. See Section 1.2, "Process Used to Determine Scope of This Supplement." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In this Supplement, the NRC fails to consider whether it has the statutory or regulatory authority to terminate a license that allows for unrestricted site use with residual contamination present on site or to terminate the license with restricted site use in an Agreement State. **(CL-17/5)**

Comment: We request that licensees undergoing or planning decommissioning require a new environmental assessment. **(AT-A/22)**

Comment: The Final GEIS should directly indicate that licensees must obtain all necessary environmental permits prior to beginning the decommissioning process. Omitting this information may imply that the compliance with the requirements of this GEIS is adequate. **(CL-11/15)**

Comment: I am violently opposed to the Nuclear Regulatory Commission's proposal to further relax its decommissioning requirements for nuclear power reactors. This is nothing but a sellout to the nuclear industry--which puts citizens at risk--with no recourse in case of liabilities. This is wrong and dangerous. **(CL-21/1)**

Comment: I am appalled at the NRC's draft of decommissioning requirements for nuclear power reactors. The requirements should be made stricter not more relaxed!!!!!!!!!!!! **(CL-24/1)**

Comment: I strongly object to the proposed changes to the decommissioning rules. We have recently become more sensitive to the rules governing nuclear power plants, even their decommissioning. Since these proposals were begun before September 11, I hope and expect that they will be dead on arrival at the Commission. **(CL-25/1)**

Comment: I urge you to stop any further relaxing of nuclear power reactor decommissioning requirements. **(CL-32/1)**

Comment: In setting requirements for decommissioning United States nuclear power reactors, please bear in mind other things besides the needs of Richard (Enron) Cheney, Halliburton Inc., Brown & Root, and other powers that be. **(CL-33/1)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow NRC to redefine terms to avoid local, site-specific opportunity by public to question, challenge and prevent unsafe decommissioning decisions. **(CL-44/9)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow (with this supplement), NRC to legally justify removal of existing opportunities for community involvement and for legal public intervention until after the bulk of decommissioning has been completed, including activities as flushing, cutting, hauling and possible rubblization of reactor. **(CL-44/11)**

Comment: In conclusion, it is with utmost disappointment to again observe with each and every new NRC rulemaking, important components of the public's existing "right to know" and the public's right of active involvement in plant processes, decisions and their methodology, on all aspects of decommissioning activities routinely appears to be further diminished. As proposed, the EIS (Supplement 1) would eliminate all opportunities for public intervention, and public oversight and/or intervention entirely with use of a "generic" EIS. In such cases, the loss of public oversight and intervention on projects with a scope as large as decommissioning at SONGS, such losses may be unparalleled, or fully understood without a site-specific issue analysis. The citizens in local communities surrounding nuclear plants such as SONGS deserve this entitlement, and demand this entitlement. **(CL-44/14)**

Comment: CAN requests the NRC restore distinct categories between reactor operations and cessation and that the Possession Only License should be reinstated. It affords citizens the possibility for a hearing prior to reactor decommissioning. The opportunity for a hearing must not be withdrawn by the Commission. The hearing is essential for communities to participate in matters that vitally effect them. To offer a hearing at the termination of the license rather than at the cessation of operations sets aside meaningful citizen participation. **(CL-50/6)**

Comment: The relaxation of regulatory control is also evident throughout this draft volume. Decommisioning is the final chapter for the agency in its relationship to a given site and license. **(CL-52/23)**

Comment: We also advocate for sound, systematic policymaking regarding decommissioning. **(AT-A/9)**

Response: *The Supplement does not eliminate opportunities for public intervention. Opportunity to intervene is specified by regulation at 10 CFR Part 2. This Supplement is a Generic Environmental Impact Statement that evaluates impacts from the decommissioning process. It does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Surely the most surprising and disturbing pronouncement in the "Draft Supplement" appears on page 1-7: "The decommissioning process continues until the licensee requests termination of the license and demonstrates that radioactive material has been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed, the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC regulations." (p. 1-7; emphasis added). **(CL-51/24)**

Response: *The comment is not specific and the NRC staff is unable to determine what is surprising or disturbing about the statement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: GEIS does not consider the give and take between the federal government and the agreement states as to who really has the authority to say that yes, you can entomb a reactor. And from the State of Illinois' perspective, it's not you folks, it's us. Because what you are proposing in this GEIS as an allowable decommissioning option is the disposal of low-level radioactive waste. **(CH-C/10)**

Response: *The NRC is currently considering the development of changes to its regulations pertaining to the entombment option for decommissioning nuclear power plants, as discussed in Section 3.2.3 of the Supplement. This comment relates to a future rulemaking process. It is considered out of scope for this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: This only relates to the nuclear power stations, but in previous NRC federal register notice, they specifically asked whether or not entombment should be allowed for non-reactors as well. In terms of authority as it relates to those federal acts, you know, there's no talk here in this GEIS about consultation with regional compacts. I see your GEIS as not addressing those issues in terms of, again, authority as to who can really say something can happen. **(CH-C/12)**

Response: *The Supplement is limited (see Section 1.1) to considering the environmental impacts of decommissioning reactor facilities that were licensed by the NRC for commercial power production. In October 2001, the Commission published for public comment an Advance Notice of Proposed Rulemaking (ANPR) on entombment options for power reactors (66 FR 32551). The rulemaking process encourages and involves the public and other stakeholders, including states, to make comments and recommendations on the rulemaking effort. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:] Regulatory Ambiguity. **(CL-02/10)**

Response: *Regulatory ambiguity is outside the scope of this Supplement. The Supplement does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC, once again, has missed an opportunity to constructively participate in solving the nuclear decommissioning riddle. Radiological decommissioning requires interagency cooperation among federal, state, and local shareholders. **(CL-02/15)**

Response: *The process followed by the NRC staff includes opportunity for cooperation on all levels. Public meetings are held during the decommissioning process to which States and local shareholders are invited to comment. In both cases, the NRC publishes notifications of the meetings in the Federal Register and in local media, and the meetings are held in the vicinity of the power plant to encourage local participation. Representatives from other Federal agencies*

and State and local governments are invited to attend. Amendments to the license also require NRC interaction with State officials. Comments and questions may also be submitted in writing to the NRC project manager of the facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: What legislation or regulations are in place to compensate communities, such as fisheries, farmers, etc. in cases of releases or accidents during or after decommissioning? **(CL-08/30)**

Comment: If the NRC is confident--as its supplementary changes to NUREG-0586 suggest--that onsite and offsite radioactive contamination during decommissioning and afterward will be minimal, why does it seek to remove all liability from the owner even before the process is complete? (If the NRC is wrong, who will pay?) **(CL-36/2)**

Response: *Licensees are required to maintain insurance coverage as part of the Price-Anderson system in the event of accidents. The level of coverage is commensurate with risk and risk changes as the plant status changes from an operating status to a permanently shutdown status. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC should be required to expressly approve a post-shutdown decommissioning activities report ("PSDAR") before a licensee initiates decommissioning activities. Otherwise, the licensees have little incentive to perform a rigorous analysis of whether their decommissioning activities fit within the envelope of environmental impacts set forth in the GEIS. Instead, they will likely assume they fit within the guidelines when they prepare their PSDAR. Moreover, a formal approval process should incorporate more opportunity for public input. **(CL-11/14)**

Response: *The primary purpose of the PSDAR is to inform the public and the NRC of the licensee's plans for facility decommissioning. NRC staff conduct an inspection to verify the licensee's basis for concluding that the potential impacts of the proposed decommissioning fall within the bounds of previously issued environmental assessments. The results of that inspection are included in an inspection report, which is available to the public. However, the regulations do not require the NRC to review and approve the PSDARs. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC should reevaluate their legal standing in deciding what radioactive material would remain at a reactor site located in an Agreement State and whether their proposed action would be contrary to the waste management policies of the applicable compact. **(CL-17/12)**

Response: *Low-level waste would not be left behind after license termination. Any radioactive contamination left behind after license termination must meet the License Termination Criteria given in 10 CFR Part 20, Subpart E. Materials that cannot meet these criteria are considered to be low-level waste and would have to be disposed of at a licensed low-level waste facility before the license could be terminated. Therefore, any radioactive material remaining onsite after license termination would not be considered radioactive waste. This Supplement does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC should add a 10% surcharge to any calculated fees for decommissioning to help cover those costs that are unforseen which may arise.[It is absurd that NRC states that "decommissioning activities do not include the maintenance, storage or disposal of spent nuclear fuel, or the removal and disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license..... they are not considered as a cost impact because the licensees are not required to accumulate funds for these activities." (See p.4-42).The licensees must be held responsible and accountable for everything about and on the site and generated by the site past, present and future.] **(CL-20/44)**

Response: *NRC's role is not to levy taxes on licensees. The NRC's regulations requiring establishment and funding of the Decommissioning Trust Fund (10 CFR 50.75) provides adequate funds necessary for the safe radiological decontamination of the facility. NRC's responsibilities are limited to the radiological decontamination of the facility. The oversight of any onsite surplus structures, after the termination of the license, is clearly outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And of course they must pay for the "spent" deadly radioactive fuel storage at the sites, whether in pools or casks at ISFSI's and the maintenance and upkeep and security and waste handling and fire prevention and similar. This MUST be addressed as past as part of this decommissioning, it must be incorporated. **(CL-20/45)**

Response: *All issues related to spent fuel maintenance and storage, including costs, are outside the scope of this Supplement (see Section 1.3). Appendix D provides additional*

information on spent fuel. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: NRC seems to have ignored it in this Draft also. This is an important health and also environmental issue that cannot be ignored.[NRC MUST MAKE LICENSEES, CONTRACTORS, SUBCONTRACTORS AND ANYONE WHO WORKS ON DECOMMISSIONING TAKE THE EFFECTS OF RADIOACTIVE "DAUGHTER" PRODUCTS INTO CONSIDERATION AS THEY MAY HAVE VERY DIFFERENT PHYSICAL, CHEMICAL AND RADIOACTIVE PROPERTIES THAN THE RADIOACTIVE "PARENT." THIS MUST BE PART OF DECOMMISSIONING STANDARDS.] **(CL-20/53)**

Response: *Decay products ("daughter" products) are included in the dose assessments. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: HOW ABOUT TESTS BEING RUN BY THE NRC ON THE SITE. HOW ABOUT INTERVIEWS WITH LONG TIME STAFF CONCERNING PAST PROBLEMS THAT COULD BE ENCOUNTERED? **(CL-20/66)**

Response: *Radioactive contamination will be detected during the final radiation survey and will be reduced to the level necessary to allow license termination. NRC staff will either oversee the final radiation survey or conduct independent surveys of the site and environs. The licensees are required by 10 CFR 50.75 to keep records of information during the operating phase of the facility that would be used to identify where any spills or other occurrences involving the spread of contamination would be located. During site characterization, licensees routinely interview former and current staff to uncover any past occurrence of radioactive spills, contaminants, or other events that may affect decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: You must not remove license amendment requirements when changing from an operating license to a nuclear materials possession-only license. **(CL-25/10)**

Comment: There should be a requirement for a license amendment when a utility changes from being a nuclear power operating license to a nuclear materials possession-only license. **(CL-39/5)**

Comment: The NRC must retain regulatory control of the entire site. The NRC must require a LICENSE AMENDMENT when an owner is granted a change from an operating license to a materials-possession-only license. **(CL-36/4)**

Response: *The regulations do not allow the reactor licensee to have a "materials-possession-only license." The operating license is maintained until decommissioning is complete and the criteria for license termination are met. The NRC retains regulatory authority over the licensee and site as long as the licensee possesses a license. This Supplement does not establish or revise regulations, impose requirements, provide relief from requirements, or provide guidance on the decommissioning process. The NRC staff believe that these comments are in fact directed at rule changes that occurred in 1996 in which the NRC revised its regulations by the Commission's notice and comment rulemaking process. The public had several opportunities during the rulemaking process to comment on and influence the development of the revised regulations. The basis for the current regulations and a summary of the current regulations are given in Sections 2.1 and 2.2 of the Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no opportunity for public challenge or adjudicatory processes.) **(CL-43/11)**

Comment: I also utterly oppose removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license, thereby eliminating the opportunity for public challenge or adjudicatory processes. **(CL-33/17)**

Comment: NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no opportunity for public challenge or adjudicatory processes.) **(CL-48/46)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no opportunity for public challenge or adjudicatory processes.) **(CL-26/13)**

Response: *There are two public meetings required by the regulations during the decommissioning process. The first occurs before the major decommissioning activities begin, when the post-shutdown decommissioning activities report is submitted. The second takes place when the licensee submits a license-termination plan, which describes how the site will be returned to a condition that makes radiological controls no longer necessary. In both cases, the NRC will publish notifications of the public meetings in the Federal Resister and in local*

media. The meetings are held in the vicinity of the power plant to encourage local participation. Normally, a license amendment request allows for an opportunity for a request to intervene, which could lead to a hearing. However, the regulations do not allow the reactor licensee to have a materials possession-only license. Therefore, there has not been, nor can there be a license amendment. The comments did not provide new information and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Decommissioning should not be a final opportunity for the nuclear industry to "take the money and run" - be it to make a profit from inadequate cleanup and monitoring, or to limit losses from costs that had been underestimated for decommissioning throughout the operating lifetime of the nuclear reactor. **(CL-47/8)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. The NRC's regulations ensure that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner and that adequate licensee funds will be available for this purpose (10 CFR 61.61). It has regulations regarding the methods used to reasonably ensure that funds will be available to decommission the facility, but it does not regulate how the funds are to be raised. The particular licensee that holds the license for the facility pays for the decommissioning. Disposition of remaining funds after license termination are outside the scope of this Supplement and NRC's purview. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Our organizations continue to assert that NRC is deferring its regulatory responsibility of radiological decommissioning to facilitate a cost driven utility self assessment through an expedited decommissioning licensing process and by restricting a duly promulgated public hearing process for affected communities as embodied under the 1988 law. **(CL-48/2)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. The NRC's regulations ensure that decommissioning of all nuclear facilities will be accomplished in a safe and timely manner. The decommissioning regulations published in 1996 supercede those promulgated in 1988. The changes in the regulations were made through an established notice and comment rulemaking process, which allowed for public participation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: CAN believes that streamlining the process for nuclear corporations and setting aside NRC requirements abdicates the responsibility to protect the health and safety of the workers, the public, the environment, and violates citizen due process. Nuclear power

generators should not be given broad discretionary powers to regulate themselves, which this Draft proposes. Protecting public and worker health and safety and the environment must remain the NRC's mission. **(CL-50/5)**

Response: *The mission of the NRC is to regulate the nation's civilian use of by-product, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. To accomplish this mission, the NRC staff must ensure that the decommissioning of all nuclear reactor facilities is accomplished in a safe and timely manner and that adequate licensee funds will be available for this purpose. The NRC has promulgated regulations which must be followed by licensees in the construction, operation, and decommissioning of power reactors. The licenses for power reactors in the United States continue throughout decommissioning, and licensees must comply with the NRC regulations and conditions specified in the license. In 1996, the NRC changed the regulations pertaining to the decommissioning of power reactors. The NRC revised its regulations by the Commission's notice and comment rulemaking process. The public had several opportunities during the rulemaking process to comment on and influence the development of the revised regulations. The NRC did not, as the commenter suggests, set aside NRC requirements, abdicate its responsibility to protect health and safety and the environment, and violated due process, but instead adopted new regulations after the appropriate notice and comment rulemaking. Supplement 1 provides no licensees of power reactors with "broad discretionary powers to regulate themselves." The Supplement does not establish or revise regulations, impose requirements, provide relief from requirements, or provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Given the repeated and serious exposure of workers during decommissioning of reactor sites, an onsite NRC inspector should be required throughout decommissioning to protect worker health and safety. **(CL-50/22)**

Response: *The NRC disputes the statement that there have been repeated and serious worker radiation exposures during decommissioning of reactor sites. Worker contamination has been infrequent and individual worker doses have been well within Federal standards. Rather than stationing a resident inspector at the site during the entire decommissioning process, the NRC will provide subject-matter experts to cover specific activities occurring at the site. For example, if the licensee is planning to remove a large component, the NRC might send, at appropriate times, an expert in radiation protection, an expert in heavy lifting and polar cranes, and an expert in packaging radioactive waste. Inspections are performed by the NRC headquarters staff and NRC regional personnel. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Concerns and unknowns about the decommissioning of nuclear power plants started many years ago. In January 1975, for example, Sheldon Meyers, as director of the EPA's Office of Federal Activities, included the following observation about the Callaway plant's draft environment statement: "The section in the draft statement regarding decommissioning of the plant indicates the plant site may require long-term surveillance after being shut down. This section should be expanded to provide an estimate of the length of the surveillance time and the length of time the land must stand unproductive. It should also identify who will be responsible for the surveillance activity and who will incur the cost." (Published by the NRC in March 1975; p. A12, emphasis added.) Why has no one answered these concerns prior to now? Or are there no credible answers? **(CL-51/26)**

Response: *Current regulations require continued surveillance at commercial power reactors after permanent cessation of operation. Such requirements are similar to those at operating plants. The NRC's environmental impact statement, NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," was prepared in support of the rulemaking effort that established the site-release criteria. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Failure of NRC regulatory control to require that the radioactively-contaminated materials and wastes remaining at a reactor site post-closure will not be released into the biosystem – as described in this document and in NRC regulations—constitutes a serious violation of the provisions of the Atomic Energy Act, as amended, Chapter 1, and of the National Environmental Policy Act. Any such decisions by the NRC are therefore arbitrary and capricious, and contrary to both the AEA and NEPA. **(CL-52/4)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. The NRC reviews and inspects the environmental programs to ensure that the requirements related to radioactive releases into the environment are consistent with the regulations. Any remaining onsite radioactive material attributable to plant operation and decommissioning must meet the stringent site-release criteria set forth in 10 CFR Part 20, Subpart E. The staff has determined that any remaining radioactive material after license termination will not pose a threat to public health and safety. The staff's analysis is presented in NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," prepared in support of the rulemaking effort that established the site-release criteria. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In practice, in the decommissioning of reactors the NRC's Decommissioning Rule has both allowed release into the environment of radioactive materials and wastes and disallowed members of the affected public from an opportunity for adjudicatory hearings in advance of decommissioning activities. **(CL-52/5)**

Response: *Nuclear power plants were licensed with the expectation that there would be routine releases of radioactive material to the air and water due to normal operations. The releases are limited to levels that ensure public health and safety. There was never the expectation that this material would be completely removed from the site or surrounding environment prior to license termination. Any radioactive materials remaining onsite that are attributable to plant operation or decommissioning must meet the stringent site release criteria set forth in 10 CFR 50.20, Appendix E. The staff has determined that any remaining radioactive material after license termination will not pose a threat to public health and safety and protection of the environment. The staff's analysis is presented in NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," prepared in support of the rulemaking effort that established the site-release criteria. The licensee is required to submit a license termination plan (LTP) for NRC review and approval approximately two years before anticipated license termination. The LTP is submitted as an amendment to the facility license. As such, interested members of the public can request intervention in the amendment process. The request for intervention could lead to an adjudicatory hearing. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: What happens in the real world is different from your idealistic presentations and your idealistic views of what ought to be happening. And we have such things as the nuclear waste train carrying Yankee Rowe waste coming into the town of Roanoke at 9: 00 on a Friday evening with a street festival going on and you know where the railroad track goes in Roanoke, it comes right into downtown. And all of the highways were blocked off for the festival, there were thousands of people there, having come into the county for this festival. And that train sat there for hours. And if they were really only emitting 10 millirem per hour at six feet—and believe me, people were closer than six feet, a bunch of them ran up to it, although our people who were there tried to stop them and get the crowd to move away from the train. There was nobody there who was doing that function except us. And so, you know, in the real world, what—the decisions that you make come down to people's communities and so I don't need to preach at you—well, yeah, I do. You've got to do better, you've got to make assumptions that are way more conservative than what you're doing. And you've got to assume human failings. **(AT-B/21)**

Response: *The regulations applying to transportation of radioactive materials are provided by the U.S. Department of Transportation (DOT) and cited in 49 CFR Parts 171-177. NRC regulations are cited in 10 CFR Part 71 and discussed in this Supplement in Section 4.3.17. These regulations are adequate to protect public health and safety and take into account public presence in the vicinity of waste shipments. Specific details related to the shipment described above are outside the scope of this Supplement. However, the comment has been forwarded to the appropriate NRC office for follow up. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Now my point in bringing this up is that the NRC cannot continue to allow rulemaking to be driven by exemption as it has been done in the past. It lowers the bar for all subsequent actions every time an exemption is made. **(AT-F/5)**

Response: *The comment is not specific. The granting of exemptions to the NRC regulations is allowed under 10 CFR 50.11. This Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Atomic Energy Act allows states to assume regulatory authority over the disposal of low-level radioactive waste in their state. In an Agreement State it is the Agreement State not the NRC that has the jurisdiction over disposal of low-level radioactive waste at reactor sites. **(CL-17/8)**

Response: *The "Low-Level Radioactive Waste Policy Amendments Act of 1985" gives states the responsibility to dispose of low-level radioactive waste generated within their borders and allows them to form compacts to locate facilities to serve a group of states. The Act provides that the facilities will be regulated by the NRC or by States that have entered into Agreements with the NRC under Section 274 of the Atomic Energy Act. This comment is in reference to entombment, which is the subject of future rulemaking, as discussed in Section 3.2.3. Such future rulemaking on entombment will address the issue as to what role Agreement States will play in the entombment process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It always amazes me how the Nuclear Regulatory Commission INVENTS its own laws and standards - its own regulations, its own definitions (such as "decommissioning" see p. xii) **(CL-20/4)**

Response: *The NRC does not pass laws; that is the role of Congress. Under its authorizing legislation, the NRC does develop implementing regulations. The definition of "decommissioning" in the NRC regulations was established by the NRC rulemaking process. The rulemaking process encourages and involves the public and other stakeholders to make comments and recommendations. Information about this process can be found in NRC regulations at 10 CFR 2, Subpart H, and on the NRC Web site at: http://www.nrc.gov. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: HOW ABOUT THE NRC ACTUALLY READING THE INSPECTION REPORTS AND VIOLATIONS ETC. ON THE DOCKETS OF EACH FACILITY AS I SAID EARLIER. **(CL-20/65)**

Response: *The NRC staff writes, reviews and issues the inspection reports and the violations placed on the dockets. All dockets that dealt with the nuclear facility must be reviewed prior to decommissioning to ensure that all previous problems or concerns with the site are taken into account and are addressed properly and thoroughly in decommissioning plans. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: NRC should take its own independent samples of offsite water and sediment and soils, as well as onsite. The NRC must not go by the original Offsite Dose Calculation Manuals as what was allowed in them. **(CL-20/67)**

Response: *During the License Termination phase of reactor decommissioning, the NRC staff conducts its own independent, confirmatory measurements. The NRC may also observe, perform, or collect side-by-side surveys or samples with licensees during the final site survey. The results of these confirmatory surveys are publicly available. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Often the plants DO NOT HAVE TO REPORT THEIR RELEASES UNTIL THOSE RELEASES REACH A CERTAIN LEVEL, IT DEPENDS WHAT THEIR LICENSE STATES. **(CL-20/95)**

Response: *The site is carefully monitored and regulated prior to license termination, and is only released for unrestricted use under carefully monitored conditions (Section 2.2.2). Gaseous effluent and liquid releases from all licensed light water power reactor sites are monitored in accordance with the licensee's Offsite Dose Calculation Manual (ODCM) and releases must meet the requirements in 10 CFR Part 20, Appendix B, Table 2. The licensee is required to submit an effluent release report to the NRC on an annual basis that summarizes*

radioactive releases over the previous 12 months. The procedures and results of the monitoring programs are inspected and reviewed by NRC staff to ensure that all requirements are being met. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: In the name of humanity and morality, you should all leave your jobs now in righteous protest at what you're being asked to do. Walk out. Say goodbye. Go work at Wal-Mart if you have to. But don't recklessly endanger the health of this nation by acquiescing in these evil plans. **(CL-33/6)**

Response: *The comment is not specific to the Supplement, however, the missions of the NRC do include the protection of public health and safety and protection of the environment. The mission of the NRC includes ensuring that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner and that adequate licensee funds will be available for this purpose. Regulations are in place to ensure that the health and well-being of our nation is protected (see 10 CFR Part 20 and NUREG-1496). The health and safety of the public is a top priority and the staff takes this matter very seriously. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The regulations are in violation of the appellate court decision in CAN v NRC. The court ruled that decommissioning remained a "major federal action" requiring National Environmental Policy Act (NEPA) compliance. CAN strongly urges the NRC to enforce NEPA compliance and require decommissioning reactors to undertake site-specific Environmental Impact Statements (EIS). In addition CAN requests the Commission withdraw the proposed draft and revise it so that it complies with the ruling of the court decision. **(CL-50/1 and CL-50/2)**

Response: *The appellate court did not rule (59 F.3d 284 [1st Cir 1995] that decommissioning was a "major Federal action." In fact, the decommissioning of power reactors was never considered a major Federal action. The appellate court did rule that the NRC had not followed its own regulations [the 1988 revision to the regulations] in allowing the licensee of the Yankee Rowe Nuclear Plant to remove major components before the completion of the review and approval of the Decommissioning Plan. Since then, in 1996, the NRC has revised its regulations by the Commission's notice and comment rulemaking process. The public had several opportunities during the rulemaking process to comment on and influence the development of the revised regulations. By regulation, the NRC staff no longer has to review and approve a decommissioning plan for power reactor decommissioning. Supplement 1 to NUREG-0586 is consistent with the current NRC regulations for decommissioning of power reactors. The purpose and need of this Supplement are to provide an analysis of environmental impacts from decommissioning activities that can be treated generically so that*

many of the decommissioning activities for commercial nuclear power reactors conducted at specific sites will be bounded, to the extent practicable, by this and appropriate previously issued environmental assessments. Supplement 1 is not the proper forum for challenging the NRC regulations on decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: What the NRC decides to do concerning decommissioning, is what the following generations of children, women, men, plants, animals, insects, birds, fish - all life, is going to suffer from, and die by. A small bunch of (mainly) men in an office complex in Washington, along with a few cohorts elsewhere, plus an immoral multinational polluting industry (in the business for money only) are seemingly setting a set of criteria that will impact the whole world to no good end and cause great misery. **(CL-20/107)**

Comment: You need to start doing what is safest and in the best interest of the people of the United States and its land, NOT what is going to relieve the nuclear power companies of their responsibility to what they have created and profited off. **(CL-24/6)**

Response: *The comments are not specific and did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC has a statuatory obligation to do a better job. **(CL-52/24)**

Comment: Because of deregulation, the United States public must rely more than ever upon the NRC to maintain its authority and responsibility to identify, assess and regulate the full range of potential high-risk impacts of every commercial reactor - before, during and following its decommissioning. The NRC is our only option. **(CL-51/20)**

Comment: I fail to see any moral difference between terrorists who fly planes into buildings, and bureaucrats who are perfectly willing to expose whole populations to additional dangers from radiation. **(CL-33/5)**

Comment: The present openness is most welcome, and a nice change, but past history hangs over NRC like a dark cloud. **(CL-10/2)**

Comment: The most formidable governmental regulations facing nuclear related industries is conflicting regulatory authority. Uncertainty is the enemy of the electric industry. This is most clearly evident in the decontamination and decommissioning of nuclear power plants. **(CL-02/38)**

Comment: The Nuclear Regulatory Commission can no longer evade its responsibilities and duties without considering the practical consequences, financial limitations, and political realities. **(CL-02/11)**

Comment: The reactors must be decommissioned in a prudent manner that will seek to protect the health and safety of the workers and the public. In the United States we must rely on the Nuclear Regulatory Commission for its knowledge, guidance and surveillance. I hope that trust is warranted. **(CL-51/28)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. The NRC staff takes this responsibility seriously. The reputations in place and the actions and activities of the NRC staff provide adequate oversight of the industry to assure public health and safety. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.2.3 Decommissioning Duration and Options

O.2.3.1 Decommissioning Duration

Comment: On page 1-6 of the document, it references that, there's literature saying that materials can be stored safely for 30 years, yet safe store can go on for 60 years. And I don't understand how you can reconcile that. There may be a way but I just don't understand it from the document. There may be a way that you can make that more clear in the document. **(CH-A/12)**

Response: *The reference on page 1-6 of the draft Supplement refers to spent fuel storage and the second reference is related to permissible time the facility has to complete decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I understand that spent fuel is dealt with in a different GEIS. But I think I raised this concern during the scoping. The 60-year period presumes a lot of things. **(SF-B/4)**

Response: *Although long-term storage of spent fuel is not within the scope of the Supplement, as described in Section 1.3, the staff is committed to ensuring that both spent fuel and low-level wastes are safely stored to protect the public. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: What was the technical basis for establishing a 60-year period? And is it still appropriate? **(CH-A/14)**

Response: *The basis was that major dose reduction via decay of cobalt-60 would occur in approximately 30 years, and major contaminant volume reduction would occur in approximately 50 years; also, detailed engineering considerations estimated that prompt dismantlement could require as much as 6 years to complete. Thus, an estimate of 50 years for significant contaminant waste reduction was used. Adding the time needed for dismantlement of 5-6 years and rounding up resulted in the 60-year time period for permissible storage delay given in the final rule. The staff currently finds the 60-year time period to be appropriate. The 60-year time includes the time required for termination of license by the NRC. A licensee of a power reactor has 60 years to complete decommissioning. Additionally, the regulations allow for completion of decommissioning beyond 60 years, but only by approval of the Commission when necessary to protect the public health and safety. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Sixty years is an arbitrary and inappropriate time period to allow a nuclear reactor to remain in SAFSTOR, where the contaminated facility will largely remain intact and spent fuel may remain onsite. According to NRC staff, no technical basis exists for this 60-year timeframe. See Transcript, December 6, 2001 Public Meeting, Drake Hotel, Chicago. First, if a company waits too long to decommission, it will lose its institutional memory and familiarity with the facility's structures because current workers may be deceased or otherwise unavailable. Such intricate knowledge of the facility is critical to avoiding radioactive releases during decommissioning. **(CL-11/9)**

Response: *There is a basis for the 60-year period for decommissioning. The consideration was that major dose reduction via decay of cobalt-60 would occur in approximately 30 years, and major radioactive contaminant volume reduction would occur in approximately 50 years. Thus, an estimate of 50 years for significant contaminant waste reduction and dose reduction was used. Adding the time needed for dismantlement of 5-6 years and rounding up resulted in the 60-year time period. The staff currently finds the 60-year time period to be appropriate. The 60-year period also includes the time required for termination of license by the NRC. The possible shortage of personnel familiar with the facility at the time of deferred dismantlement and decontamination is recognized as a disadvantage of SAFSTOR. There are offsetting advantages, such as reduction of worker dose and public exposure compared with the DECON option. Sections 3.2.1, DECON, and 3.2.2, SAFSTOR, explain the advantages and disadvantages of each option. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.2.3.2 Decommissioning Options

Comment: The Supplement incorrectly addresses the impact on the SAFSTOR scenario due to the time gap between cessation of operations and decommissioning activities. The Supplement expects the time gap will result in a shortage of personnel familiar with the facility when decommissioning activities commence. Our own experiences have shown us that both DECON and SAFSTOR decommissioning scenarios can be conducted in a safe and efficient manner. Regarding the familiarity of the facility at the end of licensed life, whether the plant begins decommissioning immediately or waits for some defined period - the most difficult aspect is retrieving records from the earliest days of operation. Recently retired facilities have taken the appropriate step of preparing a site historical assessment - documenting the operating years of the facility. This historical assessment will guide the decommissioning process whether it begins immediately upon retirement or 50 years later. **(CL-31/5)**

Response: *The text in the Supplement was meant to be general in nature with regard to the possible advantages and disadvantages of the various decommissioning options. There are always exceptions to such general comments. The staff does not mean to imply that DECON is preferable to SAFSTOR or vice versa. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In conclusion, as we have stated earlier, the methods used to decommission a nuclear plant will affect not only the communities of today but also the livelihood of future generations. **(AT-A/42)**

Response: *The staff agrees with the comment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: If life cycle plants has the decommissioning activities out as far as 60 years, what's the scenario that might involve? **(BO-A/1)**

Response: *The scenario in which decommissioning activities extend for a period of up to 60 years is described in Section 3.2.2, SAFSTOR, of this Supplement. In the SAFSTOR option, there is an initial period of activity to prepare for storage, a storage period, and a period of final decommissioning activities in which the facility and systems are decontaminated and dismantled. All three periods must be completed within 60 years. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: But, at least, in your experience, have you seen facilities--You haven't seen facilities where the only facility that's been operating has been shut down, and then they're just sitting there waiting. **(BO-A/2)**

Response: *Table 3-2 lists the facilities that have permanently ceased operations. La Crosse is a one-unit plant in SAFSTOR. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It [SAFSTOR] seems like it's taking a substantial land mass out of sort of useful life for a long period of time. **(BO-A/3)**

Response: *The SAFSTOR option involves continued commitment of land for a significantly longer period than the DECON option. This is one of the disadvantages of the SAFSTOR option. Most of the plants selecting the SAFSTOR option are at multi-unit facilities where one of the facilities has permanently ceased operation and the commitment of land would continue as a result of the other operating unit(s). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: First, we don't believe you should allow nuclear reactor owners under safe store to store waste for 60 more years after operations cease. We think the document should narrow the parameters. Because we have many concerns, some of which relate to institutional memory. **(CH-A/5)**

Response: *NRC regulations 10 CFR 50.82 require that decommissioning be completed within 60 years of permanent cessation of operations. Amendment of NRC regulations is outside the scope of this Supplement. NRC rulemaking procedures are found at 10 CFR Part 2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Allowing the licensee to choose the decommissioning method is not recommended, due to the usual pressures to cut costs despite the obvious dangers. **(CL-10/10)**

Comment: UNDER NO CIRCUMSTANCES SHOULD A FACILITY BE ALLOWED THE OPTION OF CHOOSING THE METHOD OF DECOMMISSIONING IT WANTS, AS IS THE CURRENT CASE. **(CL-20/61)**

Response: *The licensee owns the facility and is allowed to choose the process for decommissioning consistent with NRC regulations. The comments did not provide new*

information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Combinations of DECON and SAFSTOR would be the best, however, under no circumstances should SAFSTOR continue past five years. That would enable workers familiar with the plant to be still available, but at the same time allow for the decay of some of the radioactive contaminants which have shorter full hazardous radioactive lives prior to removal, thus lowering worker exposure etc. **(CL-20/62)**

Response: *The licensee owns the facility and is allowed to choose the process for decommissioning consistent with NRC regulations. NRC allows SAFSTOR because, in spite of some disadvantages, there are offsetting advantages, such as reduced worker dose and public exposure, compared with the DECON option. Under the current regulations, the licensee is permitted to begin active dismantlement after a 5-year storage period or continue to maintain the facility in SAFSTOR provided that decommissioning is completed within the 60-year period allowed by the regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC effort to approve alternate decommissioning methods constitutes significant uncertainty and an impediment to accurately estimate the real cost of decommissioning nuclear facilities. There is no real assurance that adequate funds will be available to safely and properly decommission the site and provide for remediation of all necessary cleanup. These regulatory and environmental issues do not support generic treatment of environmental impact statements. In fact because of the economic and technical and environmental uncertainties of the rubblization and Entombment options, they should be subject to much more rigorous review than provided by this Supplement. This Supplement gives only cursory attention and unsubstantiated dismissal of potentially very serious environmental consequences of the rubblization, Entombment and Partial site release options. **(CL-48/28)**

Response: *Entombment and partial site release are the focus of current NRC rulemaking that would provide further guidance on these methods of decommissioning a nuclear power facility. The staff stated in Section 1.3 that radiological impacts associated with Rubblization would receive a site-specific environmental assessment during the staff's review of the license termination plan. Additionally, providing alternative decommissioning options to licensees does not necessarily introduce uncertainty into the estimate of the cost of decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And we were tacitly or directly promised a 50-year cooling period for the nuclear power plants. I can go back and drag out some of those documents if you want to see that. And two-year cooling periods for Yankee Rowe before it's chopped up and decommissioned is unthinkable. You know, we will not approve of and we will fight diligently in every opportunity and arena we have a hot, quick and dirty decommissioning which violates the promise of future—safety to future generations. **(AT-B/16)**

Response: *NRC regulations in 10 CFR 50.82 that cover decommissioning do not require a "cooling period." Amendment of NRC regulations is outside the scope of this Supplement. NRC rulemaking procedures are found at 10 CFR Part 2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Any of the methods proposed would require long time maintenance and monitoring, but keeping it in its original location would mean that the community would be familiar with it, it would be visible, and the community would be likely to care about its monitoring. In fact, involving the community in the whole process could utilize their experience and encourage their help. **(CL-10/9)**

Comment: The lowest possibility of releasing contamination into the environment requires entombing radioactive structures, systems and components in a long-lived substance, maintaining and monitoring it, until the radioactive level is reduced to a safe level, which would take many years. **(CL-10/7)**

Comment: Although the alternatives [decommissioning options] proposed for decommissioning nuclear facilities all sound reasonable, the proposal in general has one major problem, which is the NRC's lack of credibility due to past errors and cover-ups. **(CL-10/1)**

Response: *The comments are not specific and did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.2.3.3 Entombment

Comment: One of the things that your GEIS did not consider is termination of a license under entombment. **(CH-C/7)**

Response: *The purpose of this Supplement is to evaluate the impacts associated with the process of decommissioning. Issues related to the regulatory process for terminating the license for entombment are outside the scope of this Supplement. As stated in Section 3.2.3,*

the NRC issued an Advance Notice of Proposed Rulemaking (ANPR) (66 FR 52551, dated October 16, 2001) to solicit early public comment in developing changes to its regulations to permit entombment as an option in decommissioning nuclear power plants. As stated in Section 3.2.3 for the ENTOMB1 option, "The Staff makes no assumptions as to when the license would be terminated and whether it would be terminated under the restricted or unrestricted provisions of 10 CFR Part 20, Subpart E. These decisions would likely be addressed as part of the staff's rulemaking effort related to entombment explained above." Although absent in draft Supplement 1, similar language has been added to the description of the ENTOMB2 entombment option. For this reason, the comment resulted in a change to the Supplement.

Comment: And you said that for that restricted release use is going to need analysis on a site by site basis. Then why are you dealing with entombment in a generic EIS? **(CH-C/15)**

Response: *As stated in Section 1.3, the Supplement considers the environmental impact of those activities conducted during decommissioning. The Supplement does evaluate nonradiological impacts to the environment that occur after the license is terminated but only those resulting from activities that were conducted during decommissioning. Some of those impacts can be assessed generically and have been in this Supplement. The Supplement does not consider the radiological impacts that might occur after the license is terminated. Nor does the Supplement consider nonradiological impacts due to activities conducted after the license is terminated. If a licensee pursues the entombment option, there will be activities necessary to ready the facility for the entombment. The impact, during decommissioning and after, of some of those activities are considered generic by the Supplement. The site-specific assessment required by a proposed restricted release would naturally focus on radiological issues. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 3.2, p. 3-20 - defines two ENTOMB options developed specifically to envelope a wide range of potential options by describing two possible extreme cases of entombment. These extremes are useful in bounding an analysis, however they may be inappropriate for analysis to support a potential rulemaking for this option. **(CL-05/10)**

Response: *The staff agrees with the comment. We state in Section 3.2.3, "Any rulemaking effort on the part of the NRC staff will require an environmental assessment (10 CFR 51.21)." We say further, "The staff is making the assumption that environmental issues arising from any rulemaking effort will be addressed in the rulemaking and its supporting environmental documentation." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Supplement (page 3-16) indicates that ENTOMB is still considered a viable option for decommissioning. Section 3.2.3 notes that the Supplement includes a bounding analysis, but that any environmental issues arising from a subsequent rulemaking on ENTOMB will be addressed in that rulemaking and its supporting environmental documentation. EPA urges NRC to consider in any subsequent analysis of ENTOMB the issue of residual dose and the potential need for state approval of any de facto disposal. **(CL-16/10)**

Response: *NRC published an Advance Notice of Proposed Rulemaking on October 16, 2001 (66 FR 52551) seeking stakeholder input on three proposed regulatory options and whether entombment was a viable decommissioning alternative. The ANPR comment period closed on December 31, 2001. NRC received 19 comments from: six States; eight licensees; the Nuclear Energy Institute (NEI); the U.S. Environmental Protection Agency (EPA); the Conference of Radiation Control Program Director E-24 Committee on Decommissioning and Decontamination (CRCPD E-24 Committee); the Southeast Compact Commission (SCC); and a private individual.*

Generally, the eight utilities and NEI stated that they would like to have entombment available as a decommissioning option; however, none unequivocally committed to using entombment in their decommissioning process. Some Agreement State commenters endorsed the Part 20 dose limits, with one State adding that a time limit to reach the dose rates should be considered. Although one State advocated extending the decommissioning period beyond 60 years, most were silent on the decommissioning regulations in Part 50. The staff notes that there was no consensus on a preferred option. NRC staff has considered the comments received and has prepared a paper transmitting the Staff's recommendations to the Commission. As of the date of this publication the Commission has not acted on the staff's recommendations.

Since the development of a proposed rule on entombment is clearly outside the scope of this Supplement, the comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Page 3-24 mentions the containment ceiling being lowered to the top of the pressurizer for a PWR under the ENTOMB2 option. Appendix E, page 9 lists this action as optional. This action needs to clearly be listed as optional on pages 3-24, 3-25, and 3-31. SCE&G believes this action should be optional as listed in Appendix E due to the extreme effort to lower the ceiling of a massive building such as the reactor building and yet maintain it intact for entombment purposes. **(CL-19/1)**

Response: *The scenarios for entombment are non-prescriptive and were developed to reasonably envelop a typical entombment. The staff developed the scenarios based on the*

limited past United States experience in entombing reactors and experience from other countries. The comment did not provide new information relevant to this Supplement and will not be evaluated further. However, the Supplement was revised for clarification.

Comment: Also, on page 3-24 "low density concrete grout" is mentioned. Grout is not lightweight, but concrete can make use of lightweight large aggregate to lower the weight per volume. Therefore, SCE&G recommends concrete be used in place of grout on pages 3-24, 3-25, 3-31, and 3-33. **(CL-19/2)**

Response: *Chapter 3 was revised and the term "concrete" was used in place of "grout".*

Comment: The Supplement properly addresses the ENTOMB decommissioning option. Issues related to the ENTOMB option after the facility has terminated its NRC license and entered the entombment period are outside the scope of this GEIS. Power reactor entombment is not construction of a LLW disposal facility - it is properly classified as a decommissioning scenario, which creates an assured storage facility for radioactive material to decay in place, until it no longer represents a hazard considering future public use of the site. The clear distinction between entombment as a decommissioning scenario and a LLW disposal facility may be found in the ability to reuse the site in the future for other purposes. Regulation governing LLW-disposal facilities does not contemplate future use of the site, restricted or unrestricted. Future use of an entombed site will be dictated by the dose-based performance criteria found in 10 CFR Part 20, Subpart E. **(CL-31/3)**

Response: *The comment is supportive of the discussion of entombment as a decommissioning option. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: While the Supplement addresses two entombment options stating they have prepared as extreme cases to envelop a wide range of potential options, there should be additional language early in Section 3.2.3 ENTOMB clarifying that utilities are likely to develop entombment scenarios based upon their site-specific needs. **(CL-31/18)**

Response: *Section 3.2.3 was revised to include a statement that licensees will adopt the entombment option to fit their specific site requirements.*

Comment: So I'm really interested in this entombment rule making process and I promise you that we will have a lot to say about that because that really is the only option for what to do with these plants. **(AT-B/17)**

Response: *The comment is on the NRC entombment rulemaking effort, which is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: You need to keep it where it is and somehow seal it off, and then you have to monitor it for years and years and years because none of this goes away. **(AT-D/9)**

Response: *The staff makes the assumption for the purposes of developing an entombment scenario for this Supplement that there "would be a monitoring program period as long as 20 to 30 years to demonstrate that there was isolation of the contamination and adequate permanence of the structure" (see Section 3.2.3). If isolation were not adequately demonstrated in this amount of time, it is likely that mitigation would be required along with further monitoring. This comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I'm real happy to see entombment is coming up and getting more discussion because it is the area that we look to, the avenue that we think will yield the most protection for the public ultimately. **(AT-G/1)**

Response: *The comment is supportive of the discussion of entombment as a decommissioning option. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The thing that really jumped up and disturbed me was about the middle of the paragraph. It says, "All decommissioning activities were assumed to determine their potential for radiation exposures that may result in health effects to workers and the public. This section considers the impacts to workers and the public during decommissioning activities performed up to the time of the termination of the license. And potential radiological impacts following license termination are not considered in this supplement...I don't think that you can remove the long-term radiological impacts of using entombment as a decommissioning method from this environmental impact... but if you're going to pursue entombment as a disposal option which according to your slide in the 1988 draft or '88 GEIS was assumed not to be a viable alternative, you really need to look beyond license termination into the long-term radiological impacts because that stuff is going to be there forever until it decays away. **(CH-C/1)**

Comment: As mentioned at the December 6, 2001 public meeting in Chicago, the scope of the Draft Supplement is inadequate in its evaluation of long-term radiological exposure to the public for the reactor entombment decommissioning method. **(CL-17/1)**

Response: *For license termination to occur, the radiological impacts following license termination must meet the criteria defined in 10 CFR Part 20, Subpart E. These criteria would apply to license termination for any of the decommissioning options including entombment. If the entombment process used did not allow the site to meet the license termination criteria, then the license would not be terminated. Current criteria for license termination is given in 10 CFR Part 20, Subpart E. These criteria were established by a 1997 rulemaking. The staff evaluated the impacts of the site-release criteria in NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." As stated in Table 1-1, the radiological impacts following license termination are outside the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: And depending upon what system structures and components you put into the containment building, that time period of potential radiological hazard may be relatively short, it could be really long. **(CH-C/2)**

Response: *The staff agrees with the comment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: If you take a look at the date of this NUREG-1496 being 1997, that was also in a time frame when entombment really wasn't being talked about. NRC held their first meeting on entombment as a viable reactor decommissioning option in December of 1999. So I doubt that those long-term radiological impacts are assessed in this EIS, referenced in NUREG-1496. **(CH-C/4)**

Response: *NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," does not specifically discuss entombment of power reactors. It does, however, assess the impact of specific radiological criteria and long-term radiological impacts that may result following termination of the license of a nuclear facility. The analysis clearly envelopes the entombment concept, and the long-term impacts would be those identified in NUREG-1496. Furthermore, if the proposed entombment was not within the bounds of the 1997 assessment, then the assessment would not be applicable to whatever option or scenario the licensee chose. Additionally, the radiological impacts following license termination are outside the scope of this Supplement, as indicated in Table 1-1. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Entombment is basically the isolation of contaminated reactor stuff from the environment. Now, if you, and that's just a rough estimate on a definition. But if you look at definitions of disposal, it's going to be pretty similar. **(CH-C/8)**

Comment: By definition entombment is disposal of low-level radioactive waste in the containment structure. **(CL-17/7)**

Response: *As stated by one of the commenters on the draft Supplement (CL31/3), power reactor entombment is not the same as construction of a LLW disposal facility. The LLW disposal facility is designed and constructed to accept waste from other locations and store it in a manner that allows it to decay in place until it no longer represents a hazard. A reactor entombment is designed to isolate waste generated at that location in a manner that protects public health and safety and the environment. The clear distinction between entombment as a decommissioning scenario and a LLW disposal facility may be found in the ability to reuse the site in the future for other purposes. Regulation governing LLW disposal facilities does not contemplate future use of the site, restricted or unrestricted. Future use of an entombed site will be dictated by the dose-based performance criteria found in 10 CFR Part 20, Subpart E and may allow future reuse of the site. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The one thing this GEIS did not consider is regulatory authority as to whether or not the NRC can license the disposal or in essence allow entombment as a reactor decommissioning option in agreement states, because in agreement states, it's those states such as Illinois that has licensing authority over the disposal of low-level radioactive waste in the state. **(CH-C/9)**

Comment: Entombment could potentially, in the State of Illinois, create seven disposal facilities. Your GEIS does not address the potential conflict with other state or other federal statutes as it relates to authority of the disposal of low-level radioactive waste. That being the Federal low-level radioactive waste policy act of 1980 as amended in 1985 which specifically gave states the responsibility for providing for the disposal of low-level radioactive waste generated within their states. **(CH-C/11)**

Response: *The NRC staff agrees that the Supplement does not evaluate the regulatory implications of an entombment of a power reactor within the borders of an Agreement State. Such a discussion is clearly outside the scope of this Supplement. As stated in Section 3.2.3, the NRC is considering the development of changes to its regulations pertaining to the entombment option for decommissioning nuclear power plants. The public and the Agreement States will have an opportunity to participate in the development of the regulations in the rulemaking process. Since the development of a proposed rule on entombment is also*

clearly outside the scope of this Supplement, the comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: So, what you're saying is you're going to set something in motion, i.e. entombment in motion, you're going to allow a nuclear plant operator to take all the contaminated system structures and components, put them in a containment building as part of this GEIS and you're not concerned at what's going to happen at license termination? Because that's in essence what you just said. I mean, in terms of radiological exposure. **(CH-C/14)**

Response: *The Supplement does not set anything in motion; nor does it authorize or allow entombment of a power reactor. For an entombment of a power reactor to occur, the licensee either has to obtain an exemption from certain regulations or the NRC, through the rulemaking process, has to change the regulations. The Supplement is focused on evaluating the impacts from activities associated with the decommissioning process. One of the decommissioning options that historically has been identified is entombment. This Supplement evaluated the environmental impacts from the preparation activities for two entombment scenarios. Radiological criteria for any license termination (even those granted on a case-by-case basis) are given in 10 CFR Part 20, Subpart E. The license cannot be terminated without compliance with the site-release criteria. The staff has evaluated the radiological impacts of meeting these criteria at the time of, and subsequent to, license termination in NUREG-1496, "Generic Environmental Impact statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." Both the future NRC rulemaking effort for entombment and the impacts associated with the NRC's site-release criteria are outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Doesn't that set the utility up for a great risk exposure to go down the path of entombment and find out that 40, 50 years, whatever time frame they elect when they try to terminate their license of someone saying, no, you can't do that? I mean, because of the radiological impacts? **(CH-C/16)**

Response: *For license termination to occur, the radiological impacts following license termination must meet the criteria defined in 10 CFR Part 20, Subpart E. If the criteria were met, then the license can be terminated. The staff cannot generically speculate on the potential for denying license termination after 40 to 50 years of entombment. As stated in Table 1-1, the radiological impacts following license termination are outside the scope of this Supplement. The comment is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: On October 16, 2001, the NRC published an advance notice of proposed rulemaking regarding entombment options for power reactors. Even with that notice and this draft Supplement, the NRC has yet to evaluate the long-term environmental impacts associated with entombment of power reactors. **(CL-17/4)**

Comment: So, what I see happening here is you're setting yourself up with entombment...you're not looking at the long-term radiological impacts to the residents of the State of Illinois or the residents of Connecticut or whatever state it may be. **(CH-C/5)**

Response: *For license termination to occur, the radiological impacts following license termination must meet the criteria defined in 10 CFR Part 20, Subpart E. The long-term impacts would be those identified in NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." As stated in Table 1-1, the radiological impacts following license termination are outside the scope of this Supplement. The comments are out of the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: NO WAY SHOULD ENTOMB I OR ENTOMB II BE ALLOWED. **(CL-20/63)**

Comment: One of the important and obvious things to be said about decommissioning nuclear power plants is that it is expensive, potentially dangerous and nearly unprecedented. We appreciate that entombment is now being considered. **(CL-42/1)**

Response: *The comments are matters of opinion and are general in nature. The comments do not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I am opposed to the following proposal(s) in the EIS: NRC opens up two "entombment" options. **(CL-26/4)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC opens up two "entombment" options. **(CL-43/3)**

Comment: NRC opens up two "entombment" options. **(CL-48/38)**

Response: *As stated in Section 3.2.3, the staff evaluated impacts associated with preparing the facility for a hypothetical entombment. Two scenarios were developed. Consideration of impacts in a Supplement to a GEIS resulting from two hypothetical scenarios does not in any way allow for an entombment of a power reactor. For an entombment of a power reactor to*

occur, the licensee either has to obtain an exemption from certain regulations or the NRC, through the rulemaking process, has to change the regulations. The Commission has independently issued an advance notice of proposed rulemaking on entombment options for power reactors (66 FR 32551), as discussed in Section 3.2.3, to invite early input from stakeholders on issues related to entombment. Based on comments on the proposed rulemaking, the staff may propose changes to the regulations. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Just one example is letting the concrete reactors erode naturally which is extremely unsafe. **(CL-32/2)**

Response: *The entombed power reactor would likely employ numerous engineered barriers to contain any radiological contamination. Radioactive contamination inside the entombed structures would be fixed so that migration of material in the engineered structure would be minimized or eliminated. Additionally, there would likely be a monitoring program in place for some period of time to ensure that the contamination was isolated from the environment. Finally, there would have to be institutional controls to ensure that the structure and monitoring were secure over an extended period of time. Simply abandoning the site and allowing the concrete of the containment to erode away was never considered an option for entombment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: We concur with the GAO findings as reported in GAO-02-48, "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could be Improved," dated December 2001. GAO reported the following conclusions:

"The NRC staff's decision that entombment might reduce decommissioning costs is questionable."

"According to NRC's staff, 'very expensive remedies' could be required if an entombment configuration proved unable to adequately isolate radioactive contaminants over the 100-year or longer [up to 300-years by NRC projections] time period needed for radioactive decay. Given the length of time involved, states are concerned that they will have to pay remediation costs should an entombment fail." **(CL-48/32)**

Response: *The staff understands that additional costs may be incurred if decommissioning methods do not adequately remove the radiological hazard. The cost comparison does not include costs associated with the failure of any of the engineered barriers and a release of radioactive contamination to the environment. However, the cost analyses are performed assuming that the licensee appropriately decontaminates or adequately isolates the radioactive*

contaminants during the entombment process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: This method would be the most likely to reduce exposure to workers and the public, and would not require workers familiar with the original construction. **(CL-10/8)**

Response: *The staff agrees that the most likely scenarios for an entombment of a power reactor would reduce radiological exposure to both the work force and the public when compared to the immediate DECON decommissioning option. Although none of the options "require" workers familiar with the original construction, it is the staff's position that all three options would benefit from the experience and knowledge of workers familiar with the plant design, construction, and operation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Entombment [has been] taken to an aesthetic level. You've got like contaminated soil, maybe even mill tailings if we could figure out how to get them there—fill everything in and just build out soil barriers, barriers, barriers, make it a pyramid, make it vast, make it huge—sell tickets for the first few generations. And I even think possibly the geometric—the geology of this might even be an earthquake that just keeps falling in on itself. You hit it with something, it just keeps falling in on itself. Now there's a question of subterranean—what's the subterranean issue here and, you know, forget practicality, forget cost, which I would like to do that, I mean I really would not like cost to be much of a factor here. We need to do what it takes. So probably you need some subterranean things, definitely a site-specific idea I've got here. And then let's plant spider worts around it because everybody knows that spider worts are shown to—they have these little blue hairs, maybe they're called stamens or something that's the pollinator part of it, and they are like these incredible plants that—there's this perfect correlation for the amount of radiation exposure it gets. These little things turn pink, these little hairs turn pink. And it's been like studied and it's a good correlator. So we need to plant the spider worts, which is basically a weed and then we need to teach the people how to analyze. You know, we can't forget the technology of microscope. That's pretty easy—lenses. And the site-specific advisory board and actually, you know, this sounds kind of corny, but I'm your artist speaker tonight—the nuclear priesthood has been talked about seriously. Religion is probably a good model for long memory. **(AT-G/5)**

Response: *The issue of marking the entombed facility so that it is recognized in the future has been discussed by scientists for years. The comment is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

0.2.3.4 Rubblization

Comment: Because of the potential presence of highly radioactive "hot particles" in unexpected areas through the plant, particularly in the reactor containment building, the rubblized materials proposed for on-site disposal could be more than just "slightly" contaminated. Contrary to the Draft Supplement, at page I-7, for example, I think it is important to note that the rubblization of concrete could have radiological impacts as well as non-radiological ones. **(CL-51/8)**

Response: *The Supplement states that the radiological aspects of Rubblization on onsite disposal of slightly contaminated material would be addressed in a site-specific manner at the time that the LTP is submitted. The site-specific LTP will provide a mechanism for the NRC staff's evaluation of the licensee's plans to dispose of rubblized concrete on site. The radioactive material that remains at the site after the license has been terminated must meet the dose criteria for license termination given in 10 CFR Part 20. All radioactive material removed from the site must be disposed of in a licensed low-level waste facility in accordance with 10 CFR Part 61. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Georgians for Clean Energy requests that the "rubblization" method of decommissioning be removed from the final EIS. Chopping up a plant and storing it on site not only sounds ridiculous but also is grossly negligent of the fact that there are facilities designed, built and licensed to handle radioactive materials. A point supported by the GAO report cited earlier in these comments. **(CL-08/20)**

Comment: I think if people thought we're going to be rubblized and have a waste dump out there, they might not have been so welcoming to these facilities. **(AT-C/3)**

Comment: We concur with the GAO findings as reported in GAO-02-48 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could be Improved" dated December 2001. GAO reported the following conclusions: "Aside from questionable cost benefits, rubblization and entombment raise a number of technical issues. For instance, NRC does not intend to require that sites where rubblized radioactive materials would be buried have protection equivalent to offsite disposal facilities for low-level radioactive waste. Disposal facilities for commercial low-level radioactive waste, which are licensed and regulated by NRC or by state (under agreement with NRC), must be designed constructed, and operated according to NRC regulations (or compatible regulations issued by the host state). In addition, to obtain a license to build and operate a disposal facility, the prospective licensee must characterize the facility site and analyze how the facility will perform for thousands of years. However, according to NRC, a rubblized site is not comparable to a low-level radioactive waste

disposal facility.... Nevertheless, 10 CFR Part 61 does not differentiate between what does or does not qualify as a low-level waste disposal action or facility on the basis of the quantity, forms, or range of the low-level radioactive waste to be buried." **(CL-48/33)**

Response: *In a letter dated March 1, 2002 (ML020250068), the NRC responded to the GAO findings and elaborated on its programs and practices. Rubblization (the process of onsite disposal of slightly contaminated material in a manner to meet the site release criteria of 10 CFR Part 20, Subpart E) would not involve the quantity of radioactivity, nor the inventory of radionuclides associated with a commercial low-level waste disposal site. In addition, the range of waste forms are not comparable. Rubblization is considered a viable decommissioning process that is consistent with the requirements of the license termination rule and is not considered low-level waste under 10 CFR Part 61. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Pages 4-30, 4-12 and xii. The Supplement should clarify the circumstances under which rubblization is permitted. It is EPA's understanding that, to date, rubblization has only been permitted after site decontamination. Does the term "rubblization" on page 4-30 refer to the treatment of concrete or structures that have not been decontaminated? Note that page xii indicates that the continued dismantlement of structures that have been radiologically decontaminated falls outside the scope of the Supplement. **(CL-16/67)**

Response: *The staff has clarified the use of the word "rubblization". The staff chose to use the term "demolition" to describe the process of crushing structural material to allow for easy burial or disposal. Demolition debris can be contaminated or uncontaminated. Demolition debris, if uncontaminated, can be disposed of either onsite or offsite without any additional NRC oversight. Demolition debris that is contaminated can be shipped to a low-level waste site or waste processor. Slightly contaminated demolition debris may be disposed of onsite using the process of "rubblization" (the process of onsite disposal of slightly contaminated material in a manner to meet the site release criteria of 10 CFR Part 20, Subpart E). Section 4.3.3.3 and 4.3.8.3 of the Supplement have been revised to reflect the above clarification in terminology.*

Comment: Delete the discussion of "rubblization" on page 1-7 and delete the term "rubblization" in the Glossary (Appendix M). Maine Yankee first utilized this term in a January 13, 2000 letter which served to submit their License Termination Plan (LTP). On June 1, 2001, Maine Yankee filed revision 1 to their LTP. On August 13, 2001, Maine Yankee filed revision 2 to their LTP. In their current LTP, Maine Yankee does not propose to use "rubblization" and no longer utilizes the term. No licensee is currently pursuing the "rubblization" concept as described in Maine Yankee's original LTP submittal. The term which most accurately describes the approach which licensees are currently pursuing is "concrete backfill." Connecticut Yankee described the process as follows in section 4.3.1 of our LTP

submitted on July 7, 2000: Concrete from contaminated structures will be remediated to a level meeting the radiological criteria for unrestricted release of the site. After completion of final status surveys and absent any findings during NRC inspections, concrete building debris from decontaminated structures may be used as backfill and placed into the remaining subsurface building foundations. **(CL-30/4)**

Comment: The burial of radioactively contaminated material as a means of site remediation is unacceptable for property that is to be released for unrestricted use. Rubblization (the burial of contaminated rubble) must not be permitted under any circumstances. The permission to build nuclear reactors hinged upon the utilities' commitments to regulators and the community to restore the site to "green fields." Rubblization is a blatant default on cleanup commitments, is a gross injustice to reactor communities and is a regulatory cave-in to utilities' desires and financial needs. In response to rubblization CAN also incorporates by reference Contention's 5.2 and 5.3 submitted by the organizations to the Commission on March 12, 2001 regarding Haddam Neck Reactor's License Termination Plan (Docket No. 50-213-OLA). **(CL-50/21)**

Comment: "Rubblization", to me reflects a sense that NRC is looking for ways to make it easier to finish the decommissioning process rather than thinking about ways to make it safer or more environmentally sound. And that concerns me. It seems to be driven by how we can facilitate the process, making it happen more quickly or with less cost as opposed to considering the safety issues. All of those issues relate to doing it more quickly and less costly. **(CH-A/11)**

Comment: The fact that the Staff and the Commission have even considered rubblization shows an utter disregard for the health and welfare and safety of the public and the ecosystem upon which life depends. **(CL-20/20)**

Comment: I oppose the concept of rubblization as it is very dangerous. **(CL-29/2)**

Comment: There should be no allowance for the industry to hurriedly raze structures, sweep the radioactive mess under a porous and permeable carpet (or disperse the remains and cleanup materials in many unregulated forms far from the reactor site), cut corners and add risks and contamination to an already precarious cleanup operation. The public must be protected. **(CL-47/9)**

Response: *The NRC staff has decided to retain the discussion of Rubblization in the Final Supplement. Rubblization (the process of onsite disposal of slightly contaminated material in a manner to meet the site-release criteria of 10 CFR Part 20, Subpart E) is considered a viable*

decommissioning process that is consistent with the requirements of the LTP and is not considered low-level waste under 10 CFR Part 61. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Rubblization (p. 4-14), the breaking of contaminated concrete structures into gravels and blocks cannot be considered an option where: A. the leachate plume could contaminate potable water, B. the leachate plume could contaminate water used for food production such as farming, fishing, seafood harvest, or dairy, C. the leachate plume could contaminate closed bodies of water such as cooling canals or cooling ponds, or D. airborne particles could contaminate food crops, fishing waters, seafood harvesting waters, or dairy areas. All contaminated building materials must be removed from the nuclear plant site. **(CL-14/4)**

Comment: We concur with the GAO findings as reported in GAO-02-48 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could be Improved" dated December 2001. GAO reported the following conclusions: "Water intrusion is also a major concern for rubblized or entombed sites, and the fact that most nuclear power plants are situated in shallow water table or flood plan locations may limit the viability of these options." **(CL-48/34)**

Comment: Essentially, the agency and industry are proposing that a so-called "low-level" radioactive waste dump can now be grandfathered on a reactor site without a formal permitting and licensing hearing process. The decommissioning utilities will provide an analysis that can "assure" that no ground water movement will occur through the radioactive burial site providing a potential transport mechanism and potential radioactive exposure to the public and environment. The utilities are to provide a "dose model" to "assure" the affected communities that the radioactive site will pose no health risks to present and future public health and the environment. These "assurances" cannot be bona fide by generic treatment and therefore require the availability of site-specific proceedings. **(CL-48/30)**

Response: *Rubblization (the process of onsite disposal of slightly contaminated material in a manner to meet the site-release criteria of 10 CFR Part 20, Subpart E) would require a site-specific analysis during the LTP review. Such a site-specific review would consider the potential for groundwater contamination. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The Supplement improperly addresses rubblization by stating it will require a site-specific analysis at the time the license termination plan is submitted. Rubblization should be addressed generically as a part of the decommissioning process. The NRC should continue to

maintain that to the extent that 10 CFR Part 20, Subpart E dose performance criteria are met - and that decommissioning has been performed using the ALARA principle, rubblization has a SMALL environmental impact. **(CL-31/4)**

Comment: Some of my concerns about NUREG-0586 include: the generic approval of rubblization of reactor buildings and leaving them on site. **(CL-38/3)**

Comment: I oppose rubblization but support its designation as site-specific. **(CL-24/4)**

Response: *Both site-specific factors and the licensee's preparation of the demolished demolition debris prior to onsite disposal can significantly affect the dose assessment calculations that are necessary to demonstrate compliance with the licensee termination criteria. As such, a generic analysis cannot be made that would envelop rubblization. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Now, with Supplement 1 to NUREG-0586, the NRC would appear to be paving the way for the very rubblization and possible release into the environment of slightly contaminated material that the AEP rep said could not happen. The vehicle to allow this (rubblization) would appear to be the declaration of more decommissioning issues "Generic" rather than "Site-Specific," thus preempting the right of local residents to raise concerns during the License Termination Plan review. **(CL-38/1)**

Comment: NRC's proposal to allow "rubblization" (defined as: "the demolition of onsite concrete structures. Rubblizing these structures could result in material ranging from gravels to large concrete blocks, or a mixture of both.") of concrete structures at the reactor site to take place without opportunity for public intervention until after the action is completed is outrageous. **(CL-47/14)**

Comment: NRC allows "rubblization" (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed. **(CL-48/36)**

Comment: We adamantly disagree with the possibility of rubblization as a method of decommissioning. Chopping up a plant and storing it on site not only sounds ridiculous, but also is grossly negligent of the fact that there are facilities designed, built and licensed to handle radioactive materials. Plant owners never told communities near nuclear plants that they were also accepting a permanent nuclear waste dump. Rubblization is an egregious assault on the public participation process and a devious example of corporations casting aside those communities that supported them over the years. **(AT-A/37)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC allows "rubblization" (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed. **(CL-26/2)**

Comment: [Georgians for Clean Energy] recognizes that nuclear plant owners and the NRC never told communities near nuclear plants that they were also accepting a permanent nuclear waste dump. Rubblization is an egregious assault on the public participation process and a devious example of corporations casting aside those communities that supported them over the years. **(CL-08/22)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC allows rubblization (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed. **(CL-43/1)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow rubblization (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed. **(CL-44/5)**

Comment: Rubblization poses some specific risks to the surrounding communities and the site workers, as the rubblized material could contaminate via air, soil, and water pathways. Thus, Public Citizen insists that it is only appropriate that the affected communities surrounding the reactor site be given opportunities to review rubblizing plans and procedures, and that this issue be addressed on a site-specific basis. **(CL-47/15)**

Comment: However, the rubblization process must account for the permeation of porous concrete structures (containment dome, basemat, and walls) with radioactivity much deeper than surface contamination that would be sand blasted during a decontamination process. Activated concrete would be rubblized and would thus constitute so-called "low-level" radioactive waste. Long-lasting radioactive elements such as cesium-135 and strontium-90 are present with many other fission products and radioisotopes in the concrete and should not be ignored or defined away. No data are provided in this Supplement to justify rubblization and onsite or offsite disposition. Thus, local communities have every right to participate legally (in adjudicatory proceedings) and be provided with information - full disclosure of such planning. **(CL-48/29)**

Comment: I utterly oppose "rubblization" with no opportunities for meaningful public intervention ahead of time. **(CL-33/7)**

Comment: It is extremely important for the NRC to level with the public about the potential hazards of the concrete debris and related rubble from the dismantled plants. **(CL-51/7)**

Response: *Rubblization (the process of onsite disposal of slightly contaminated material in a manner to meet the site release criteria of 10 CFR Part 20, Subpart E) is considered a site-specific issue and would be addressed during the LTP review. Since the LTP is approved by amendment to the facility license, the public will have the opportunity to participate in the review. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: If rubblization were technologically achievable, where on a plant site could the wastes be stored in perpetuity? Would that be above grade or below? **(CL-51/14)**

Response: *An explanation of rubblization and the location of the demolition debris is given in Section 1.3. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The question goes to the issue of the rubblization and the language in the GEIS that puts part of it out of scope and part of it is discussed as being covered under the generic environmental impact statement supporting the license termination rule. The heart of the comment and question really gets at the issue that from our perspective is not yet covered in that license termination rule and the assumptions embedded in that GEIS. And that has to do with the scenario of what happens and what are the assessments for the radiological materials post license termination. The rubblization is one angle that begs that question...The question is do you need to assume some refurbishment scenario post-license termination?...The question the industry asks is how do we address that? Do we come up with some scenario and refurbishment that would account for that? What would that scenario look like? We need that information so that we can do those assessments....Again, the issue is post-license termination. How do you assess a potential risk to a member of the public from that material?...The question is, is there some unique pathway that needs to be assessed for this material, such as an intruder pathway?...Our understanding was this GEIS would sort of beef that up because of this new idea; however, it appears that was sort of left out of scope and appropriately maybe so. Perhaps that is in the scope of the license termination rule. **(AT-E/1)**

Response: *The License Termination Rule does not contemplate post-license termination assessments for radiological hazards. The staff finds that the site-release criteria are sufficiently conservative to protect public health and safety and the environment for any reasonable post-license termination use of the site. The expectation is that any potential pathway would be addressed during the site-specific review of rubblization that occurs during the LTP review. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: We concur with the GAO findings as reported in GAO-02-48 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could be Improved" dated December 2001. GAO reported the following conclusions: "rubblization represents a departure from NRC's past licensing practice, which emphasized shipping low-level radioactive wastes from decommissioning sites to disposal sites. Although NRC has estimated that rubblization could save a licensee from $10 million to $16 million in waste disposal costs during decommissioning, its Advisory Committee on Nuclear Waste has concluded that technical factors, such as the depth of radioactive contamination and the volume of rubblized waste, could significantly diminish the potential cost savings. The Advisory Committee also believes that evaluating radioactive material content and doses from rubblization, both at the site and in local groundwater, may prove difficult and expensive." **(CL-48/31)**

Response: *Rubblization requires a site-specific analysis, as noted in Section 1.3 of the Supplement. The staff acknowledges that technical factors related to the site and the licensee's actions could significantly influence the cost savings. Additionally, the staff acknowledges that it may be difficult to demonstrate that the material can be safely disposed of in the below-ground structures on site. These and other factors have led the staff to conclude that the radiological effects of rubblization would necessarily have to be considered on a site-specific basis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I find it hard to believe that the massive structures of concrete and steel reinforcing bars found in a typical commercial power plant could be rubblized. The complexity and size of the task seem overwhelming. What technologies could be used to dismantle the base mat of the Callaway reactor building, for example: 13,400 tons of concrete plus 1,470 tons of intertwined #18 reinforcing steel bars? Do most 1,000-megawatt pressurized water reactor containment building have similar base mats? **(CL-51/12)**

Response: *The staff believes that if a licensee chose to rubblize a portion of their facility and dispose of the slightly contaminated rubble onsite they would only rubblize above-ground structures. Rubblizing a base mat for a reactor would not be necessary or required. The deconstruction industry is very effective in rubblizing reinforced concrete and it is done quite frequently. San Onofre recently rubblized several uncontaminated structures onsite, separating the reinforcing steel from the concrete. The effort was accomplished without incident. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.2.4 Safety of Decommissioning

O.2.4.1 Issues Related to Terrorist Events

Comment: Getting onto a brief comment on security, as many things are being reviewed in light of September 11, the decommissioning of nuclear reactors should be no exception. From what I've heard today, it sounds like there will be some sort of analysis of security issues and I hope that's directly relating to this decommissioning document. As we know, the draft EIS is grossly deficient in ensuring that security measures are taken to protect our homeland security from threats of sabotage at a nuclear plant. Georgians for Clean Energy request that a thorough amended review of necessary security measures be compiled by the NRC and added to the supplement. **(AT-A/12)**

Comment: If there is the possibility of release during decommissioning, then that should be something that should be accounted for especially in light of concerns of attack. **(CH-A/9)**

Comment: The terrorist attacks of September 11, 2001 have raised many issues concerning the currently, inadequate security of our nation's nuclear reactors. Because decommissioning creates opportunities for release of spent fuel and structures contaminated with radioactive material, the Final GEIS should revisit the appropriate security needed during decommissioning. **(CL-11/12)**

Comment: While EPA did not identify security issues during the GEIS scoping process, the events of Sept. 11 have brought them to the forefront of public concern. EPA suggests that NRC include in the final Supplement a general discussion on how the Commission is addressing security from terrorism at plants undergoing decommissioning. **(CL-16/9)**

Comment: I do want to talk about the physical protections and the existing regulations under 10 CFR 73.55. I guess I could state this as more or less of a question. For example, what measures will the Commission employ during decommissioning to protect against radiological sabotage? **(AT-F/2)**

Comment: Even 10 CFR 73.55 falls short in our estimation in the preparations for such a scenario. 73.55 considers only primary physical security barriers for vehicles, for isolation zones, for access to the plant, for detection of intrusion and what not. For example, it mentions that there [would] be bullet resistant walls, floors and doors in reactor control rooms. Well plainly this 10 CFR 73.55 needs to be updated because this is woefully inadequate to consider anything which is now possible after September the 11th. **(AT-F/4)**

Comment: Security must be upgraded, not downgraded. **(CL-20/74)**

Comment: EVERY SITE, OPERATING OR NOT OPERATING, IS A PRIME TERRORIST TARGET AS I HAVE SAID FOR DECADES. **(CL-20/79)**

Comment: It ought to be equally obvious that a serious accident or terrorist act in this industry could be catastrophic, leaving immense fatalities, injuries, future cancer victims and vast areas uninhabitable for years. **(CL-42/3)**

Comment: A reduced security force at a decommissioned nuclear plant increases the threat of terrorism. A thorough amended review of necessary security measures during decommissioning of nuclear facilities [due to 9/11] must be compiled by the NRC and added to the supplement. **(CL-53/2)**

Comment: The danger to the public from a terrorist act is a function of the total level of radiation that exists on one given site. We cannot do anything about the total level of radiation in a global sense, but through government regulations we could do something about the amount of radioactive material that is stored at any one location. **(SF-C/6)**

Comment: But I think that there is an overall concern, which I know that this doesn't address, and that is the vulnerability of nuclear power plants to various acts of terrorists. And I don't think it should be ignored, and I think that we should be very concerned about it. **(SF-C/3)**

Comment: Before September 11th, I probably felt that the SAFSTOR approach was one of the best things, to let them sit for 10, 20 years, and let the radioactive level decrease significantly before you try to disperse it. I no longer think that. And yet I just heard, well, the licensees have 60 years to decide, and they can do anything they want. And I don't think that's a danger that the public should put up with. **(SF-C/4)**

Response: *NRC and other Federal agencies have heightened vigilance and implemented initiatives to evaluate and respond to possible threats posed by terrorists, including the use of aircraft against commercial nuclear power plants. Malevolent acts remain speculative and beyond the scope of a NEPA review. NRC routinely assesses threats and other information provided to them by other Federal agencies and sources. The NRC also ensures that licensees meet appropriate security levels. The NRC will continue to focus on prevention of terrorist acts for all nuclear facilities and will not focus on site-specific evaluations of speculative environmental impacts. While these are legitimate matters of concern, they should continue to be addressed through the ongoing regulatory process as a current and generic regulatory issue that affects all nuclear facilities and many activities conducted at nuclear facilities. The NRC has taken a number of actions to respond to the events of September 11, and plans to take additional measures. However, the issue of security and risk from malevolent acts at nuclear*

power plants is not unique to decommissioning facilities and, therefore, is not within the scope of a Generic Environmental Impact Statement (GEIS) on decommissioning of nuclear power plants. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: With regard to the threat of attack, I think this relates to our second point. The document was prepared after September 11th, but it doesn't seem to respond to September 11th. We think the document should be responsive to the events of September 11th. What is NRC going to do to make sure that facilities are protected and secure during decommissioning? Has that changed in response to the threat of terror attack? We think it should. **(CH-A/8)**

Comment: In light of September 11th it is now abundantly clear that nuclear materials are desired by terrorist organizations. Our nation's operating nuclear power plants represent terrorist targets, but so too does the nuclear waste they generate. Since a decommissioned nuclear power plant would have a greatly reduced security force, the closed plant could provide an easier opportunity for terrorists to obtain nuclear materials. In the case of plants like Hatch that have outdoor storage of nuclear waste, the notion of a reduced security force is even more troubling. Georgians for Clean Energy again stresses the need for a full evaluation of security measures to be assessed prior to issuing a final GEIS. **(CL-08/3)**

Comment: NRC staff mentioned at the public meeting on 12/12/01 that a full, top-to-bottom review of security concerns would be conducted. Georgians for Clean Energy urges that this review be done prior to the issuance of the final generic impact statement for decommissioning (GEIS). **(CL-08/34)**

Comment: The massive destruction of September 11th accomplished by the Al Qaeda terrorists has rendered the Waste Confidence Policy ineffective and obsolete. No reasonable person can be assured that high-level nuclear waste can be safely stored at plant sites under present conditions. The GEIS fails to consider the consequences of acts of terrorism and acts of war perpetrated by suicidal zealots against spent fuel facilities at decommissioned nuclear plant sites. This failure of the GEIS needs to be remedied. **(CL-14/6)**

Comment: In the aftermath of September 11th, NRC and licensees must address earlier assumptions that decommissioning was less dangerous than operation and that security measures and insurance could be reduced because of it. Nuclear fuels pools as well as on site dry cask storage of high-level waste are targets for terrorism. In fact decommissioned sites could be selected as targets because there is less security and oversight during decommissioning and the monitoring of the ISFSI. NRC must require increased security and the

reinstatement of insurance provisions. Additionally, emergency preparedness drills and the EPZ should be reestablished. KI should be stockpiled in communities since the potential for off site consequences from a terrorist attack is possible. **(CL-50/28)**

Comment: The threat of terrorism: With terrorism now a legitimate concern in the United States, the potential of a suicide assault on a nuclear plant - whether the plant is operable or decommissioned - must be assessed plant by plant, not generically. **(CL-51/21)**

Comment: THE SPENT FUEL IS THE ULTIMATE IN TERRORIST TARGETS. **(CL-20/80)**

Response: *Malevolent acts affecting the physical security of nuclear power plants is an important issue for all reactors, both operating and permanently shut down, and is not unique to reactors in the decommissioning process. Shortly after the events of September 11, 2001, the NRC initiated a comprehensive review of its security requirements at nuclear power plants to ensure that the appropriate level of protection is in place for both operating and decommissioning reactors. The safety review will transcend the entire NRC licensing framework (operating reactor licensing, license renewal, decommissioning etc.) to fulfill NRC's responsibilities under the Atomic Energy Act. The findings resulting from the NRC's comprehensive review of its security requirements and whatever actions the Commission determines to be appropriate will be required of decommissioning reactors. Comments related to physical security considerations at decommissioning facilities have been forwarded to the appropriate program office within the NRC for consideration during the Commission's comprehensive review of security requirements. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Indeed, under the current plan, facilities under SAFSTOR will have fewer personnel at the site even though the radioactivity of the material will still be high. With less security, these facilities are at greater risk for attack. **(CL-11/13)**

Comment: Since a decommissioned nuclear power plant would have a greatly reduced security force, the closed plant could provide an easier opportunity for terrorists to obtain nuclear material. **(AT-A/14)**

Response: *Changes in the level of security at a nuclear power plant during decommissioning would be related to the type of activities and the area that requires protection. The Commission has initiated activities to reassess security issues in light of recent terrorist activities with the principal objective of maintaining public health and safety. While these are legitimate matters of concern, they should continue to be addressed through the ongoing regulatory process as a current and generic regulatory issue that affects all nuclear facilities. Comments related to physical security considerations have been forwarded to the appropriate program office within*

the NRC for consideration. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: If an organization like ours can spot a train carrying very dangerous radioactive waste, any terrorist organization can do the same thing. You've got to take that into consideration. **(AT-B/11)**

Comment: Re 9/11: I direct you to a quote from a recently published German report concerning the vulnerability of the Castor containers to terrorism: "The fact that all the technical data used in the report can be accessed by terrorists does not imply that a more restrictive policy towards information is required. Rather, it should be regarded as an argument against the use of a technology which is, at the time, hazardous and complex to a large degree, creating a conflict between the necessary societal discussion on the one hand and the protection of society from terrorist attacks on the other." **(CL-27/3)**

Response: *NRC routinely assesses threats and information provided to the NRC by other Federal agencies and other sources and ensures that licensees meet appropriate security levels. This issue will remain a priority for the NRC even during the transportation of the spent fuel. However, as discussed in Section 1.0, transportation of the spent fuel is outside the scope of the Supplement. Comments related to physical security considerations have been forwarded to the appropriate program office within the NRC for their consideration. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.2.4.2 Safety of Decommissioning

Comment: We're also concerned about safety. With reduced staffing as mentioned in the document, there's an increased risk of accident [and] the threat of attack on these sites with huge environmental and human consequences. **(CH-A/7)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. Staffing reductions at decommissioning power facilities are made commensurate with the reduction in risk associated with the facilities' permanently shutdown condition. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Every shut down reactor can take us a step closer to a sustainable energy future but, unfortunately, reactor shut down is not the threshold of safety, where the public can be assured that no health or environmental dangers will originate from the site. **(CL-47/6)**

Comment: Since many nuclear contaminants are extremely long-lived and dangerous to humans and the environment, decommissioning measures need to be handled most carefully, as our future generations literally will depend on how well the job is done today. **(AT-A/10)**

Comment: The notion presented by industry and others that decommissioning is inherently safe because the plant is no longer operating is a deceptive argument that confuses the public. Due to the nature of radiation, even after shutdown, parts of the plant, as we know, remain highly contaminated and extremely radioactive. The nuclear waste, such as the spent fuel produced by the plant during operation generates heat and emits radiation for thousands of years after the plant is shut down. Therefore, there is risk to the workers at the plant and to the local communities during decommissioning. **(AT-A/11)**

Response: *Decommissioning results in a reduction of the risks associated with the nuclear power plant. No major decommissioning activities take place until the fuel has been permanently removed from the reactor. Those risks associated with nuclear power plant operation are eliminated when the spent fuel is permanently removed from the reactor and placed in spent fuel storage. The risks continue to decrease as contaminated structures and systems are cleaned up and dismantled and the contaminate material is shipped offsite. Risks associated with storage of spent fuel are also reduced over time but are outside of the scope of this review. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC must address the subject of radiation dangers after decommissioning HONESTLY, USING THE BEST INDEPENDENT RESEARCH, including: --exposure of children --exposure of the weak, the ill, the elderly --offsite contamination --credible, not arbitrary, environmental impact categories FOR EACH STEP OF A DECOMMISSIONING. **(CL-36/6)**

Response: *Potential radiological impacts following license termination that are related to activities performed during decommissioning are not considered in this Supplement, as discussed in Table 1-1. Such impacts are covered by NUREG-1496, Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities and given in regulations in 10 CFR Part 20. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The workers were not prepared. They didn't—whatever the—the moon suits they were supposed to wear or something, they often didn't. And it was—I mean it's dangerous. **(AT-D/2)**

Response: *Radiological conditions that workers are likely to be exposed to dictate the need and type of protective clothing to be used for a specific task. The industry has a remarkably good safety record when it comes to radioactive contamination and exposure. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It affects people's health. Workers especially who are not warned, who are not protected. **(AT-D/11)**

Response: *Training is required including notification of hazards for each specific job that involves the actual or potential exposure to radiation. In addition, there are regulations controlling the occupational doses to the workers. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.2.4.3 Risk-Informed Regulations

Comment: The U.S. Nuclear Regulatory Commission (NRC) has applied extraordinary effort to risk-inform reactor oversight but, save for Appendix G of this report, has avoided translation of environmental impacts from dose based-language to risk-based language. **(CL-13/1)**

Response: *The commenter is correct. The Supplement does not use risk-based language for the major portion of the Decommissioning Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The whole approach—the whole probablistic approach to risk is inappropriate. You must assume that whatever can go wrong will go wrong and that should be the level at which your risks are evaluated, not some unrealistic dream-like assessment of probability that isn't real world anymore. **(AT-B/12)**

Response: *The use of probabilistic risk assessments (PRA) as a tool to support regulatory decision making is a well established process that has been fully vetted, publically discussed, and widely accepted. The use of PRA by the industry and NRC staff complements the staff's deterministic approach to evaluating safety and supports the more traditional defense-in-depth philosophy. One of the primary reasons to employ a PRA approach is to achieve greater realism and effectiveness in evaluating and regulating what precisely is important and safety-significant. Evaluating every conceivable accident scenario without regard to its probability of occurrence is not realistic, wasteful of resources, and does not lead to good regulatory decisions. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Instead, the NRC has chosen to abandon its former regulatory philosophy (defense in depth and redundancy of safeguards) in favor of the far less restrictive and less protective approach (performance-based and risk-informed). **(CL-52/22)**

Response: *The NRC staff has not chosen to abandon its former regulatory philosophy. Defense-in-depth, which includes redundancy, remains a principal element of the NRC safety philosophy. Any application of risk-informed or performance-based regulation must be entirely consistent with the principals of providing for defense-in-depth and maintaining adequate safety margins. See Regulatory Guide 1.174, "An approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis", July 1998, for a detailed discussion of the NRC's regulatory guidance on risk-informed decision making. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.3 Decommissioning Process

Comment: The location of intake and outfall structures in the lake alone requires site-specific analysis. As written, the Draft GEIS does not make clear whether an intake/outfall structure on the facility is considered part of a previously disturbed area. If deemed part of the previously disturbed area, any work on the intake/outfall structure will be deemed generic and the impact small. **(CL-11/6)**

Response: *Chapter 4 of the Supplement has been extensively revised and the concept of "previously disturbed area" is no longer the criteria for initiating a site-specific analysis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 3-5, Section 3.1.2, Lines 31-33 and Page 3-8, Lines 13-16. The document states on page 3-5 that "the impacts of dismantling all SSCs (structures, systems and components) that were built or installed at the site to support power production are considered in this Supplement." It then states on page 3-8 that the Supplement does not evaluate switchyards which "may remain on the site." If they are dismantled, would they be evaluated? **(CL-16/17)**

Response: *None of the facilities that have recently permanently ceased operation have dismantled their switchyards. However, if licensees choose to remove the switchyards it could be accomplished with little or no impact to the environment. The staff, in deciding the scope of the Supplement, attempted to place reasonable limits on the analysis. Since historically*

licensees generally maintained the switchyard the staff chose to not include it in the assessment of potential impact. The comment did not provide new information relevant to this supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Could you explain to me what that [previously disturbed area] would mean for an intake for water for cooling at the facility. Would that, does anything happen to that intake position during decommissioning? **(CH-A/3)**

Response: *Chapter 4 of the Supplement has been extensively revised and the concept of "previously disturbed area" is no longer the criteria for initiating a site-specific analysis. The intake structure, for the purpose of this Supplement, is considered within the operational area (the concept that replaced "previously disturbed area"). The licensee may choose to remove the intake structure during decommissioning, could wait until after the license is terminated to remove the intake structure, or could choose to leave the structure in place. The text was revised in several sections of this Supplement to better describe this issue.*

Comment: Major component removal should not be approved with the submission of a Post Shutdown Decommissioning Activities Report (PSDAR). A clear definition must be established to clarify what constitutes major and minor component removal. Approval of decommissioning plan should be required before major decommissioning activities begin. The PSDAR does not afford the community effective input into the decommissioning process since this document is a skeletal outline of generalized activities planned by the licensee. **(CL-50/7)**

Response: *Major decommissioning activities are clearly defined in 10 CFR 50.2. Regulatory Guide 1.184, Decommissioning of Nuclear Power Reactors, July 2000, provides additional clarification on major and minor components and what can be removed prior to submission of the PSDAR. The NRC regulations do not require the approval of a decommissioning plan prior to the commencement of major decommissioning activities. The purpose of the PSDAR is to inform the public and the NRC of the licensee's plans for the decommissioning of the facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The original site maps and drawings and photos made during construction should be consulted (some building techniques may have changed) all modifications and revisions should be tracked down. All vent systems should go through both HEPA (for the chemicals) and sand filters. Additional containment should be added around spent fuel pools including over the top and beneath it, extra supports, new liners. They will suffer serious embrittlement and activation, same goes for the casks. Such issues must be addressed. **(CL-20/72)**

Response: *Licensees are required by 10 CFR 50.75(g) to keep records of information important to the safe and effective decommissioning of the facility. Records of spills or unusual occurrences as well as "as-built" drawings and modifications to structures, systems, and components are covered by this requirement. The licensee is also required to use procedures and processes to accomplish decommissioning in a safe manner and to keep doses to the public and to the workers As Low As Reasonably Achievable (ALARA). The staff does not prescribe specific requirements related to facility decommissioning. The detailed suggestions made by the comment are outside the scope of this environmental assessment. The staff does, however, oversee the decommissioning process to ensure that appropriate regulatory requirements are being met. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The License Termination Plan (LTP) should be established, reviewed by the public and approved by the NRC before site remediation begins. **(CL-50/18)**

Response: *The NRC regulations require that the licensee submit the License Termination Plan (LTP) approximately two years prior to expected termination of the license. This could, depending on the decommissioning option chosen, be anywhere from approximately 3 to 58 years after permanent cessation of operation. Therefore, the current regulations (10 CFR 50.82) allow for site remediation to begin prior to submission and approval of the LTP. The regulations require that the NRC staff conduct a public meeting related to the LTP submittal in the vicinity of the plant. Since the LTP is approved by amendment to the facility license, the public will have the opportunity to participate in the review. Amendment of NRC regulations is outside the scope of this Supplement. NRC rulemaking procedures are found in 10 CFR Part 2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: But things that shouldn't have been done did happen and things—you know, when they were washing some of the surfaces to prepare for cutting apart and shipping the wash water—I've spoken about this to some of the people already. It just went into the ground. It was supposed to be contained and it wasn't. And other things like that, that happened that were not supposed to happen, but they do happen. **(AT-D/5)**

Response: *Although infrequent, inadvertent releases of radioactive material during decommissioning occurs, the amount and consequences of those releases in the past have been minor and pose no threat to public health and safety. Past Releases to the environment have been remediated or determined to be of inconsequential health risk. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: One idea that we've talked about for a long time, and we actually had a big meeting about it and I think the idea is probably still alive, the site-specific advisory board. **(AT-G/4)**

Response: *Licensees at many decommissioning facilities have developed site-specific advisory boards that are composed of elected officials, technical experts, and members of the local public. These boards have been used as a means of keeping the public informed regarding the decommissioning process and to provide public input to the utility. The NRC encourages the use of these boards and frequently attends the meetings. However, NRC regulations do not require the formation of these advisory boards, nor is the NRC involved in their formation or their maintenance. This subject is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: My direct experience is limited to having heard an eyewitness account of the decommissioning of Yankee Rowe. This person reported a whole list of unfortunate incidents that released contamination into the air and groundwater, contaminating workers on site who were not wearing protective clothing, and possibly contaminating people along the rail and truck routes where parts of the plant were being transported. **(CL-10/3)**

Response: *Occasional releases of radioactive material have occurred at Yankee Rowe during decommissioning. Such events have been documented, investigated, and determined not to pose any risk to public health and safety. Specific information on the decommissioning at Yankee Rowe can be found in the NRC's ADAMS information system under docket number 050-00029. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Technical Specifications and what the facility was allowed to dump under the license are outdated and bear no resemblance to current knowledge and should be junked and the whole thing done over. **(CL-20/14)**

Response: *The comment is nonspecific. The Technical Specifications for the decommissioned facility are modified as decommissioning progresses through the license amendment process. Releases of radioactive material from the facility must be consistent with the regulations. The release limits are the same for decommissioning plants and operating plants. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: To find out the extent of past problems, and contamination levels, IT IS VITAL THAT THE NRC; THE LICENSEE (as some are new owners/licensees), AND THE CONTRACTORS AND SUB-CONTRACTORS, GET ALL REPORTS OF ACCIDENTS,

LICENSEE EVENT REPORTS, VIOLATIONS, INSPECTION REPORTS, SPILLS AND CONTAMINATION EVENTS FROM THE DOCKET FOR THE REACTOR AND SITE IN QUESTION. **(CL-20/22)**

Response: *The staff agrees that those NRC staff members responsible for the oversight of the facility decommissioning should have access to and become familiar with the relevant NRC documents. Licensees are required by 10 CFR 50.75(g) to keep records of information important to the safe and effective decommissioning of the facility. Records of spills and unusual occurrences as well as "as-built" drawings and modifications to structures, systems, and components are covered by this requirement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: NRC must stipulate, that ALL CONTRACTORS AND SUB-CONTRACTORS RIGHT DOWN TO THE BACK-HOE OPERATORS MUST BE HIGH SCHOOL GRADUATES. Cleanup cannot just be dished out to any contractor, all involved should not only have a sterling track record, but experience in nuclear fields. There should be a radiation biologist on site, plus a health physicist, plus a wildlife biologist with a knowledge of radiation effects, plus there must be federal and state oversight ON THE SITE at all times. **(CL-20/23)**

Response: *Qualifications and educational requirements for various licensee positions are specified in the regulations in 10 CFR Part 50 and are outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: ALL workers must have self-contained breathing systems (moon-suits). **(CL-20/32)**

Response: *Requirements for personnel protection are outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The use of high pressure water sprays is obscene. **(CL-20/69)**

Response: *High-pressure water sprays have been used to decontaminate structures, systems, and components and are an effective and safe method of decontamination. The use or non-use of specific decommissioning equipment is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Methodology must be established to locate and collect for proper disposal contaminated tools, soils, concrete blocks, plywood and other building materials that may have been taken offsite by workers during reactor operation such as was the case at Connecticut Yankee and Yankee Rowe. **(CL-50/15)**

Response: *Licensees, as part of their radiological control procedures, have established requirements to limit the spread of radioactive contamination from tools. The recovery of contaminated material improperly released from facilities undergoing decommissioning is outside the scope of this document. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It is obvious that the reactor vessel should NEVER be cut up, but do what was done with the Trojan vessel (p.G-18, remove the whole thing offsite) **(CL-20/58)**

Response: *Although the intact shipment of the reactor vessel greatly reduced the dose to the workers and the cost of removal, it was only facilitated because of the proximity of the Trojan Nuclear Plant to the low-level waste site at Hanford, Washington, the ability to use the Columbia River, a navigable river that allowed the barge transport for the reactor vessel, and the ability of Hanford to take the vessel for disposal. The industry has had experience in removing reactor vessel internals and, in the case of Shoreham, did segment and dispose of the reactor vessel. Such activity has been performed safely in the past and without serious injury or release of radioactivity to the environment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: However, the vessel should have additional shielding placed around it prior to placement on the heavy haul trailer, and upon arrival at the disposal site it should be further encased in what would amount to a giant burial cask. **(CL-20/59)**

Response: *Licensees must comply with NRC standards for allowable offsite radiation; regulations for transportation of waste materials are in 10 CFR Part 20, Subpart K. Additional shielding beyond that required by NRC regulations is not required to protect the health and safety of workers or members of the public. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Removing the vessel offsite massively reduces worker doses, water contamination and the contamination to the local community and the environment. **(CL-20/60)**

Response: *The comment was not specific and did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I noticed that it said cutting methods included abrasive water G-17, but in any case where there is plutonium contamination or depleted uranium metal, that all is meant to be cut under heavy oils and much else besides. Since many of the components will have been contaminated with plutonium, or were made of depleted uranium (when is the NRC going to tell the public that DU is NOT radioactive waste?) **(CL-20/57)**

Response: *Abrasive cutting of structures, systems, and components has been used frequently in decommissioning operations (Trojan, Fort St. Vrain, Haddam Neck). Such activities require stringent contamination control measures and occur inside buildings or structures, such as the containment building, which are designed to contain radioactive contamination. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: No structural remains should be sent to local landfills. **(CL-20/75)**

Response: *Only materials that have been carefully surveyed and determined to have no detectable radiation are allowed to be released from the plant. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4 Out-of-Scope Issues

O.4.1 Reuse of Materials Offsite

Comment: In a related issue, there continues to be a gap in regulations concerning the release of slightly contaminated solid materials. In both partial site release without a license termination plan and license termination for the entire site, residual radioactivity may remain as long as the exposure criterion of 10 CFR 20 Subpart E is satisfied. Conversely, this same residual radioactivity is treated as licensed material prior to license termination--regardless of how little the amount, concentration, or dose significance--and can only be disposed of at a licensed facility. This double standard poses an incentive to retain radioactive material onsite until the license has been terminated to avoid potentially excessive costs for radwaste disposal, while creating a longer term risk for additional site cleanup required by other regulator authority or court of law. While we recognize that the U.S. Nuclear Regulatory Commission (NRC) is seeking to resolve this discrepancy through study by the National Academy of Sciences, and further agency deliberation, this process may take several years. Prolonged delay contributes to the erosion in public understanding and confidence in government policy as well as the lack

of resolution mentioned above for licensees. Public policy is needed to define the quantitative dose and radionuclide characteristics that have no discernible public health consequences. **(CL-01/8)**

Comment: The release of scrap metal from power reactors undergoing decommissioning will present a far more insidious problem than orphan sources, by greatly increasing the volume of radioactive scrap arriving at, and the frequency of alarms at, metals companies. This poses a serious problem for the suppliers and transporters, who must manage and arrange for the ultimate disposition of the rejected scrap. It would have a similarly enormous adverse impact on the smaller producers, foundries, scrap dealers and processors, fabricators, and end product manufacturers. Metals companies experiencing several alarms daily would continue to incur enormous costs, either unfairly increasing their manufacturing costs or compelling them to raise detection levels to above background, thereby exposing themselves to increased risk of inadvertently melting sealed sources. Receipt of even slightly elevated levels of radioactively contaminated scrap imposes enormous costs on metals companies. **(CL-03/6)**

Comment: No radioactively contaminated parts should be allowed into consumer use, commerce, or unregulated disposal. **(CL-39/3)**

Comment: Georgians for Clean Energy also opposes any efforts by the nuclear industry or licensee of a decommissioning nuclear plant to "recycle"—and I use that in quotes—radioactive materials for release into the marketplace. It is appalling that there may be an option for companies involved in a technology that can cause its own facilities to become radioactive, to financially benefit from selling the hot garbage to unsuspecting citizens in the form of daily household products. **(AT-A/38)**

Comment: Georgians for Clean Energy also opposes any efforts by the nuclear industry or licensee of a decommissioning nuclear plant to "recycle" radioactive materials for release into the marketplace. No facilities should be able to sell their demolition debris. Instead, it should be dealt with as regulated nuclear waste since the bulk of the materials will be radioactively contaminated. **(CL-08/23)**

Comment: The radioactive components, parts, liquids i.e. anything part of or to do with or emanating from the structures and the site MUST NEVER BE RE-CYCLED, OR RE-USED. **(CL-20/109)**

Comment: NRC MUST IMMEDIATELY CEASE ALLOWING, OR THINKING OF ALLOWING, RADIOACTIVELY CONTAMINATED SOIL TO BE RE-USED FOR ANYTHING. **(CL-20/110)**

Comment: Has the NRC no common sense at all? Releasing radioactively contaminated materials into daily consumer use and commerce and unregulated disposal is a direct assault on humanity. Don't let this happen. **(CL-23/1)**

Comment: Although it is not certain, a strong possibility exists that power reactors could release scrap metal that has a serious impact on the environment, such as by contaminating the soils or groundwater underneath a scrap yard or by escaping detection and becoming melted inadvertently in a metal company furnace. Furthermore, certain isotopes in scrap metal that escape detection before melting may accumulate and concentrate in emission control systems at metals company facilities, to the extent that metals producers could generate low-level wastes ("LLW") or mixed wastes. **(CL-03/3)**

Comment: Even if NRC eventually does establish dose-based clearance standards for solid materials, thousands of tons of scrap metal with residual radioactive contamination still would be released into the economy or sent to LLW or industrial waste landfills. **(CL-03/4)**

Comment: The economic and socioeconomic impacts of decommissioning, coupled with the lack of health-based release criteria using dose-based standards, create a disturbing incentive for the nuclear power industry to release as much surplus metal as it can into the economy and market it as useful material, rather than incurring additional disposal costs when the scrap metal meets general regulatory release guidelines but may contain levels of residual radioactivity unacceptable to metals producers. NRC's recognition of these economic and socioeconomic impacts and its concurrent failure to consider the impacts of contaminated scrap metal on the metals industries create the mistaken impression that the agency has covered all of the significant impacts of decommissioning. **(CL-03/8)**

Comment: We oppose any unlicensed disposition of long-lasting radioactivity from the nuclear fuel chain activities. As long as radioactive materials remain, someone should retain a license for those materials, and responsibility for them. That burden should not be shifted to the states and local communities without clear acknowledgment of the stewardship responsibility for that material. **(CL-48/17)**

Comment: I specifically oppose any release of contaminated materials during decommissioning or other times/procedures. **(CL-38/7)**

Comment: Concerning the scope of this hearing and to what extent the radioactive contamination levels that are permitted to be released from regulatory control for decommissioning are being used to release radioactive materials routinely. **(SF-D/2)**

Comment: We would oppose any release of contaminated materials during decommissioning or other times. **(SF-D/3)**

Comment: I Firmly oppose the "release" of radioactively contaminated materials into daily consumer use and commerce and unregulated disposal. **(CL-24/5)**

Comment: I stand firmly against the "release" of contaminated materials into daily consumer contact and commerce or unregulated disposal. **(CL-25/11)**

Comment: I stand firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal. **(CL-26/15)**

Comment: I oppose the release of radioactive contaminated materials into daily consumer or commercial uses. **(CL-29/3)**

Comment: I stand firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal. **(CL-37/1)**

Comment: The Supplement indicates that portions of a nuclear reactor site could be released from regulatory control prior to the site operator's license termination. This would relieve the nuclear utility of responsibility and liability for portions of sites (be they materials or real property) while still being licensed for the control of the entire site. Public Citizen is completely opposed to any such practice, which would allow radiation/radioactively-contaminated materials and wastes to be released, reused, or recycled, without restriction, into the unregulated industrial, commercial, and public environment. **(CL-47/16)**

Comment: Subsequent uses of these "slightly contaminated" materials and wastes—in roadbeds, or construction, consumer products, or other objects individuals may contact—will each add to the radiation doses received without knowledge or consent of the recipient. **(CL-52/16)**

Comment: NRC defines decommissioning, in part, to include the "release of property for unrestricted use...." and the "release of property under restricted conditions..." NIRS stands firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal. **(CL-48/49)**

Comment: The NRC must NOT permit "release of property for unrestricted use" or under "restricted conditions." To permit the release of radioactively contaminated materials into daily consumer use and commerce, or to allow unregulated disposal of such materials is abhorrent. Bin Laden might approve of such an interesting experiment; I trust that the NRC does not and will not. **(CL-36/7)**

Comment: MIRC appreciates the opportunity to comment on the draft Supplement and urges NRC to consider in the final Supplement to the GEIS the environmental impacts of releasing radioactively contaminated scrap metal into the economy for unrestricted use, as well as the economic impacts on the metals industries and related socioeconomic impacts. **(CL-03/9)**

Comment: The Supplement does not discuss the potential environmental impacts of releasing scrap metal or other solid materials pursuant to NRC's unrestricted release guidance, except to state that licensed facilities must comply with standards in 10 CFR. Part 20, limiting the sum of allowable internal and external doses to individual members of the general public to 0.1 rem per year. NUREG-0586 at 4-26. (Allowable doses to individual members of the public following license termination are limited to 25 millirem per year during the control period and 100 millirem per year after the end of institutional controls. See 10 CFR § 20.1402) **(CL-03/2)**

Comment: IF NRC, EPA, THE DOE AND OTHERS DO NOT STOP THIS INSANE RUSH TO REUSE, RECYCLE, DUMP AND COVER ETC. NUCLEAR MATERIALS, RADIOACTIVE MATERIALS, ACTIVATED MATERIALS ETC., WITHIN FIFTY YEARS NO LIVING BEING WILL BE BORN WITHOUT SOME TYPE OF DEFORMITY, GENETIC ABNORMALITY, CHROMOSOME ABERRATION ETC AND THE IMMUNE SYSTEMS OF EVERY LIVING BEING WILL BE SERIOUSLY COMPROMISED DUE TO RADIATION SUPPRESSING THE IMMUNE SYSTEM RESPONSE, AND ALL BECAUSE WE WILL BE COMPLETELY ENGULFED IN A MIASMA OF MANMADE, OR MAN ENHANCED, RADIOACTIVE CONTAMINATION. **(CL-20/112)**

Comment: These exposures from multiple unmonitored, unlabeled, uncontrolled sources are in no way accounted for, but they are additive and cumulative for the individual. They violate the fundamental tenet of radiation protection: viz., that the recipient of a radiation dose that is in addition to naturally-occurring background exposures should receive a benefit equal to or greater than the risk incurred. **(CL-52/17)**

Comment: IT MUST FORBID THE MELTING, SMELTING OR RE-USE OF RADIOACTIVELY CONTAMINATED METALS, PIPING, PLASTICS, WOOD, (INCLUDING FORBIDDING THE BURNING OF WOOD), ASPHALT, AND SO ON. **(CL-20/111)**

Comment: As we have previously commented in other dockets, there should be no release of radioactively contaminated material of any kind into consumer use or into general commerce. Disposal of all materials from decommissioning needs to be regulated, regardless of whether they are radioactive or not. **(CL-40/4)**

Comment: The NRC should not permit radioactive materials or wastes to be released into the environment. That is the basic message, the rightful demand of all those who will be affected negatively by releases. **(CL-52/18)**

Comment: Because the costs of sequestration ("disposal") of wastes is high, and deemed to be a "burden" for the licensee, the agency continues its endeavor to allow massive deregulation—release, recycle, and re-use—of radioactively-contaminated materials and wastes and their entry into the "free market" for resale and reuse in a host of consumer products. **(CL-52/15)**

Response: *During the decommissioning process, solid materials may not be released, recycled, or reused if there are detectable levels of licensed radioactive material present. Solid materials are carefully surveyed before release. The NRC has an initiative underway to consider the reuse or recycling of slightly contaminated solid material. This issue is being considered in an open forum and is outside the scope of the Supplement. Comments on the reuse or recycling of solid material will be forwarded to the appropriate NRC office for consideration. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Since at least as early as 1974, NRC has espoused a policy of "unrestricted release" of solid materials, including scrap metal, from nuclear fuel cycle facilities, without any specific, health-based release criteria. Unlike NRC requirements applicable to gaseous and liquid releases from nuclear facilities, there are no specific criteria governing releases of solid materials by licensees. Requests to release solid material are approved on a case-by-case basis using existing regulatory guidance and license conditions. **(CL-03/1)**

Response: *The release criteria for scrap metals and other solid material from nuclear power reactors are not "health-based" because the release criteria are based on demonstrating that there is no detectable contamination on the material. While these criteria do not have a specific dose or risk basis, they are considered to be protective of public health. The NRC has an initiative underway to consider the reuse or recycling of slightly contaminated solid material. This issue is being considered in an open forum and is outside the scope of the Supplement. The evaluation of environmental impacts from the release of potentially contaminated solid materials is not within the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4.2 Partial Site Release

Comment: To categorize as "generic" "the release" from regulatory control portions of sites before they are completely decommissioned is not responsible. **(CL-39/2)**

Response: *The Supplement does not categorize partial site release as "generic". It does indicate that a proposed rule was issued on September 4, 2001 for partial site release prior to license termination. The partial site release rule does not advocate the release from regulatory control, portions of the site before they are completely decommissioned. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I utterly oppose allowing portions of sites to be released from regulatory control before the whole site is released. **(CL-33/8)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC allows portions of sites to be "released" from regulatory control before the whole site is released. **(CL-43/2)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow portions of sites to be "released" from regulatory control before the whole site is released. **(CL-44/6)**

Comment: NRC allows portions of sites to be "released" from regulatory control before the whole site is released. **(CL-48/37)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC allows portions of sites to be "released" from regulatory control before the whole site is released. **(CL-26/3)**

Response: *The partial site release rule does not advocate the release from regulatory control portions of the site before they are completely decommissioned. The rule requires that portions of a site released prior to NRC approval of the License Termination Plan must meet the same criteria as the entire site would at license termination. In providing public review of a proposed partial release, the NRC notices receipt of a licensee's proposal for a partial site release, regardless of the potential for residual radioactivity, and makes it available for public comment. The NRC is also required to hold a public meeting in the vicinity of the site to discuss the licensee's request for approval, or license amendment application in the case of impacted property, as applicable, and obtain comments before approving the release. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Again THERE MUST NEVER BE A PARTIAL OR FULL SITE RELEASE. ALL PROPERTY DEEDS MUST STATE THE SITES ARE NOT ONLY RADIOACTIVE, BUT SUPERFUND SITES, AS THAT IS WHAT THEY ARE. THE RIVER, LAKE, OCEAN BEACH

STRETCH OR WHATEVER IS NEXT TO THE SITE SHOULD BE POSTED AS RADIOACTIVE ALSO, EVEN IF THE SEDIMENT IS REMOVED, AS IT IS IMPOSSIBLE TO GET EVERYTHING. **(CL-20/73)**

Response: *A power reactor site or portions of a power reactor site that are released prior to termination of the reactor license would not qualify as a Superfund site with respect to a radiological hazard because the site or portion of the site would not be released from the NRC license until the licensee could demonstrate that the property posed no immediate or long-term radiological danger to the public. How former sites are identified, posted, or described in property deeds is outside the scope of NRC's mandate and regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the text of the Supplement.*

Comment: Partial release of property for unrestricted use should not be allowed until the LTP has been established, reviewed by the public, approved by the NRC and implemented on the given piece of land. Furthermore, methodology should be established for preventing recontamination of the released property through environmental migration e.g. rain, wind, etc and future decommissioning activities i.e. excavating, tracking or relocating contaminated materials. **(CL-50/19)**

Response: *The partial site release rule requires that portions of a site released prior to NRC approval of the License Termination Plan must meet the same criteria as the entire site would at license termination. In providing public review of a proposed partial release, the NRC notices receipt of a licensee's proposal for a partial site release, regardless of the potential for residual radioactivity, and makes it available for public comment. The NRC is also required to hold a public meeting in the vicinity of the site to discuss the licensee's request for approval, or license amendment application in the case of impacted property, as applicable, and obtain comments before approving the release. The partial site release rule does not specifically address methodologies for preventing recontamination of the released property. Licensees, however, have the same continuing responsibilities for controlling radiological releases onto property previously released for unrestricted use as they do for releases onto any other unrestricted areas adjacent to the site. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4.3 Disposal of Low-Level Radioactive Waste

Comment: The draft GEIS says that low-level radioactive waste disposal is not part of the scope of this GEIS. However, this would appear to be contradicted by the definition of decommissioning (pg. xii), and by the scope, the release and removal of Sites, Systems and Components (SSCs). **(CL-38/6)**

Response: *The disposal of low-level waste (LLW) is not within the scope of this Supplement as it is an activity performed at a facility that is separately licensed or regulated. Sections 1.2, "Process Used to Determine the Scope of this Supplement," and 1.3, "Scope of this Supplement," address low-level waste and how it is considered in this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:] "Low-level" Radioactive Waste Isolation; **(CL-02/6)**

Comment: You talk about burying it somewhere, well everybody is in danger when you do this kind of thing. **(AT-D/7)**

Response: *The disposal of LLW is not within the scope of this Supplement, as it is an activity performed at a facility that is separately licensed or regulated. LLW facilities are sited in areas that are away from surface water and where the groundwater is located at depths sufficiently beneath the trenches to minimize nuclide migration. Sites and the surrounding areas are monitored using a system of wells to determine whether radioactive material is migrating into the groundwater. A combination of natural site characteristics and engineered safety features is used to ensure the safe disposal of LLW. In addition, restrictions of types and amounts of waste disposed of at a site, as well as the technical analysis performed as part of the licensing review to demonstrate compliance with performance objectives in NRC regulations, maintain the safety of LLW disposal. The natural characteristics of an LLW disposal site are relied on in the long-term, and they should promote disposal-site stability and attenuate the transport of radionuclides away from the disposal site into the general environment. Sites generally must possess the following characteristics: (1) relatively simple geology, (2) well-drained soils free from frequent ponding or flooding, (3) lack of susceptibility to surface geological processes, such as erosion, slumping, and landslides, (4) a water table of sufficient depth so that groundwater will not periodically intrude into the waste or discharge onsite, (5) lack of susceptibility to tectonic processes, (6) no known potentially exploitable natural resources, (7) limited future population growth or development, and (8) capability of not being adversely impacted by nearby facilities and activities. Engineered barriers are man-made structures designed to improve the natural site characteristics to isolate and contain waste. They consist of various engineered system components, including the following: (1) a layered earthen cover, (2) a disposal vault, (3) a drainage system, (4) waste forms and containers, (5) backfill material, and (6) an interior moisture barrier and low-permeability membrane. Regulations specify the*

allowable radiation dose from the LLW facilities to the workers and to the public. Evaluation of the environmental impacts associated with the disposal of low-level waste is outside the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: The on site disposal of radiological demolition debris (rubblization) is considered in the GEIS. With rubblization abandoned at Maine Yankee, the cumulative effect of disposal of the debris at a licensed facility elsewhere is not considered. This makes no sense. Nor does it make sense to "lose" impacts when contaminated materials are shipped to handling facilities for recycling. Different choices made at the decommissioning site will result in different impacts to workers and other citizenry offsite and away. These effects should not be artificially separated from the environmental impacts of decommissioning simply because they are exported. **(CL-13/19)**

Response: *The disposal of low-level waste (LLW) is not within the scope of this Supplement, as it is an activity performed at a facility that is separately licensed or regulated (see Section 1.3). Regulations related to LLW disposal are in 10 CFR Part 61 and 10 CFR Part 20, Subpart K, of the Code of Federal Regulations. The staff did consider cumulative impacts. Section 4.2 has been changed for clarification.*

Comment: If such a tent system were used, afterwards it would be disposed of as rad waste. **(CL-20/35)**

Response: *If the tent system was contaminated and the contamination could not be removed to undetectable levels then the tent or the contaminated portions of the tent would have to be disposed of as LLW. The disposal of low-level waste (LLW) is not within the scope of this Supplement, as it is an activity performed at a facility that is separately licensed or regulated. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In addition to recomputing the cost of LLW disposal, the reopening of Barnwell has indefinitely postponed the siting of a waste facility in Pennsylvania. **(CL-02/29)**

Response: *The factors influencing the siting of regional-compact burial sites is outside the scope of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The fact is, wherever this radioactively contaminated refuse winds up - from spent fuel to contaminated rags - it can't be contained forever and will reach the environment, which is why it must go to a remote location, below ground (none of this idiot parking lot out in Utah or

Nevada cask storage either) in a dry, geologically sound (as far as possible in a moving planet) location where monitoring could alleviate problems that arise prior to reaching the public and wildlife. NRC must recognize that this "solution" - while not a perfect solution, as there is no perfect solution to the nuclear waste issue, is the solution that has been gone back to repeatedly over the decades, after thousands of studies contemplating what to do with the waste failed to identify anything better, or safer. What NRC and industry are proposing in this Draft, flies in the face of thousands of prior studies by some of the world's most renowned people who understand the horror of the dilemma, and of their conclusions. Leaving all this contamination on sites around the nation to contaminate and kill hundreds of communities is simply barbaric and must be stopped at all costs. **(CL-20/114)**

Comment: The nuclear industry is leaving humankind a legacy of devastation, epitomized by its long-lived and highly dangerous nuclear waste. They are unable to solve their waste problem and now, when faced with the eventual shutdown of their plants, are unwilling to take measures to ensure that the public is protected. **(AT-A/43)**

Response: *The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact for at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time. The evaluation of environmental impacts from the disposal of LLW and spent fuel is outside the scope of the Supplement (see Section 1.3). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: There still remains a mountain of radioactive waste after shut down, including the reactor itself and, typically, an incredibly dangerous stockpile of irradiated reactor fuel. Whereas the reactor itself and the equipment and materials of the central facilities are often treated as the object of decontamination, it must be noted that the previous operation of the plant has dispersed radiation and contamination that did not regard the facility's fence line as a barrier. Any serious approach to decommissioning a site must take this into account. **(CL-47/7)**

Response: *Nuclear power facilities were licensed with the expectation that there would be routine releases of detectable radioactivity to the air and water surrounding the site. Such releases are controlled and limited to levels considered adequate to protect public health and*

safety. Radiological impacts of releases during plant operations are limited by criteria set forth in 10 CFR Part 20. Offsite remediation due to routine plant release is not warranted. The evaluation of environmental impacts from the disposal of LLW and spent fuel is outside the scope of the Supplement (see Section 1.3). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Allowing NRC to determine whether waste can or will remain after a reactor license is terminated is contrary to the policy of the respective compacts and in direct disregard of the federal low-level radioactive waste framework established by Congress. **(CL-17/9)**

Response: *Material that could be classified as low-level waste would not be left behind after license termination. Any radioactive contamination left behind after license termination must meet the License Termination Criteria given in 10 CFR Part 20, Subpart E. Materials that cannot meet these criteria are considered to be low-level waste and would have to be disposed of at a licensed low-level waste facility before the license could be terminated. Therefore, any radioactive material remaining onsite after license termination would not be considered radioactive waste. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Inherent in the decision to operate the reactors is an acceptance on the part of the generator and the regulator of the production of long-lasting radioactive waste and radioactive and chemical contamination of large volumes of resources. Decommissioning should include responsibly managing that material, not denying its existence. **(CL-48/10)**

Response: *Although long-term storage of spent fuel and low-level waste is not within the scope of the Supplement, as described in Section 1.3, NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact for at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time. LLW facilities are sited in areas that are away from surface water and where the groundwater is located at depths sufficiently beneath the trenches to minimize nuclide migration. Sites and the surrounding areas are monitored using a system of wells to determine if there is any leakage of radioactivity into the groundwater. A combination of natural*

site characteristics and engineered safety features is used to ensure the safe disposal of LLW. In addition, restrictions of types and amounts of waste disposed of at a site, as well as the analysis performed as part of the licensing to demonstrate compliance with performance objectives in NRC regulations, increase the safety of LLW disposal. The natural characteristics of an LLW disposal site are relied on in the long-term, and they should promote disposal-site stability and attenuate the transport of radionuclides away from the disposal site into the general environment. Sites generally must possess the following characteristics: (1) relatively simple geology, (2) well-drained soils free from frequent ponding or flooding, (3) lack of susceptibility to surface geological processes, such as erosion, slumping, and landslides, (4) a water table of sufficient depth so that groundwater will not periodically intrude into the waste or discharge onsite, (5) lack of susceptibility to tectonic processes, (6) no known potentially exploitable natural resources, (7) limited future population growth or development, and (8) capability of not being adversely impacted by nearby facilities and activities. Engineered barriers are man-made structures designed to improve the natural site characteristics to isolate and contain waste. They consist of various engineered system components, including the following: (1) a layered earthen cover, (2) a disposal vault, (3) a drainage system, (4) waste forms and containers, (5) backfill material, and (6) an interior moisture barrier and low-permeability membrane. Regulations specify the allowable radiation dose from the LLW facilities to the workers and to the public. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Limerick, Oyster Creek, Peach Bottom, Salem, and Three Mile Island are among the nation's nuclear generating stations currently serving as "temporary" repositories for low-level radioactive waste. Limerick, Peach Bottom, and Three Mile Island do not meet the standards set by the Appalachian Compact in regards to a permanent LLW facility. **(CL-02/30)**

Response: *The NRC has historically discouraged the use of onsite storage as a substitute for permanent disposal, but has not limited the amount of time that the waste can be stored. However, LLW is normally stored onsite on an interim basis before being shipped offsite for permanent disposal. Onsite storage facilities are designed to minimize personnel exposure. High-dose-rate LLW is isolated in a shielded storage area and is easily retrievable. The lower dose-rate LLW is stacked or stored to maximize packing efficiencies. The NRC has guidelines regarding the storage facility, including the following: (1) shielding used should be controlled by dose-rate criteria for both the site boundary and any adjacent offsite areas and (2) a liquid drainage collection and monitoring system should be present. The drain should be routed to a radwaste processing system. The regulations related to LLW disposal are in 10 CFR Part 61 and 10 CFR Part 20 Subpart K. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Anything dumped or buried from the past practices on site must also be dug up and removed. **(CL-20/21)**

Response: The licensee is required to conduct a site characterization study to determine the location and extent of radioactive contamination. The LTP addresses the issue of onsite buried waste and soil contamination. Site remediation is addressed by the LTP. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: YOU CAN'T BURN IT/INCINERATE IT, IT GOES OUT THE STACK AND POLLUTES THE STACK, YOU CAN'T WASH IT, IT WINDS UP ALL OVER THE PLACE AND IN THE WATER, IT IS ALWAYS THERE, THE DEADLY, INVISIBLE KILLER. AT MOST YOU CAN TRY AND CONTAIN IT. **(CL-20/71)**

Response: *Companies licensed to incinerate radioactive waste are regulated by the NRC and EPA. Effluents are monitored and controlled prior to release and limited by NRC and EPA regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: None of the mixed-waste should be dealt with as mixed waste (i.e. a combination of chemical/hazardous and radioactive) because MIXED WASTE FALLS THROUGH ALL REGULATORY CRACKS, BUT IT SHOULD BE TREATED AS RADIOACTIVE WASTE. **(CL-20/77)**

Response: *The disposal of mixed waste falls under NRC regulations (10 CFR Part 61, "Licensing requirements for land disposal of radioactive waste") and EPA regulations for disposal of hazardous waste (40 CFR Part 260 through 40 CFR Part 270). Offsite disposal of mixed waste is outside the scope of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: WASTE OILS SHOULD NOT BE SENT TO VENDORS FOR INCINERATION OR RECYCLING OR REUSE AS THEY ARE CONTAMINATED. **(CL-20/78)**

Response: *Contaminated waste oil will be dealt with in an appropriate manner consistent with NRC and EPA regulations. Offsite disposal of LLW is outside the scope of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: One of the things that has to be acknowledged I think or anticipated is the failure of the United States nuclear waste program on all levels, so that low-level dumps are not getting established, high-level dumps are not getting established. Therefore, we may really have to keep a lot more of this radiation on site than we had anticipated. **(AT-G/2)**

Comment: No facility exists for the permanent disposal of the nation's high-level waste (irradiated reactor fuel), and only one burial site, in Barnwell, SC, is currently available to most reactors for the rest of their wastes (their so-called "low-level" wastes, which ultimately could include the rubble and dismantled components from decommissioned plants). That one "low-level" waste facility however, that is serving most of the nation, is expected to be closed in the near future to non-Southeast-United States reactors. **(CL-51/22)**

Response: *The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact for at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time. LLW facilities are sited in areas that are away from surface water and where the groundwater is located at depths sufficiently beneath the trenches to minimize nuclide migration. The natural characteristics of an LLW disposal site are relied on in the long-term, and they should promote disposal-site stability and attenuate the transport of radionuclides away from the disposal site into the general environment. Sites generally must possess the following characteristics: (1) relatively simple geology, (2) well-drained soils free from frequent ponding or flooding, (3) lack of susceptibility to surface geological processes, such as erosion, slumping, and landslides, (4) a water table of sufficient depth so that groundwater will not periodically intrude into the waste or discharge onsite, (5) lack of susceptibility to tectonic processes, (6) no known potentially exploitable natural resources, (7) limited future population growth or development, and (8) capability of not being adversely impacted by nearby facilities and activities. Engineered barriers are man-made structures designed to improve the natural site characteristics to isolate and contain waste. They consist of various engineered system components, including the following: (1) a layered earthen cover, (2) a disposal vault, (3) a drainage system, (4) waste forms and containers, (5) backfill material, and (6) an interior moisture barrier and low-permeability membrane. Regulations specify the allowable radiation dose from the LLW facilities to the workers and to the public. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.4.4 Spent Fuel Maintenance, Storage, and Disposal

Comment: I find nothing in this thick document where [it] addresses at all the generic, or under generic or site-specific issues the impact and the effects on the structure, systems and components of an event which happens during decommissioning. And, of course, the radioactive fuel pools are the principle source in that case of radioactive contamination. **(AT-F/3)**

Response: *Section 4.3.9 addresses accident analysis, including those involving the spent fuel pool. Details of potential accidents are in Appendix I. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Draft says, p.1-6, that NRC and the Commission are not considering the issue of spent fuel storage (in a pool or in one of those ridiculous casks outside in plain view for every terrorist to see) as part of decommissioning. The excuse is that its dealt with under other license aspects. **(CL-20/25)**

Response: *The commenter is correct in noting that the issue of spent fuel storage is outside the scope of this Supplement for reasons discussed in Section 1.3, "Scope of This Supplement." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It also says that the Commission has made a finding that the DEADLY, RADIOACTIVE SPENT FUEL BE STORED SAFELY AND WITHOUT SIGNIFICANT ENVIRONMENTAL IMPACTS FOR AT LEAST THIRTY YEARS BEYOND THE LIFE FOR OPERATION ETC. ETC. **(CL-20/26)**

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:]Spent Fuel Isolation. **(CL-02/5)**

Comment: When California's nuclear plants received licenses for construction and operation, promises were made that high-level radioactive waste would be removed within a few years. Every deadline to open a safe and permanent repository for high-level radioactive waste has been missed. Therefore, the issue has grown; we are not accessing only the decommissioning of a power plant, but dealing also with storage and transportation of lethal substances unforeseen when licenses were granted. **(CL-53/4)**

Comment: One of the things it (the 60 year period) presumes is that there's going to be a viable option for removing the spent fuel from the site. And I'm just wondering if anybody could

talk a little bit about the relationship there, because I am one of many people who believe that Yucca Mountain is not a foregone conclusion, although probably that is not your view here, but there is significant opposition to it from some rather more powerful actors than us in the State of Nevada. **(SF-B/5)**

Comment: Can the Commission identify a pragmatist, physicist, chemist, policy analyst, or behavioral scientist who is willing to testify that radiological decommissioning can be achieved with the fate of Yucca Mountain in perpetual limbo and the three current "low-level" radioactive waste facilities limited by finite capacity and geopolitical considerations? **(CL-02/13)**

Comment: Spent fuel "disposal" is an unresolved and hugely problematic area. Each reactor produces approximately 20 to 30 tons of high-level radioactive waste per year. There is presently, and at least until 2010, nowhere to put this waste. The technology to safely manage spent fuel for an indefinite period of time does not exist. There is no location to permanently store spent fuel and high-level radioactive waste (HLW) generated by nuclear power plants. **(CL-02/21)**

Comment: Aggravating the critical shortage of HLW storage space is the bleak estimate for the completion of Yucca Mountain, the designated repository for high-level nuclear waste. The earliest date this repository could be available is 2010. Lynn M. Shishido-Topel served as the Overseeing Commissioner of the Illinois Commerce Commission testified, also predicted that the amount of spent fuel generated by 2000 will be 40,000 metric tons (MTU). This amount of waste would exceed Yucca Mountain's capacity, and the State of Nevada has demonstrated that Yucca Mountain will probably hold about 20% of the total 85,000 MTU of spent fuel earmarked for the facility. **(CL-02/23)**

Comment: Isolation of high-level radioactive waste, which is primarily composed of spent fuel, can not be separated from radiological decommissioning. The earliest Yucca Mountain will be available is in the year 2010. Nuclear generating stations can not be decommissioned or decontaminated with the presence of HLW onsite or inside the reactor vessel. Aggressive decontamination process will be precluded, necessitating utilities to place retired reactors into extended-DECON or SAFSTOR. If a long-term solution to spent fuel isolation is not found in the immediate future, some of the nation's nuclear generating stations will be shut down prematurely due to an absence of spent fuel storage capacity. **(CL-02/26)**

Comment: It ought to be equally obvious that a satisfactory waste isolation solution evades us (we do not agree with Secretary Abraham that Yucca Mountain is a suitable repository based on science - the DOE itself admits that the site is not geologically suitable and the GAO raises serious questions about the selection process). **(CL-42/2)**

Response: *Although long-term storage of spent fuel is not within the scope of the Supplement, as described in Section 1.3, "Scope of This Supplement," NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact of at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time. The comments do not provide new information relevant to this Supplement and will not be evaluated further. The comments do not result in a change to the Supplement.*

Comment: I probably have a question in there because I wasn't sure, reading through the document itself, where, like the outdoor storage facilities at Plant Hatch and elsewhere—how they are dealt with after the plant itself is decommissioned and if the license is terminated. I'm not sure how that works and who's responsible and I would like more clarification on that. **(AT-A/16)**

Response: *Both operating plants and plants that have permanently ceased operations and are decommissioning have the option to store their spent fuel in dry cask storage outside on a specially constructed concrete pad. The facility is called an Independent Spent Fuel Storage Installation or ISFSI. An ISFSI can be constructed and operated either under the same licensee that is used for an operating or decommissioning facility (called a "Part 50 license" in reference to the location in the Code of Federal Regulations that describes the license requirements) or under a site-separate license (called a "Part 72 license" in reference to the location in the Code of Federal Regulations that describes the licensing requirements for the ISFSI). Licensing the ISFSI separately under Part 72 license allows completion of the decommissioning of the power reactor and its associated structures, systems and components while retaining a license for the ISFSI. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Furthermore, some nuclear plants, like Hatch have overflowing volumes of nuclear waste that are now being stored outdoors which impacts the environment and could affect decommissioning. **(AT-A/25)**

Comment: Some nuclear plants, like Hatch, have overflowing volumes of nuclear waste that are now being stored outdoors which impacts the environment and could affect decommissioning. **(CL-08/7)**

Response: *Some of the spent fuel at Hatch is stored in an ISFSI located onsite. The ISFSI is licensed under the provisions of 10 CFR Part 50. The spent fuel at Hatch is stored in accordance with the regulations in 10 CFR Part 50 and/or 10 CFR Part 72. However, the impacts from an ISFSI are outside the scope of this Supplement, as discussed in Section 1.3. The impacts that an onsite ISFSI might have on decommissioning activities were considered to be insignificant since it is an independent facility located some distance from structures, systems or components that are likely to be removed during decommissioning. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: How will onsite, outdoor nuclear waste storage dumps, [also known as Independent Spent Fuel Storage Installations—ISFSI] like at Plant Hatch, be affected by decommissioning? How will the licensee of an ISFSI be impacted by events that may happen during decommissioning, i.e. what if there is an accident nearby and the casks are damaged or the site is rendered inaccessible? **(CL-08/27)**

Comment: Those issues are of grave concern. What happens, if during decommissioning terrorists take out three spent fuel casks blasting them to kingdom come OR two casks had a major problem and needed to be opened under shielding inside the spent fuel pool and there was either no room in the spent fuel pool or the cask came apart while trying to move it due to embrittlement of the cask from the radioactive decay heat coming off the spent fuel? **(CL-20/27)**

Response: *ISFSIs are generally located far enough away from structures and systems being dismantled or demolished during decommissioning that an accident during decommissioning would be unlikely to adversely impact the ISFSI. If a cask were to be damaged by some means, the licensee would be required to decontaminate the area and re-secure the spent fuel. Although difficult, such activity is technically feasible and could be accomplished relatively quickly. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The GEIS does not consider the impacts of spent fuel storage. We believe this to be based on artificial distinctions. Both Maine Yankee and Haddam Neck have identified establishing an Independent Spent Fuel Storage Facility as a " critical pathway" in decommissioning. ISFSI construction has been regulated under the very same Part 50 license that

will be terminated upon successful decommissioning. Only then will a Part 72 license be issued. The ISFSI is in the middle of a decommissioning site and physically inseparable from decommissioning. Its impacts should be considered among the impacts of decommissioning in the GEIS. **(CL-13/18)**

Comment: Nuclear corporations should not be allowed to decommission reactors under an operating license through a series of amendments nor should they be allowed to create an Independent Spent Fuel Storage Installation (ISFSI) under an operating reactor license when they are decommissioning. Decommissioning reactors installing ISFSI's should be required to go into a Part 72 license to provide adequate regulatory oversight protect public health and safety. The Part 72 general license provision for creating an ISFSI at an operating reactor was never intended to cover a decommissioning reactor when regulatory oversight is minimized. **(CL-50/23)**

Response: *Both operating plants and plants that have permanently ceased operations and are decommissioning use ISFSIs. ISFSIs are not unique to decommissioning plants. The initial development of the decommissioning regulations occurred in the early 1980s. At that time, the NRC and the industry assumed that by the time facilities began decommissioning, the U.S. Department of Energy's (DOE) high-level waste repository would be accepting spent fuel for ultimate disposal. Therefore, spent fuel onsite during decommissioning was not expected to be an issue. Consequently, development of regulations related to ISFSIs occurred separately from the development of decommissioning regulations. Since the ISFSI may in some cases remain at the site longer than a nuclear facility that is undergoing immediate decommissioning, it is appropriate that ISFSIs be capable of being licensed separately. The decommissioning of the ISFSI is also handled separately from the decommissioning of the nuclear power plant. Site-specific ISFSI licenses require the evaluation of the ISFSI separately from the remainder of the facility although other site activities adjacent to the ISFSI are considered to evaluate their impact on the storage of the spent fuel. An ISFSI can be constructed and operated either under the same license that is used for an operating or decommissioning facility (called a "Part 50 license" in reference to the location in the Code of Federal Regulations that describes the license requirements) or under a site-separate license (called a "Part 72 license" in reference to the location in the Code of Federal Regulations that describes the licensing requirements for the ISFSI. ISFSI licensing, siting, construction and operation are outside the scope of the GEIS on decommissioning (see Section 1.3). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Until the spent rods are removed from local nuclear power plants the decommissioning rules should be tightened, not loosened. Your proposal may have seemed reasonable earlier this year but we live in a very different world now. It can no longer be business as usual at the NRC. **(CL-25/4)**

Response: *The Supplement provides an assessment of impacts related to the decommissioning process. The Supplement does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The regulations for maintenance and storage of spent fuel are given in 10 CFR Parts 50 and 72 and are summarized in Appendix L of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In the case of plants like Hatch, that have outdoor storage of nuclear waste, the notion of a reduced security force is even more troubling. **(AT-A/15)**

Response: *Nuclear power plants are regulated under 10 CFR Part 50 during both plant operation and decommissioning. Typically once a plant permanently ceases operation there is a gradual reduction in security requirements commensurate with the reduction of risk associated with the various structures, systems and components. However, security around the spent fuel pool remains at levels commensurate with those at an operating nuclear facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The excess storage—I mean the storage in pools, but there's a whole lot setting out in dry casks very vulnerable to whatever comes along, whatever happens. I mean the whole thing is just—I don't know how in the world they're going to deal with it. **(AT-D/4)**

Response: *Although long-term storage of spent fuel is not within the scope of the Supplement, as described in Section 1.3, "Scope of This Supplement," NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact of at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: As early as 1995, concerns about Yucca Mountain's integrity surfaced from scientists at Los Alamos National Laboratories. Dr. Charles Bowman warned that plutonium would remain after the steel casks holding the nuclide dissolved. Plutonium could then migrate and concentrate. And in February 1999, the scientific peer review panel for Yucca Mountain commissioned by the U.S. Department of Energy (DOE) produced a "highly critical" report. "The review panel said the model [DOE'S computer model] has so many uncertainties - like the corrosion rates of waste containers, the area's vulnerability to earthquakes and how climate

changes would affect rainfall - that its reliability was limited. In February, 1999, the scientific peer review panel for Yucca Mountain commissioned by the U.S. Department of Energy (DOE) produced a "highly critical" report. 'The review panel said the model [DOE's computer model] has so many uncertainties - like the corrosion rates of waste containers, the area's vulnerability to earthquakes and how climate changes would affect rainfall - that its reliability was limited." **(CL-02/24)**

Comment: A satisfactory waste isolation site evades us. Yucca Mountain is not a suitable geologic repository based on science – the DOE itself admits that the site is not geologically suitable; storage canisters will be required to protect the waste from exterior environmental contamination. Additionally, the GAO raises serious questions about the selection process. **(CL-46/3)**

Comment: I don't think there is any good way to treat the long-term storage of radioactive waste. I don't think Yucca Mountain is the answer, for darn sure, for various reasons. Also at Lawrence Berkeley Lab the group that's the Earth science group has done the study on groundwater transportation. And I know from some of my associates there that they think it is not a satisfactory location for long-term storage. **(SF-C/5)**

Response: *The spent fuel repository planned for Yucca Mountain is the subject of a separate NRC licensing action. Uncertainties of specific parameters are being evaluated at this time and will ultimately be addressed in the licensing action and the specific documents associated with it at that time. High-level waste disposal is outside the scope of this Supplement, as discussed in Section 1.3, "Scope of This Supplement." The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Furthermore, on October 4, 1999, LeBoeuf, Lamb, Green & MacRae, filed a complaint alleging a conflict of interest by the Department of Energy in their selection and awarding of $16 million legal contract to Winston & Strawn. Former general counsel to the Energy Department, R. Jenney Johnson, in a sworn affidavit, stated: "[A] situation has been created which an entity [Winston & Strawn] will pass judgment on its own work." **(CL-02/25)**

Comment: Years ago, when people spoke of some type of monitored, retrievable spent fuel storage, they meant monitored, so repairs could be made by remote control if needed, and retrievable so problems could be addressed. Spent fuel is the stuff that the Department of Energy has been charged with trying to contain for approx. 10,000 years removed from the biosphere. **(CL-20/81)**

Response: *High-level waste disposal is outside the scope of this Supplement as discussed in Section 1.3, "Scope of This Supplement." The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: THE SPENT FUEL IS THE MOST SERIOUS ISSUE THERE IS. ANYONE WHO DOES NOT UNDERSTAND THAT SPENT FUEL CANNOT BE LEFT WHERE IT IS ON SITE, IN POOLS OR ISFSI'S BEYOND A VERY LIMITED NUMBER OF YEARS, BUT MUST BE PLACED DEEP UNDERGROUND, IN A DRY LOCATION, GEOLOGICALLY AS SOUND AS POSSIBLE, MONITORED FOR ETERNITY, DOES NOT UNDERSTAND RADIATION OR THE NUCLEAR ISSUE AND SHOULD NOT BE WORKING FOR THE NRC. NRC MUST SET THE TIME WHEN THE SPENT FUEL SHOULD ALL BE REMOVED OFFSITE AS NO LATER THAN TWO YEARS AFTER THE LAST CORE OFFLOAD HAS SPENT TEN YEARS IN THE SPENT FUEL POOL, I.E. FROM SPENT FUEL REMOVED FROM THE REACTOR INTO THE SPENT FUEL POOL AND THEN THE TEN YEAR "COOL DOWN" PLUS TWO YEARS, AFTER WHICH IT MUST BE MOVED. IF SUCH A DEADLINE IS NOT DECIDED, AND SET, COMMUNITIES ARE GOING TO BE STUCK WITH IT, WITH AWFUL CONSEQUENCES. **(CL-20/84)**

Response: *Although long-term storage of spent fuel is not within the scope of the Supplement, as described in Section 1.3, "Scope of This Supplement," NRC is committed to ensuring that both spent fuel and low-level wastes are managed to prevent detrimental health impacts to the public. The NRC has stated in its regulations: "The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impact of at least 30 years beyond the licensed life for operation (which may include the term of renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent fuel-storage installations." Further, the Commission believes there is reasonable assurance that at least one mined geological repository will be available in the first quarter of the 21st century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time. The comment proposes limits for the onsite storage of spent fuel. The Supplement does not (1) establish policy, (2) establish or revise regulations, (3) impose requirements, (4) provide relief from requirements, or (5) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4.5 License Extensions

Comment: Likewise, there is no experience in decommissioning nuclear reactors that have operated beyond the original 40-year license period. **(AT-A/26)**

Comment: The NRC has no experience in decommissioning nuclear reactors that have operated beyond the original 40-year license period. **(CL-08/8)**

Response: *The commenter is correct. Nevertheless, the NRC is considering the environmental impacts of decommissioning following the extended operation during the renewal period and, if appropriate, refurbishment activities. License renewal is not within the scope of this Supplement, as it is a licensing activity covered elsewhere in the NRC regulations (see 10 CFR Parts 51 and 54) and in other EISs (see NUREG-1437, its addendum and supplements). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: We believe that the decommissioning document has definitely underestimated the impacts of the additional license extension period. In fact, the minimization of that impact I think is a major flaw in the document and that there needs to be a reassessment of all of the impacts, including cost, but also including the aging issues, including the waste issues and other offsite environmental impacts for license extension periods. **(AT-B/8)**

Response: *An analysis performed for NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, indicated that the physical requirements and attendant effects of decommissioning nuclear power plants after a 60-year license renewal (original 40-year license plus an additional 20 years for license renewal) are not expected to differ from those of decommissioning at the end of 40 years of operation. Section 1.3 was changed for clarification of this information.*

Comment: None should be re-licensed - the NRC should be ashamed of re-licensing. **(CL-20/116)**

Comment: I am opposed to any extensions on operating licenses for nuclear facilities of any sort and wish for a move to cleaner renewable energy. **(CL-41/2)**

Response: *License renewal is outside the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.4.6 Site Characterization and Final Site Surveys

Comment: Additionally each nuclear power plant has a different historical performance record that may have impacted the surrounding environment in ways that are unique to the facility. What makes it acceptable to ignore these operating histories when decommissioning? **(AT-A/24)**

Response: *Licensees are required by 10 CFR 50.75(g) to "keep records of information important to the safe and effective decommissioning of the facility in an identified location until the license is terminated." These records include records of spills, etc. Prior to termination of an operating license, the NRC must determine that the terminal radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the criteria for decommissioning in 10 CFR Part 20, Subpart E. Title 10 CFR Part 51.53(d) requires that the "Supplement to the Applicant's Environmental Report–Post Operating License Stage," which must be submitted with the License Termination Plan, update the "Applicant's Environmental Report– Operating License Stage" to reflect any new information or significant environmental change associated with the applicant's proposed decommissioning activities or with the applicant's proposed activities with respect to the storage of spent fuel. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In order to provide a complete and up-to-date environmental profile of the site, the Supplement should direct licensees to summarize the following in their site-specific NEPA analyses (and as appropriate in the PSDAR and LTP): (a) pre-plant construction environmental reports (for plants constructed before the enactment of NEPA) and environmental impact statements (EISs) regarding the impacts of plant construction and operation, (b) environmental reports and/or assessments that were prepared during the period the plant was in operation regarding the impacts of plant operation, (c) significant requirements and changes in the licensee's environmental permits, and (d) changes in the environmental parameters of a facility site during operation and the impacts of any such changes (see also Response to Comment #6-A, page A-11). **(CL-16/7)**

Response: *The purpose of the Supplement is to provide an environmental analysis of the impacts associated with the decommissioning process. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The historic undocumented burial of nuclear waste onsite at nuclear power stations must be investigated, surveyed and mitigated by station owners under the decommissioning plan. As the U.S. General Accounting Office (GAO) May 1989 "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened" (GAO/RCED-89-119) reports in its Executive Summary: "For almost 25 years, NRC allowed licensees to bury radioactive waste onsite without prior NRC approval. NRC required the licensees to retain records on the amounts and substance buried rather than provide them to NRC. In five of the eight cases GAO reviewed, licensees buried waste onsite, but four licensees either did not keep disposal data or the data are incomplete. In one case, NRC terminated a license and 10 years later learned that radioactive material had been buried on the site. Also, NRC generally does not require licensees to monitor for groundwater or soil contamination from buried waste. All five licensees have found ground water contaminated with radioactive substances. At four sites, some of the contamination appears to have resulted from the buried waste—the contamination at one site was 400 times higher than EPA's drinking water standards allow. At another site, the contamination was 730 times higher, but the source was not known." **(CL-48/15)**

Response: *The NRC has addressed the issues in the GAO report in a letter to U.S. Senator Joseph I. Lieberman from Richard A. Meserve, Chairman U.S. NRC dated, March 2002 (ML020250068); however, the comment does not relate to commercial nuclear reactors. 10 CFR 50.75(g) requires power reactor licensees to maintain records of activities or events that could influence decommissioning. Additionally, licensees are required to conduct a site characterization study to support remediation efforts outlined in their LTP. During the review of the LTP, the NRC staff focuses attention on the possibility of groundwater contamination and soil contamination. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: An inventory of all the radioactivity, radioactive wastes and materials from reactor operation and decommissioning, and independently verified reporting of its disposition (whether onsite or offsite, whether in licensed or unlicensed facilities and specifics of its storage condition) should be a required part of the environmental review and reports. This information must be part of the site-specific Environmental Impact Statement process and fully disclosed at each reactor as site-specific issues, with the opportunity for formal local hearings and legally-binding input. The corporations responsible for the radioactive wastes from nuclear power reactor operations should be required, by NRC, to keep balance sheets of the radioactivity generated by their reactors and the decommissioning process, and track the disposition of that radioactivity whether it is kept onsite, allowed to leak out into the air and water, or shipped to licensed or unlicensed facilities for disposal or processing, and for possible release into household items. **(CL-48/16)**

Response: *The purpose of the Supplement provides an environmental analysis of the impacts associated with the decommissioning process. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. 10 CFR 50.75(g) requires power reactor licensees to maintain records of activities or events that could influence decommissioning. Additionally licensees are required to conduct a site characterization study to support remediation efforts outlined in their LTP. During the review of the LTP, the NRC staff focuses attention on the possibility of groundwater contamination and soil contamination. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: New environmental assessment documents must be required, as old assessments are outdated and have been found to be inaccurate both on and offsite. **(CL-50/11)**

Response: *This Supplement is an update to an existing environmental impact statement. In addition, NRC decommissioning regulations at 10 CFR 50.82 require (1) that environmental issues be addressed in the post-shutdown decommissioning activities report and (2) that the licensee include a supplement to its environmental report part of the License Termination Plan. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Many questions regarding decommissioning require site-specific and reactor-specific analyses. The Callaway plant, for example, here in Missouri, is located about 5.5 miles away from the Missouri River, the source of the plant's cooling water and the depository for its liquid effluent. It would seem that testing would be needed of the unusually long effluent-discharge pipe in order to determine where leakage may have occurred during the plant's operation and where soil excavation may therefore be required as a part of the

decommissioning. Sediment samples would be needed where the discharge pipe releases the plant's effluent into the Missouri River. Without such site-specific analyses, a determination of the extent of the riverbed's contamination would not be possible. **(CL-51/2)**

Response: *This Supplement deals with the impacts of decommissioning. Identification of onsite, contaminated areas is an integral part of the decommissioning process. Licensees are required to conduct a site characterization study to radiologically characterize the site and to support remediation efforts outlined in the LTP. One of the stated purposes of this document is to identify and assess the impact of decommissioning activities generically so that a site-specific assessment is not needed. The cooling water system, from intake structure through the discharge structure, is an integral part of the plant and is on owner-controlled land. It is, therefore, considered to be onsite. NRC will not terminate an operating license until the radiation survey and associated documentation demonstrate that the facility and site are*

suitable for release in accordance with the criteria for decommissioning in 10 CFR Part 20, Subpart E. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: This Draft 1 references MARSSIM. In its introduction, Draft "Marssim" did not address all sorts of things from contamination on vicinity properties through contaminated subsurface soil, water, construction materials and on and on. All of which must be cleaned up/have the contamination removed. They showed a lack of understanding of the groundwater cycle, and groundwater issues JUST LIKE THIS DRAFT DOES. **(CL-20/17)**

Comment: Methodology must be established to determine the extent of underground rad waste contamination and burial. The Multi-Agency Radiological Site Survey and Investigation Manual (MARSSIM) establishes measurement criteria for only 6 inches below the surface of soil. MARSSIM does not address the serious problem of locating and remediating underground contamination. Before 1980, the NRC in fact allowed the burial of rad waste onsite. A General Accounting Office (GAO) investigation found that the routine burial of rad waste 4 feet deep at reactor sites before 1980 occurred without adequate documentation. **(CL-50/26)**

Response: *The MARSSIM provides detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance with a dose- or risk-based regulation. It was prepared by the Department of Defense, The Department of Energy, the Nuclear Regulatory Commission, and the Environmental Protection Agency and discusses contamination of surface soil and building surfaces in detail. The MARSSIM specifically states that since other media (e.g., groundwater, surface water, subsurface soil, equipment, and vicinity properties) are potentially contaminated at the time of the final status survey, modifications to the MARSSIM survey design guidance and examples may be required. Identification of onsite contaminated areas is an integral part of the decommissioning process. NRC will not terminate an operating license until the radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the criteria for decommissioning in 10 CFR Part 20, Subpart E. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Nuclear reactors, through planned and unplanned radioactive releases, can create plumes of contamination, which migrate offsite. Yankee Rowe currently has a plume, which reached springs, feeding into the Deerfield River where residents recreate. Connecticut Yankee has plumes of tritium and other radionuclides which have migrated into the aquifer and the Connecticut River for decades. Accountability (i.e. remediation and/or long-term monitoring) for plumes of contamination that have offsite consequences must be established. **(CL-50/13)**

Response: *The purpose of this Supplement is to provide an environmental assessment of the impacts associated with the decommissioning process. It is not the place to establish or revise NRC regulations. Procedures for revising NRC regulations are found in 10 CFR, Part 2. NRC will not terminate an operating license until the radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the criteria for decommissioning in 10 CFR Part 20, Subpart E. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Furthermore, accountability must be established for routine NRC-regulated releases, which have accumulated in the discharge pathways. Big Rock Point, Millstone Unit 3 and other reactors have identified contaminated sediment caused by such releases. Remediation must capture such plumes both onsite and off. **(CL-50/14)**

Comment: Reactor contaminants in the sediments in the EPA studies included cesium-134 and -137, cobalt-58 and -60, manganese-54, and antimony-125. With evidence that these isotopes were able to bypass the liquid waste filters, it would seem probable that other fission, activation and corrosion products could have, too. And of course some reactor isotopes are extremely long-lived. Nickel-59, mentioned above, is produced when the nickel-58 in stainless steel captures electrons. Since the EPA found corrosion products in the sediment of several metals for which they tested, is it not possible that other metals subjected to the reactor's hostile environment (repeated cycles of temperature and pressure, high neutron fluxes, harsh chemicals, etc.) may also have degraded or dissolved, and migrated out of the plant? **(CL-51/3)**

Comment: Could they be detected in the sediment if tested? Some of the corrosion products identified in the oxide layer ("crud") of various reactors include isotopes of iron, zinc, molybdenum, tungsten, titanium, and carbon. Nickel-59, mentioned above, is produced when the nickel-58 in stainless steel captures electrons. Since the EPA found corrosion products in the sediment of several metals for which they tested, is it not possible that other metals subjected to the reactor's hostile environment (repeated cycles of temperature and pressure, high neutron fluxes, harsh chemicals, etc.) may also have degraded or dissolved, and migrated out of the plant? **(CL-51/4)**

Response: *Nuclear power reactors were licensed with the expectation that there would be routine airborne and liquid releases of radioactivity to the environment and that the releases would be detectable. The licensee is allowed to release gaseous and liquid effluents to the environment, but the releases must be monitored and meet the requirements of 10 CFR Part 20, Appendix B, Table 2. Therefore, although contaminants may be present and*

detectable offsite, the release limits have been designed and proven to be protective of the health and safety of the public and the environment. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

O.4.7 License Termination Criteria

Comment: Can you explain what the differences are between the actual impacts on a population of say 10,000 for the two options of non-restricted use and restricted use at the end of the decommissioning. And number two is what are the two levels of acceptable risk for the two options of leaving the site—leaving the site really clean, which is unrestricted use, or leaving the site restricted? **(AT-B/2)**

Comment: The question was 25 millirems where? (for unrestricted release) **(AT-B/3)**

Response: *The criteria for license termination are discussed in Section 2.2.2. For sites that have been determined to be acceptable for unrestricted use, there are no requirements for further measurement of radiation. For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are required for sites that have residual radioactivity in excess of 1 mSv/yr (100 mrem/yr), but less than 5 mSv/yr (500 mrem/yr). These measurements are to be made by a responsible government entity or independent third party, including a governmental custodian of a site. The measurements are to be carried out no less frequently than every 5 years to ensure the institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I also utterly oppose defining decommissioning, in part, to include the "release of property for unrestricted use" and the "release of property under restricted conditions"—in other words, releasing radioactively contaminated materials into daily consumer use and commerce and unregulated disposal. How can you contemplate such a thing!!!!!!!!!!!!!! **(CL-33/20)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC defines decommissioning, in part, to include the "release of property for unrestricted use.." and the "release of property under restricted conditions." **(CL-43/14)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow NRC to define decommissioning in part, to include "the release of property for unrestricted use.." And the "release of property under restricted conditions." It is entirely inappropriate and

scientifically ludicrous to allow "release" of highly radioactive contaminated materials into daily consumer use and commerce, or unregulated disposal, or the recycling of such materials into any form which causes public exposure with radioactivity contaminated materials. **(CL-44/13)**

Response: *The criteria for license termination are described in Section 2.2.2. The release of the property occurs only after the license termination criteria are met. The purpose of this Supplement is to provide an environmental assessment of the impacts associated with the decommissioning process. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or 4) provide guidance on the decommissioning process. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC states that the portion of the decommissioning regulations (10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496) that set the 25, 100, and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear power sites, are not part of the scope of the Supplement. **(CL-43/13)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow NRC to assert that the portion of decommissioning regulations (10 CFR 20 section E and its EIS, NUREG 1496) set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear plants sites, and are not part of the scope of the Supplement. I disagree, and consider the inclusion of exposure from closed decommissioned plants a necessity to develop an accurate and realistic analysis of cumulative impacts. **(CL-44/12)**

Comment: NRC states that the portion of the decommissioning regulations (10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496) that set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear power sites, are not part of the scope of this Supplement. **(CL-48/48)**

Response: *Chapter 1, Introduction, addresses how the scope of the Supplement was determined. Regulations pertaining to restricted or unrestricted release of a site were promulgated as part of the 1997 rulemaking on radiological criteria for license termination of NRC-licensed nuclear facilities. The rulemaking relied on by the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," NUREG-1496, July 1997. Site release criteria are outside the scope of this Supplement. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the*

decommissioning process. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: The trans-solutional problem of complete site decontamination is here evident: the NRC does not require the return of a decommissioned facility and site to its preoperational radiation level. **(CL-52/14)**

Response: *Naturally occurring radioisotopes in the building materials would make such a standard impossible to achieve. For those facilities in which soil or building contamination exists, it would be extremely difficult to demonstrate that an objective of "return to background" had been achieved. In addition, the removal of soil or concrete to "pre-existing background" levels is generally not desirable from the perspective of risk to public health and safety and protection of the environment. For example, at some point, the removal of increasingly larger volumes of concrete and soil would also result in a greater net risk from transportation accidents. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It really may matter to you, Ms. Hickey, that the license termination document details one level of exposure while the draft EIS on decommissioning details another level of exposure. **(AT-B/6)**

Response: *The comment is not specific and the staff is unable to respond. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Twenty-five millirems additional per year of exposure added to an increasing background, which is certainly manmade—and I say manmade. I mean women had very little to do with the decision making that went into increasing the background radiation that all of us are exposed to. But 25 millirems per year additional exposure is way too much....This is a roulette game. So the dose is way out of line for the restricted use, not to even mention the unrestricted use, which I'll get distressed if I do, so I won't. **(AT-B/15)**

Response: *The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations (the International Commission on Radiological Protection [ICRP], the National Council on Radiation Protection and Measurements [NCRP], and the National Academy of Sciences [NAS]) and are conservative to ensure that the public and workers at nuclear power plants are protected. The NRC radiation exposure standards are presented in 10 CFR Part 20, "Standards for Protection Against*

Radiation," and are based on the recommendations in ICRP 26 and 30. The purpose of this Supplement is to provide an environmental assessment of the impacts associated with the decommissioning process. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The acceptability of the site release criteria is outside the scope of the Supplement (see Section 1.3). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: I think the one other question I had was as I recall when the first statement was issued, there was a discrepancy between the NRC radiation exposure floor, threshold level, and the EPA level. Is that still out there? I think yours is 25, theirs is 4 to 15 or something for the same exposure. **(AT-C/5)**

Response: *NRC continues to rely on the findings from two international organizations, the International Commission on Radiation Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP). Both organizations have acknowledged the difficulty in setting acceptable levels of risk for the public; however, both ICRP and NCRP have established a dose of 1 mSv/yr (100 mrem/yr) to an individual member of the public as the level that is acceptable for exposure to radiation from sources other than medical procedures. The ICRP and the NCRP further established the need to reduce this annual dose rate by using the principle of "optimization," considering the cost-effectiveness of additional dose reduction. Following these recommendations, the NRC adopted a level of 0.25 mSv/yr (25 mrem/yr) as the value for residual radioactivity at a site under consideration for license termination. EPA's radiation dose limit of 0.15 mSv/yr (15 mrem/yr) results from a different technical analysis for establishing an acceptable risk to the public and a value for residual radioactivity other than that of NRC where radiation is the only contaminant considered. In addition, the NRC also has a "cleanup" requirement of "As Low As Reasonably Achievable" (ALARA). The use of the ALARA requirement usually results in a site that is below the EPA's requirements as well. Nuclear reactors are licensed by the NRC, and the NRC is responsible for making the safety and environmental determination for termination of the license. Therefore, licensees are required to meet the NRC's requirements for residual radioactivity. However, since the NRC value of 0.25 mSv/yr (25 mrem/yr) is a limit, a licensee can choose to further reduce the value of residual radioactivity at a site to achieve annual dose values less than 0.25 mSv/yr (25 mrem/yr). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: THERE SHOULD BE ABSOLUTELY NO UNRESTRICTED USE OF THE PROPERTY EVER. THE ADDITIONAL EXPOSURE IS TOTALLY INSANE **(CL-20/12)**

Response: *Unrestricted use is described in Section 2.2.2. The purpose of the Supplement is to provide an environmental assessment of the impacts associated with the decommissioning process. The 1997 rule establishing site release criteria allows for termination of the license without continued restrictions on the site. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements or (4) provide guidance on the decommissioning process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I am opposed to the following proposal(s) in the EIS: NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions. **(CL-26/6)**

Response: *The staff believes the author of the comment is referring to the effects of radiation exposures to the public from the site following license termination. The acceptability of the site release criteria is outside the scope of the Supplement. However, the dose models that were used to develop the site release criteria evaluate the persons receiving the highest dose as the maximally exposed individual. This person is a resident farmer. Doses were calculated to children and other vulnerable members of the population; however, their doses were lower because of the types of activities they were involved in. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4.8 Beyond License Termination

Comment: There are still radioactive dangers after decommissioning. **(CL-29/1)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability. **(CL-43/4)**

Comment: The proposed rules ignore radiation dangers after decommissioning. **(CL-25/7)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability. **(CL-26/5)**

Comment: I utterly oppose ignoring radiation dangers after decommissioning is done and utility is relieved of liability. **(CL-33/9)**

Comment: The nuclear facility's land, even after decommissioning, must not be allowed to revert to public or private use, even if the NRC believes that the radioactivity on the land is less than 25 millirems per year. Additionally, in no circumstances should future buildings, structures, etc. be built atop the former nuclear site. The draft GEIS mentions that tourism activities are planned for the Trojan nuclear plant in Oregon after decommissioning. Under no circumstances should that be allowed at any of these sites. Bringing tourists or school groups to nuclear plants that are running now is not acceptable. It's dangerous. I was just in Oregon for my honeymoon, and I just can't imagine going and touring that site. There are a lot of beautiful things in Oregon but the Trojan plant ain't one of them. **(AT-A/39)**

Comment: The nuclear facility's land, even after decommissioning, must not be allowed to revert to public or private use even if the NRC believes that the radioactivity on the land is less than 25 millirems per year. Additionally, under no circumstances should future buildings, structures, etc. be built atop the former nuclear site. **(CL-08/24)**

Comment: Even after all fuel is removed from the site and the entire structure is removed, the site will still be radioactive forever and still need a security person, basic maintenance person. **(CL-20/42)**

Response: *The acceptability of the site release criteria and its potential for affecting public health and safety and protection of the environment after license termination is outside the scope of the Supplement (see Section 1.3). Potential radiological impacts following license termination are covered by the "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," NUREG-1496, which supported the development of 10 CFR Part 20. Current criteria for license termination, given in 10 CFR Part 20, Subpart E, and shown in this Supplement in Section 2.2.2, stated that the Commission has established a 0.25 mSv/yr (25 mrem/yr) total effective does equivalent to an average member of the critical group as an acceptable criterion for release of any site for unrestricted use. This Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements, or (4) provide guidance on the decommissioning process. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC must continue to monitor sites FOREVER after license termination in case of sudden increases in radiation levels from a source on the site no one had either considered or knew was there. **(CL-20/88)**

Comment: What agency or governing body is responsible for monitoring the site after the decommissioning is deemed "complete"? How do the licensee and a government agency, such as the NRC, which is mandated to protect the public health, allowed to walk away from a site that will essentially remain radioactive forever? **(CL-08/31)**

Response: *Structures, systems, and components onsite will be surveyed during the final radiation survey and contamination levels will be reduced to the level necessary for termination of the license. All structures, systems, and components that have radioactive contamination that could exceed the criteria would be decontaminated or dismantled and shipped to a low-level-waste disposal site. The licensee must keep records of information during the operating phase of the facility that would be used to identify where any spills or other occurrences involving the spread of contamination would be located. In addition, because the radioactive material will have been removed from the site, there would be no mechanism for further contamination or radiological releases, and any radiation levels would only be reduced over time due to natural decay. Therefore, there would not be any significant increase in onsite radiation levels some time in the future. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: For a site decommissioning that results in a license termination for unrestricted use, the long-term radiological impacts to the public may well be within acceptable limits. However, for a decommissioning that results in a license termination with restricted site use the potential exists for long-term radiological impacts to the public to be far above acceptable limits. The draft Supplement does not consider this potential. While narrowly focusing the radiological studies to the decommissioning process, the NRC does not consider those potential long-term impacts to the public. **(CL-17/3)**

Response: *Licensees are allowed by regulations in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination," to release the site for restricted use. The impacts following a restricted release license termination will not be considered by this Supplement because the impacts are highly site-specific and would require a site-specific analysis. The site-specific analysis would be included in the License Termination Plan submitted to the NRC for review and approval by the license amendment process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: To allow utilities to have no liability after decommissioning is done when the proposals are seen as "generic" does not provide any protection to local citizens. Accountability for our actions is important and utility companies should not be exempt from that. **(CL-39/4)**

Response: *The consideration of liability is outside the scope of this Supplement. The criteria for license termination are discussed in Section 2.2.2. Termination of the NRC license does not eliminate the utility's liability. The missions of the NRC include the protection of public health and safety and protection of the environment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Decommissioning should never be deemed to be complete until the entire site is no longer radioactive. We understand that this means extremely long-term oversight of the reactor sites. Some of the decommissioning wastes, such as the nickel compounds, have extremely long half-lives and remain dangerous for millennia. Liability for the site needs to remain with the utilities and the NRC must retain regulatory control over the entire site. **(CL-40/3)**

Response: *For those sites in which structures or buildings are left it would be extremely difficult or impossible to demonstrate a "return to background" or that the site is "no longer radioactive." Naturally occurring radioactive materials in the building materials, soils, the presence of radon gas, and cosmic rays would make such a standard impossible to achieve. Termination of the license does not eliminate the licensee's liability for the site. The criteria for license termination are described in Section 2.2.2. The release of the property occurs only after the license termination criteria are met. The purpose of this Supplement is to provide an environmental assessment of the impacts associated with the decommissioning process. The Supplement does not (1) establish or revise regulations, (2) impose requirements, (3) provide relief from requirements or (4) provide guidance on the decommissioning process. The consideration of liability is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Residual contamination left at a site whose license was terminated for unrestricted use could be perceived as disposal of low-level radioactive waste. **(CL-17/6)**

Response: *The material that remains at the site after the license has been terminated must meet the license termination criteria in 10 CFR Part 20, Subpart E, or it can not have been left at the site. Material that cannot meet these criteria would have been considered to be low-level radioactive waste and would have to have been disposed at a licensed LLW facility before the license could be terminated. Therefore, any low-level radioactive waste left on site after license termination would not be considered as radioactive waste. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Since the NRC would no longer have regulatory authority over the site, what governmental institution or corporation would be entrusted with the long-term collection, monitoring and analyses of the groundwater samples? **(CL-51/16)**

Comment: Okay, so who's responsible then for a site that has restricted use. Because I couldn't quite tell. Who would actually protect the public? **(AT-B/4)**

Response: *For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are only required for sites that have residual radioactivity between 1 and 5 mSv/yr (100 and 500 mrem/yr) to the average member of the critical group. These measurements are to be made by a responsible government entity or independent third party, including a governmental custodian of the site. The institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group (Section 2.2.2). The licensee is responsible to provide sufficient funds to carry out responsibilities for control and maintenance of the site (Section 2.2.2). The NRC regulations do not specify the institutional controls. The institutional controls are established during the NRC staff review of the license termination plan (LTP). The LTP is incorporated into the license by amendment so an opportunity to request a hearing would be provided. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Who would determine if remediation were needed; who would be liable for the costs of offsite contamination or other accidents? **(CL-51/17)**

Response: *For sites that have been determined to be acceptable for unrestricted use, there are no requirements for future measurement of radiation levels. It is not expected that these radiation levels would change, other than to be reduced over time, because the radioactive material will have been removed from the site, and there would be no mechanism for further contamination or radiological releases. For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are only required for sites that have residual radioactivity between 1 and 5 mSv/yr (100 and 500 mrem/yr) to the average member of the critical group. These measurements are to be made by a responsible government entity or independent third party, including a governmental custodian of the site. The institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group (Section 2.2.2). The licensee is responsible to provide sufficient funds to carry out responsibilities for control and maintenance of the site (Section 2.2.2). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Who would be responsible to protect against the inadvertent recycling of radioactively contaminated building rubble and soil into new construction or as fill, a possibility mentioned but basically discounted in SECY-00-0041, a letter about rubblized concrete dismantlement, from William Travers, NRC Executive Director for Operations, to the Commissioners (February 14, 2000). **(CL-51/18)**

Response: *During the decommissioning process for power reactors, materials may not be released, recycled, or reused if there are detectable levels of licensed radioactive material present. These materials are carefully monitored and controlled before release. If contaminated equipment or debris is inadvertently released from the site and it presents a risk to public health and safety or a risk to the environment then the material would be recovered and disposed of in a licensed disposal facility. Responsibility for recovery of the material would be determined on a case by case basis. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The transformation of the nation's abandoned nuclear power plants into de facto waste facilities is worrisome from environmental, safety and national security standpoints. **(CL-51/23)**

Response: *Nuclear power plants will not be abandoned. NRC oversight at the facility will continue until the license terminated. There are two categories of uses for the facility after license termination: unrestricted use and restricted use. For sites that have been determined to be acceptable for unrestricted use, there are no requirements for further measurement of radiation levels. It is not expected that these radiation levels would change, other than to be reduced over time, because the radioactive material will have been removed from the site and there would be no mechanism for further contamination or radiological releases. For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are only required for sites that have residual radioactivity between 1 and 5 mSv/yr (100 and 500 mrem/yr) to the average member of the critical group. These measurements are to be made by a responsible government entity or independent third party, including a governmental custodian of the site. The institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group (Section 2.2.2). The licensee is responsible to provide sufficient funds to carry out responsibilities for control and maintenance of the site (Section 2.2.2). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: THERE NEVER SHOULD BE A LACK OF INSTITUTIONAL CONTROL EITHER. **(CL-20/13)**

Response: *NRC has regulations in place to monitor sites until license termination. At that time, if the facility is categorized for restricted use, the institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group (Section 2.2.2). The licensee is responsible to provide sufficient funds to carry out responsibilities for control and maintenance of the site (Section 2.2.2). If it meets the criteria for unrestricted use, there are no required institutional controls. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: To enforce no liability after they leave is simply criminal. **(CL-34/4)**

Comment: The owner must remain fully liable. **(CL-36/5)**

Response: *The consideration of liability is outside the scope of this Supplement. However, termination of the NRC license does not eliminate the utility's liability. The criteria for license termination are discussed in Section 2.2.2. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The federal government (the U.S. Atomic Energy Commission and its progeny) initiated and funded the promotion of nuclear power. How, then, can it walk away from the long-term surveillance of the plant sites, even though it will have declared the residual radioactive contamination to be at permissible levels? **(CL-51/25)**

Response: *The criteria for license termination are discussed in Section 2.2.2. For sites that have been determined to be acceptable for unrestricted use, there are no requirements for further measurement of radiation. For sites that have been determined to be acceptable for license termination under restricted conditions, additional measurements of radiation are required for sites that have residual radioactivity in excess of 1 mSv/yr (100 mrem/yr) but less than 5 mSv/yr (500 mrem/yr). These measurements are to be made by a responsible government entity or independent third party, including a governmental custodian of a site. The measurements are to be carried out no less frequently than every 5 years to ensure the institutional controls remain in place as necessary to meet the criterion of 0.25 mSv/yr (25 mrem/yr) to an average member of the critical group. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In effect, the NRC plans to wash its hands of any responsibility for the long-term damage that may result from reactor decommissioning (and that of other nuclear licensee'

facilities and activities). It is the state or municipality and community in which a plant is located and the residents that will be required to bear the burdens of injury and costs of further clean-up after the NRC has vanished. **(CL-52/11)**

Response: *Compliance with the Radiological Release criteria found in 10 CFR Part 20, Subpart E, will result in protection of the public health and safety. Once the licensee can demonstrate that the Radiological Release Criteria will not be exceeded, no further cleanup is necessary. Therefore, the State or municipalities would not incur any additional costs. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.4.9 Ownership

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:] Joint Ownership. **(CL-02/9)**

Response: *Joint ownership of a nuclear facility is not uncommon and is an outgrowth of anti-trust consideration. This comment relates to nuclear power facilities in general and is outside the scope of this Supplement. However, a number of power facilities undergoing decommissioning have joint owners and no significant problems in this arrangement have been identified. The decommissioning funds will be available for decommissioning a permanently shutdown reactor, regardless of ownership. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The most disturbing and financially bizarre component of radiological decommissioning is the relationship between a "power reactor license" and the "minority power reactor licensee." Unlike "power reactor licensees," "fractional licensees" are not subjected or mandated by the Nuclear Regulatory Commission to empirically verify, report or monitor record keeping relating to nuclear decommissioning funding mechanisms. In some instances, even Public Utility Commissions lack the ability to mandate or regulate savings levels from "fractional licensees", e.g., Rural Electric Cooperatives. **(CL-02/35)**

Response: *Although the facility may be owned by multiple owners, the licensee is a single entity and is responsible for complying with the financial assurance requirements of 10 CFR 50.75. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: How will the facility licensee, in our case, Southern Nuclear, benefit from later sale of the nuclear plant's land to a new owner? Also, how will the land be tracked after it's deemed "safe" and the licensee sells it...especially in cases where there may be a leak or a release of radiation into the environment after the initial sale occurred? For instance, isn't it in the best financial interest of the licensee, in our case Southern Nuclear, to use the fastest and least expensive decommissioning option so that the license can be terminated and they can sell the land before deficiencies can be found in the manner in which a plant was decommissioned? **(CL-08/28)**

Response: *Once the license is terminated, the NRC has no regulatory authority over activities at the site, and the owner of the site is no longer subject to NRC regulations. If the condition of the facility at the time the license is terminated is such that the regulations allow the site to be available for unrestricted use, then there will not be any sources of radioactive contamination to result in a leak or significant release of radioactive material into the environment. The economic benefits to the utility after license termination are not within the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Since deregulation, numerous nuclear plants have changed hands. To "Cushion" the transition from regulated monopoly to competitive marketplace, many states allowed"electric utilities" to recover "stranded costs." Rate payers are saddled with paying for the industry's uneconomical investments, i.e., "stranded costs." "Two of the most "bullish" nuclear corporations, Exelon and PPL, recovered over $8.3 billion in "uneconomical investments." This figure does not include the millions in savings Exelon and PPL have accrued by unilaterally devaluing the combined PURTA and Real Estate tax assessments for their nuclear generating stations.

The Susquehanna Steam Electric Station is the most glaring example of a company "devaluing" their property at the expense of taxpayers, while billing the same hostage rate payer for uneconomical investments, and exposing this rate payer/taxpayer to further financial exposure related to the underfunding of nuclear decommissioning.

In the of Winter 1999-2000, PPL unilaterally devaluated the combined PURTA and Real Estate tax assessments for the SSES. Prior to the 1998 Joint Petition for Negotiated Settlement, the nuclear power generating units were assessed by PP&L at approximately $1 billion. PPL now claims that the SSES is only worth $74 million or the same amount as the valuation of the Columbia Hospital. Not only did the Berwick School District and Luzerne County experience revenue shock, but PPL refused to pay or escrow any monies they owed to Luzerne County and the Berwick School district while the case was being appealed.

PPL's behavior is all the more egregious in an era where nuclear plant's value on the open-marker are equal to, or in excess, of fossil generating stations. For example, Entergy and Dominion resources engaged in a bidding war to purchase the Fitzpatrick and Indian Point 3 nuclear generating stations from the New York Power Authority (NYPA). The sale established a record high. **(CL-02/32)**

Response: *The Supplement provides an environmental assessment of the impacts associated with the decommissioning process. Discussions on the source of funds for the decommissioning trust fund are outside the scope of the GEIS. Furthermore, the comment relates to operating nuclear power facilities and not decommissioning facilities and is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The General Accounting Office has slammed the NRC for its lack of oversight of transfers and mergers in the nuclear industry and had not verified that new owners would have guaranteed access to the decommissioning charges that their affiliated utilities would collect, in some cases, plus, a host of other safety and other issues were raised, all of which are troubling. The NRC must immediately address problems, and should demand that companies provide enough money for oversight - to include security staff, maintenance staff, nuclear engineers, radiation safety officers etc. - essentially forever. **(CL-20/41)**

Response: *In a letter dated March 1, 2002 (ML-020250068), the NRC responded to the GAO findings and elaborated on its programs and practices. The Supplement provides an environmental assessment of the impacts associated with the decommissioning process. Discussion of access to the decommissioning trust funds by new owners of facilities is outside the scope of the GEIS. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Utility deregulation has put the ownership of these plants in hands that are not as responsible as they once were. Plymouth MA suffers financially because of the loss of tax revenue from the Pilgrim Plant - we cannot assume the additional risk these rules would place on us. **(CL-25/3)**

Response: *This comment relates to the power market and the effects of deregulation in general and is outside the scope of this Supplement. Licensees are required to satisfactorily maintain the decommissioning trust fund for the facility under the provisions of 10 CFR 50.755.*

They are required to periodically report the status of their trust fund to the NRC. The NRC has the responsibility to review the progress the licensee is making in fully funding the trust fund for decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

O.4.10 Financial Assurance

Comment: Second, we're concerned about the financial viability of the companies that own these sites. During a 60-year period, the companies may go bankrupt and that may leave the sites unaccounted for. We're also worried about the uncertainty associated with the cost of disposing radioactive material later. We understand that safe store is preferred because of lower costs later, but because of Yucca Mountain and other uncertainties about disposal, we're concerned about those hanging costs. **(CH-A/6)**

Comment: But what happens to a facility that shuts down prematurely and they haven't actually collected sufficient funds for what's necessary for decommissioning and then, they go bankrupt? And that situation still poses a risk. **(CH-A/15)**

Comment: Does any one of sound mind or body residing within the Commission really think that a nuclear power plant can be radiologically decommissioned if the funding is inadequate and the plant is prematurely shut down? **(CL-02/12)**

Comment: Prematurely shutdown reactors place an additional financial strain on the licensee. **(CL-02/42)**

Comment: There's a financial assurance gap here, I feel, and this has been mentioned several times tonight. I'll say two syllables—Enron....And I could be wrong about this but I thought the money was somewhat linked to the rate base and all these plants are not operating for their design life. And so I'm real concerned that the fund was never—the goal was never set correctly to begin with and that we would fall short on raising the money, it may not be enough....Is there assurance or something for a corporation a couple of generations removed from the corporation that actually originally licensed and built the plant? **(AT-G/3)**

Response: *If a facility shuts down prematurely before the decommissioning trust is fully funded, or if it unexpectedly finds itself having to shift to a more costly decommissioning option, the facility license holder is still obligated to fund the entire cost of decommissioning. Most power generators are diversified and are able to continue to add funds to their decommissioning trust fund. To date, none of the license holders of prematurely shutdown power reactor facilities have defaulted on their decommissioning funding obligation. Bankruptcy does not necessarily mean that a power reactor licensee will liquidate. To date, the NRC's experience with bankrupt power reactor licensees has been that they file under Chapter 11 of*

the Bankruptcy Code for reorganization, not liquidation (for example, Public Service Company of New Hampshire, El Paso Electric Company, and Cajun Electric Cooperative). In these cases, bankrupt licensees have continued to provide adequate funds for safe operation and decommissioning, even as bondholders and stockholders suffered losses that were often severe. Because electric utilities typically provide an essential service in an exclusive franchise area, the NRC staff believes that, even in the unlikely case of a power reactor licensee liquidating, its service territory and obligations, including those for decommissioning, would revert to another entity without direct NRC intervention. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: However, the Nuclear Regulatory Commission has steadfastly refused to address the fundamental problem that has created and perpetrated financial gaps between "target" (2) decommissioning funding and actual assets on hand to complete radiological decommissioning (3). In fact, the Commission has no statutory authority to compel "electric utilities" to physically raise, maintain, secure and account for radiological decommissioning funding. The NRC can authorize and mandate a preferred "mode of decommissioning", but the Commission lacks the ability to ensure the existence of adequate funding levels. i.e. accretible external sinking funds.

The NRC's GENERIC Environmental IMPACT STATEMENT (GEIS) on DECOMMISSIONING of NUCLEAR FACILITIES-NUREG-0588: DRAFT SUPPLEMENT DEALING WITH DECOMMISSIONING of NUCLEAR POWER REACTORS does not adequately factor the financial disconnect between NRC "Funding targets" and actual and realized funding pools accrued by "electric utilities." Moreover, there remains a chronic shortfall between "targeted" funding levels and actual costs for nuclear decommissioning. (4) **(CL-02/2)**

Comment: The GEIS failed to address the issue of nuclear plant "devaluation" and revenue shock. **(CL-02/33)**

Response: *While the process for decommissioning nuclear power facilities is now well established, the cost of decommissioning varies from one nuclear facility to the next. The variability is due to the major factors listed in the Supplement (Section 4.3.11.2). Cost estimates (at the time of licensing, 5 years before anticipated shutdown, with the Post-Shutdown Decommissioning Activities Report submittal, 2 years following shutdown, and 2 years preceding the anticipated termination of the license) are site-specific, and provide a method of re-evaluating the decommissioning costs at various times and stages in each facility's life. The regulations to ensure the availability of decommissioning funds were originally established in 1988, and site-specific decommissioning cost estimates are required as provided in 10 CFR 50.75 and 10 CFR 50.82. Failure to comply with NRC regulations is a violation of the facility license and the NRC could take enforcement action to compel the licensee to comply*

with the provisions of 10 CFR 50.7. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Funding targets to bring a site back to "Greenfield' are set by the Nuclear Regulatory Commission and do not include spent fuel disposal or non-radiological decommissioning. However, the NRC has no rate making authority and electric utilities must go before state utility commissions to recover funding levels "suggested" by the NRC. But the Companies are not mandated by the federal government to submit detailed funding plans until two years prior to site closure. In addition, if a utility has been saving for DECON, but SAFSTOR is necessitated, the funding package becomes grossly inadequate. **(CL-02/39)**

Response: *Radiological decommissioning activities continue until the licensee requests termination of the license and demonstrates that radioactive material has been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed, the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC authority. As a result, activities performed after license termination (to meet other requirements, e.g., additional state requirements such as additional radiological decontamination, removal of structures, site grading, etc.), and the resulting impacts are outside the scope of this Supplement. These activities may include site restoration. The return of the site to Greenfield conditions is specifically stated to be out of scope of the Supplement (Section 1.3, "Scope"). Experience to date has shown that licensees have been able to change decommissioning options (such as DECON to SAFSTOR) without significant financial difficulties. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: As of this filing, no commercial nuclear power plant has been decommissioned, decontaminated, and returned to free-release. Nuclear decontamination and decommissioning technologies are in their infancy and several identifiable industrial trends are apparent when reviewing the Nuclear Regulatory Commission's treatment of prematurely shutdown reactors: There is a reluctance to undertake, initiate or finance decommissioning research. **(CL-02/41)**

Response: *The statement is not true; two commercial nuclear power plants (Shoreham and Ft. St. Vrain) have been decontaminated and decommissioned and the sites released for unrestricted access. The U.S. Department of Energy (DOE) has funded significant decommissioning-related research over the past 10 years. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Georgians for Clean Energy does not believe that the GEIS adequately addresses decommissioning costs. Though assurances were made at the public meeting in Atlanta that decommissioning funds are adequate, real-world examples have proved otherwise. For instance, in the current world of mega-mergers of electric utilities and sudden dissolution of energy giants such as Enron, there is little guarantee in place that companies will be able to pay for the full costs of decommissioning. Additionally, we are concerned that the method of decommissioning a nuclear power plant is determined more by the cost implications to the licensee than the overall ramifications of leaving a contaminated site for the local communities. **(CL-08/10)**

Response: *NRC staff would not speculate on how the financial collapse of one corporation affects the financial soundness of power generators as a whole. There is, in fact, reasonable assurance that utilities will have the resources to fund decommissioning. Industry experience to date has not revealed problems in securing adequate funds in the decommissioning trust fund to complete decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Furthermore, a report issued this December by the U.S. Government Accounting Office, "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could Be Improved--GAO-02-48," brings to light many concerns about the lack of adequate funding available for decommissioning activities. The following statement by the GAO makes it apparent that the NRC needs to improve, "However, when new owners proposed to continue relying on periodic deposits to external sinking funds, NRC's reviews were not always rigorous enough to ensure that decommissioning funds would be adequate. Moreover, NRC did not always adequately verify the new owners' financial qualifications to safely own and operate the plants. Accordingly, GAO is making a recommendation to ensure a more consistent review process for license transfer requests." **(CL-08/12)**

Comment: Georgians for Clean Energy requests that this extensive report be thoroughly reviewed by the NRC staff, be printed in it's entirety as an appendix in the final GEIS as the report did not come out before the draft GEIS was issued, and that the recommendations by the GAO be studied and incorporated into the final GEIS. Additionally, the public participation process should be extended to allow for proper review of this important report. **(CL-08/13)**

Comment: Additionally, ownership of nuclear facilities has changed for more than half of the nuclear power plants in the United States through mergers and transfers. This shuffling of ownership has raised much uncertainty about the availability of adequate funds for the eventual decommissioning of the nuclear facilities. As reported by GAO December 2001 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could Be Improved" NRC reviews of financial arrangements exchanged in these transfers and mergers "were not always

rigorous enough to ensure that decommissioning funds would be adequate. Moreover, NRC did not always adequately verify the new owners' financial qualifications to safely own and operate the plants." **(CL-48/23)**

Response: *In a letter dated March 1, 2002 (ML-020250068), the NRC responded to the GAO findings and elaborated on its programs and practices related to licensee financial qualifications and decommissioning funding assurance. Based on the industry experience to date and the decommissioning funding requirements in 10 CFR 50.75, the NRC staff has no reason to believe that the decommissioning trust funds are inadequate. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The NRC needs to pay attention to decommissioning costs proposed by Georgia nuclear utilities during rate cases and other proceedings so there is not a situation created where much needed monitoring and maintenance is ignored simply because there was no regulatory attention to the real cost of decommissioning. **(CL-08/16)**

Response: *Decommissioning activities continue until the licensee requests termination of the license and demonstrates that radioactive material has been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed, the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC authority. As a result, activities performed after license termination (to meet other requirements, e.g., additional state requirements, not subject to NRC authority) and the resulting impacts are outside the scope of this Supplement. These activities may include any other than NRC-required monitoring, including site restoration. The return of the site to Greenfield conditions is specifically stated to be outside the scope of this Supplement (Section 1.3, "Scope"). Most power generators are diversified and are able to be flexible in case of a change in plans (such as a change in decommissioning method). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: How is the funding of decommissioning costs guaranteed to be met by a company in a day and age where gigantic utility companies can collapse at any moment, as has recently happened with Enron? **(CL-08/29)**

Response: *NRC staff would not speculate on how the financial collapse of one corporation affects the financial soundness of power generators as a whole. There is, in fact, reasonable assurance that utilities will have the resources to fund decommissioning. Furthermore, the decommissioning trust fund is specifically set up to prevent licensees from accessing the fund for money other than for decommissioning. To date, none of the license holders of prematurely*

shutdown facilities have defaulted on their decommissioning funding obligation. Bankruptcy does not necessarily mean that a power reactor licensee will liquidate. To date, the NRC's experience with bankrupt power reactor licensees has been that they file under Chapter 11 of the Bankruptcy Code for reorganization, not liquidation (for example, Public Service Company of New Hampshire, El Paso Electric Company, and Cajun Electric Cooperative). In these cases, bankrupt licensees have continued to provide adequate funds for safe operation and decommissioning, even as bondholders and stockholders suffered losses that were often severe. Because electric utilities typically provide an essential service in an exclusive franchise area, the NRC staff believes that, even in the unlikely case of a power reactor licensee liquidating, its service territory and obligations, including those for decommissioning, would revert to another entity without direct NRC intervention. Additionally, an NRC licensed facility undergoing decommissioning or a site that is not under license but is undergoing decommissioning under NRC's regulation also warrant remediation under CERCLA as a Superfund site. These statutory provisions might become particularly relevant at sites for which funding is inadequate for cleanup. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: As a result of electric utility deregulation where a competitive market has replaced regulated rates, traditional methods of amassing decommissioning funds through imbedded utility rates have been replaced with by competitive electricity rates. **(CL-48/22)**

Comment: Costs: Because of current efforts to restructure and deregulate the electric power industry, decisions about decommissioning could be driven by economic considerations, not by safety - by efforts to cut costs in order to stay competitive. I believe the electric utilities should not be relieved of liability for their decommissioned reactors. **(CL-51/19)**

Response: *The NRC has published a final policy statement in the Federal Register (62 FR 44071) regarding the adequacy of decommissioning funds. Because of deregulation in the power market, some licensees would cease being an "electric utility," as defined in NRC regulations. Should this occur, periodic deposits to an external sinking fund would no longer be allowed; rather, the NRC requires that a licensee provide funding assurance for the full estimated cost of decommissioning, either through full up-front funding or by some allowable guarantee or surety mechanism. Deregulation would not invalidate the license; as a result, the licensee will still be liable for the safe and complete decommissioning of their facilities. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Objective empirical data clearly demonstrate that the majority of commercial nuclear power plants will not operate through their planned operating life of forty years (40). While the power reactor licensees are entitled to recover a portion of decommissioning funding

through the rate, they are not entitled to a full and complete rebate on "stranded investments", and shortfalls that will certainly arise due to the under funding of nuclear decommissioning "funding targets." Shareholders and Board Members of electric utilities and Rural Electric Cooperatives (REC) must assume responsibility for their business decisions. These aforementioned entities aggressively sought to license, construct, and operate nuclear power plants. To allow artificial definitions concerning ownership of nuclear generating stations to insulate those who cogently made capital investments is immoral, unethical, and an endorsement of corporate socialism. That is, shareholders profit from imprudent investment decisions and are accorded relief when error of mismanagement becomes manifest. The Pennsylvania Public Utility Commission cited Nuclear Regulatory Commission guidelines that suggested five criteria for evaluating alternative financing mechanisms for nuclear decommissioning. One of the components of was titled "Intergenerational equity - that the cost of decommissioning be spread equitably to all rate payers throughout the life of the facility." Unless a more equitable funding formula for nuclear decommissioning is established, rate payers and taxpayers who received little or no direct electrical benefit from nuclear generating, will be financially exposed. The nuclear industry must assume responsibility for their investment strategies. Creating and perpetuating intergenerational debt is reckless and fundamentally inequitable and undemocratic. Future generations may be exposed to gross rate payer inequity if adequate decommissioning funding based on realistic estimates (and not "funding targets") are not assured. The solution should not be a financial safety net provided by hostage rate payers and taxpayers excluded from internal corporate decision making. "Electric utilities" must assume financial responsibility for their decisions to invest in nuclear power which necessarily means the shareholder should bear a substantial portion of post-deregulation decommissioning expenses. Clearly, a formula must be established that recognizes rate payer and taxpayer equity for the realized service that power reactor licensees provide. It is time for the Nuclear Regulatory Commission to recognize, through its Environmental Impact Statements, that consumers and taxpayers are human beings and not abstract, hypothetical billing invoices. **(CL-02/31)**

Response: *The missions of the NRC include the protection of public health and safety, and protection of the environment. NRC requirements established a framework to ensure that decommissioning of all nuclear reactor facilities will be accomplished in a safe and timely manner, and that adequate funding will be available for this purpose. NRC does not prescribe how the funds are to be raised. The license holder for the facility funds decommissioning costs. Equitability of investment decisions is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Second, we are concerned that over the course of 60 years, the ownership of nuclear plants, financial status of licensees, and decommissioning obligations for many plants could change; if companies have not operated the facility long enough to accrue sufficient funds

for decommissioning, and then go into an extended SAFSTOR period, bankruptcy of the facility owner could jeopardize cleanup at the site. The extended time of storage combined with reduced staffing associated with SAFSTOR could mean that these sites are more likely to be subject to accident, theft of equipment, or attack. **(CL-11/10)**

Response: *If a facility shuts down prematurely before the decommissioning trust is fully funded, or if it unexpectedly finds itself having to shift to a more costly decommissioning option, the facility license holder is still obligated to fund the entire cost of decommissioning. To date, none of the license holders of prematurely shutdown facilities have defaulted on their decommissioning funding obligation. Bankruptcy does not necessarily mean that a power reactor licensee will liquidate. To date, the NRC's experience with bankrupt power reactor licensees has been that they file under Chapter 11 of the Bankruptcy Code for reorganization, not liquidation (for example, Public Service Company of New Hampshire, El Paso Electric Company, and Cajun Electric Cooperative). In these cases, bankrupt licensees have continued to provide adequate funds for safe operation and decommissioning, even as bondholders and stockholders suffered losses that were often severe. Because electric utilities typically provide an essential service in an exclusive franchise area, the NRC staff believes that, even in the unlikely case of a power reactor licensee liquidating, its service territory and obligations, including those for decommissioning, would revert to another entity without direct NRC intervention. Additionally, an NRC-licensed facility undergoing decommissioning or a site that is not under license but is undergoing decommissioning under NRC's regulations also warrant remediation under CERCLA as a Superfund site. These statutory provisions might become particularly relevant at sites for which funding is inadequate for cleanup. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5 NEPA-Related Issues

O.5.1 Process for Developing the GEIS

Comment: What consideration was given to the location of the facility as a variable in determining? **(CH-B/3)**

Response: *Location of the facility (on the ocean, a lake, a river, etc.) was one of the variables used to determine the potential environmental impacts from decommissioning activities. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I don't know if site location was included in as an Other in the variable. I'd be interested in what kind of depth of analysis went into that if it was a variable that was considered. **(CH-B/4)**

Response: *Location of the facility (on the ocean, a lake, a river, etc.) was one of the variables used to determine the potential environmental impacts from decommissioning activities. Data from sites located on the Great Lakes, the Atlantic and Pacific Oceans; as well as plants located on rivers were used in evaluating the impacts from decommissioning facilities. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I recommend highly that in the future efforts of this sort, the communications to get information about specific plants be with those specific plants or otherwise actions be taken to ensure that all plants are covered. **(CH-D/12)**

Response: *The staff agrees that in many instances direct contact with the licensees yields the most accurate and current information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I understand that Elk River is the only United States commercial reactor that has been completely dismantled down to its original greenfield state. It so completely disappeared, in fact, that it is not even mentioned in the "Draft Supplement," in the tables of "permanently shutdown plants" (for example, as pages 3-27, 4-44, and Table F-1. **(CL-51/5)**

Response: *The Elk River Reactor was not regulated by the NRC. Elk River was not a commercial reactor and not attached to the electric power grid. It was a 58 megawatt (thermal), boiling water reactor that was owned and operated by the Atomic Energy Commission as part of the demonstration reactor program project. Therefore, it was not included in the permanently shutdown reactors considered in this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5.2 Public Meetings and Public Participation

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC redefines terms to avoid local, site-specific opportunity to question, challenge and prevent unsafe decommissioning decisions. **(CL-43/9)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community

involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling and possible rubbilizing of the reactor. **(CL-43/12)**

Comment: While the 9/11 events may call for some more secrecy, in most cases it's a matter of "closing the gates long after the horses are gone." Instead you should adopt a policy of allowing more public participation to ensure public confidence in your process! **(CL-27/2)**

Comment: I would like to start out by addressing the process and how it limits the ability for the public to effectively participate in this and other nuclear-related issues that impact Georgia communities. The technical nature of the issues and an ongoing resistance by nuclear regulators to share accurate information about nuclear threats has always made it difficult for the public to be involved in decision-making involving nuclear energy issues. **(AT-A/2)**

Comment: We have some grave concerns about the process....There is a real problem, I think, with public knowledge about the opportunities for input into NRC's decision making. **(AT-B/5)**

Comment: My executive director asked me to express our concern for we want this process to be transparent. Allow public accessibility to the process, knowledge of the standards. Do no harm. We represent physicians who take the Hippocratic Oath. Take no risks that can be avoided. It seems ridiculous to come in here and say to professionals "be careful." But Adele quoted the too-cheap-to-be-metered promise and there's some credibility problems, so be careful. **(AT-H/1)**

Comment: As I noted at the time, I am concerned about the silence of the draft supplement on public participation in the decommissioning process. Commenters raised these concerns 18 months ago, but the draft supplement does not seem to address them. **(CL-12/1)**

Comment: As I read the supplement, its effect will be to predetermine a number of issues about decommissioning of all public-utility power reactors. This will remove those issues from examination in trial-type proceedings, where licensees' evidence or the NRC's assumptions and conclusions could be tested and exposed to public scrutiny. **(CL-12/2)**

Comment: Unless the public is allowed to intervene in decommissioning proceedings and participate fully in those proceedings, it cannot be certain that trustworthy decisions will result. Your 1996 brochure Public Involvement in the Nuclear Regulatory Process, NUREG/BR-0215, assures us that "the public has an opportunity to participate in NRC's decision making process to decommission a facility." Public participation short of party-intervener status and review of

less than all issues relevant to each plant seems to me a recipe for inadequate decision making. If your agency restricts review, I believe you will be reneging on your promises to the public, as well as violating NRC's laws and regulations and the Administrative Procedure Act. **(CL-12/3)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC redefines terms to avoid local, site-specific opportunity to question, challenge and prevent unsafe decommissioning decisions. **(CL-26/11)**

Comment: I also utterly oppose redefining terms to avoid local, site-specific opportunity to question, challenge, and prevent unsafe decommissioning decisions. **(CL-33/15)**

Comment: I also utterly oppose attempting to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until activities such as flushing, cutting, hauling, and possibly rubblizing of the reactor are complete—in other words, until the damage has irretrievably been done. **(CL-33/18)**

Comment: Please increase, rather than decrease, public participation in every single aspect of the planning, building, and running of Nuclear Power Plants. Please do this even if you don't want to. The public, to you, may seem like a thorn in your side, something that gets in the way of your plans. But a democratic government should not seek to shut their people out of decisions that effect their lives. It is a very sad reflection on the state of our democracy that this seems to be precisely the aim of your draft regulations. Don't you believe in democracy? Are you tired of playing by democratic rules if it means you can't win each and every time? Is democracy too inconvenient for you? If you were busy doing the "right thing" you would be excited and proud to open your process to the public. If you were involved in an honest process, you would be eager to engage your opponents in debate about it. You would not have to stack the deck, hide your process, shut the people out. Shame on you! See if you have the courage to do the right thing! --- And have the courtesy not to send one of those dummy automatic replies! **(CL-35/1)**

Comment: In keeping with appropriate medical and public policy principles, we urge total transparency. United States citizens deserve nothing less than total transparency. **(CL-46/1)**

Comment: We urge that the Commission always lead it's interactions with the public at large by being fully open and informative about the potential dangers, the expense and the limited experience we as a nation have with the decommissioning of nuclear reactors. **(CL-46/2)**

Comment: Any and all decommissioning activities should be performed methodically and with great caution, ensuring that the public is appropriately involved in the processes and thoroughly protected from dangers every step of the way. **(CL-47/4)**

Comment: Further, this move runs counter to NRC's "Openness" Principle of Good Regulation, wherein "Nuclear regulation is the public's business, and it must be transacted publicly and candidly. The public must be informed about and have the opportunity to participate in the regulatory processes*" and to NRC's Organizational Value of "Service to the public, and others who are affected by our work." (both found at http: //www.nrc.gov/who-we-are/values.html) **(CL-47/12)**

Comment: We're concerned that the use of the proceeding may be used to eliminate site-specific evaluation of local concerns. And our concern is the right of local residents will be preempted from raising concerns during the license termination plan review. **(SF-D/1)**

Comment: The elimination of sub part M hearings coupled with the instituting of sub part L further inhibits public participation and is a violation of citizens constitutional rights guaranteed under section 189a of the Atomic Energy Act. **(CL-50/8)**

Comment: The PSDAR skirts accountability and obstructs required public participation. The PSDAR does not require a clear description of the methodologies so that the public can understand what will be taking place during decommissioning. Only with a sufficiently detailed plan, can the public meaningfully research, investigate, formulate comments and questions, and possible objections to the decommissioning activities. A meeting does not afford citizens the level of institutional accountability necessary given the dangers of environ-toxic contamination inherent in the reactor cessation. Informational meetings, as experienced at Yankee Rowe, CT Yankee, Maine Yankee, and Millstone Unit 1 obfuscated, confused, and ignored the concerns of local citizens. Both the Federal District Court and the Appellate Court chastised the agency for this approach. If the community has concerns, and there is no regulatory recourse save one "meeting" with NRC, the Commission will, in fact, create polarization between the community and regulator leading to erosion of public confidence in the NRC. **(CL-50/9)**

Comment: Increasingly, no forum is available to citizens in which to exercise their rights under the Federal Administrative Procedure Act. This is yet another reason that this Supplement is unacceptable and should be withdrawn. **(CL-52/7)**

Comment: These denials of access to the judicial system are currently being extended in the form of NRC's proposed Rule, "Change of Adjudicatory Process," compounding the illegalities inherent in this Supplement. **(CL-52/6)**

Comment: The NRC claims the agency and the industry have accumulated substantial decommissioning experience and that this is justification for hastening the generic treatment of

Environmental Impact Statements. In effect, this eliminates meaningful public involvement in site-specific reviews and prevents the necessary full disclosure of nuclear facility contamination and decommissioning practices. **(CL-48/4)**

Comment: Why, in this same democracy that we hold up so proudly to the world, does the NRC seek to prevent public comment on the basic issue of public health in a nuclear world? **(CL-36/1)**

Comment: Please consider my opposition to many of the proposed Supplements. The public should not be further shut out of the decommissioning process. Nuclear waste is deadly and it's handling should not be downgraded in any way. **(CL-43/16)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling and possibly rubblizing of the reactor. **(CL-26/14)**

Comment: CWAA supports the comments of NIRS, Public Citizen and the Critical Mass Energy Project. We concur with these organizations that changes in the supplement designed to limit citizen's opportunities to review or challenge decommissioning projects are undemocratic and ill advised. It is imprudent to reduce public oversight of these projects, no matter how much more convenient it seems. **(CL-45/1)**

Comment: Alternative methods being considered by the NRC include "entombment" and "rubblization." These involve leaving more nuclear waste onsite in an effort to reduce industry's short-term decommissioning costs but are likely to increase long-term costs to affected communities once the sites are abandoned after license termination. The proposed alternative methods additionally raise significant technical and environmental impact issues and conflicts with the permanent emplacement of so-called "low-level" radioactive waste at nuclear facility sites not originally licensed as regulated nuclear waste management facilities. The proposed alternative methods are tantamount to creating an unlicensed radioactive waste disposal site. These alternative methods must therefore be subject to review by the affected communities with full disclosure and documentation of the amount of radioactivity, the location and condition of all residual contamination and the types of radioactive contamination that remain onsite. On-site and offsite contamination and radioactivity and associated issues involved with extended institutional control must all be subject to site-specific public hearings. **(CL-48/27)**

Comment: NRC redefines terms to avoid local, site-specific opportunity to question, challenge and prevent unsafe decommissioning decisions. **(CL-48/44)**

Comment: NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling, and possibly rubblizing of the reactor. **(CL-48/47)**

Response: *The Supplement provides an environmental analysis of the impacts associated with the decommissioning process for power reactors. Comments pertaining to the decommissioning process for power reactors as prescribed by 10 CFR 50.82 are outside the scope of this Supplement. The current regulations were published on July 29, 1996 as part of a comprehensive rulemaking effort related to power reactor decommissioning. The NRC revised its regulations by the Commission's notice and comment rulemaking process.*

Section 2.2 of the GEIS describes the regulatory aspects of the decommissioning process as specified by 10 CFR 50.82, including the options for public participation. In addition to public meetings, the public has certain adjudicatory opportunities that are outlined in NRC regulations at 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders." If the licensee has requested an action requiring a license amendment, then the process for intervening in this action is by requesting or participating in a hearing. For decommissioning reactors, the process will usually follow the regulations in 10 CFR Part 2, Subpart L, "Informal Hearing Procedures for Adjudications in Materials and Operator Licensing Proceedings" (depending on the timing of the request, the process may follow the regulations in 10 CFR Part 2, Subpart A). If the action of concern does not involve a license amendment, then any member of the public may raise potential health and safety issues in a petition to the NRC to take specific enforcement action against a licensed facility. This provision is contained in the NRC's regulations and is often referred to as a "2.206 petition" in reference to its location in the regulations (Chapter 2, Section 206 of 10 CFR). Licensees are permitted to perform activities allowed under their licenses. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: After the tragic events of September 11, this problem has escalated to a point where our organization believes it is highly irresponsible of our Federal government to go forward with making crucial decisions that will affect generations and generations to come. The NRC's Web site, as many of you know, was not available for a time and is currently severely scaled back, making public access to important background information very difficult or impossible. I have spoken with representatives of the U.S. Nuclear Regulatory Commission and they have echoed some of my concerns as they, too, have difficulty gaining information on nuclear industry activity. If people like myself who have the ability to research these issues on a full-time basis along with staff members of the regulatory agencies are having a hard time, imagine the fate of a concerned citizen who has limited time to devote....For citizens concerned about issues at Plant Hatch in south Georgia, unless they have a hard copy of the relicensing

documents, it is difficult for them to look up concerns that would be relevant to today's meeting because those relicensing documents are no longer available online. We did have a link to it on our Web site, but you know, we all know it's not working. **(AT-A/3)**

Comment: Georgians for Clean Energy remains concerned about the ability for the public to effectively participate in this and other nuclear related issues that impact Georgia's communities. Due to the tragic events of September 11th the Nuclear Regulatory Agency's (NRC) Web site was not available for a time and is currently severely scaled back, making public access to important background information very difficult or impossible. **(CL-08/1)**

Comment: SLOMP is troubled by the inability of the public to have adequate access to the NRC Web site. Prior to the censorship, the existence of the Web site had been viewed as a giant step forward in communication between the public and the Commission. **(CL-53/1)**

Comment: Given the difficulty in accessing thorough and accurate information, including potentially relevant material such as the relicensing documents on Plant Hatch in South Georgia, we feel it is important to both extend the public comment period until these documents can be made readily available and to provide more meeting locations to adequately gather public comments. Since nuclear reactors will eventually be decommissioned in many states the public should be given more than just four locations nationwide to voice their concerns. Public meetings should also be held in communities neighboring currently existing nuclear power plants. **(CL-08/2)**

Comment: Moreover, the NRC's public notice, as an example, that went out on November 2 of this meeting, contained an inaccurate link to the public electronic reading room.... Well, for a lot of people that got that link, that's all they'll do, they'll go to that link and it doesn't work and they think they don't know how to use their computer and then they just go home. So again, the accuracy of information that's going out right now, we have to be very aware of when there are mistakes made. **(AT-A/5)**

Response: *The NRC realizes that the Web site was not available to the public for a period of time following September 11, 2001, and has taken prudent steps to make important information available to the public as soon as practicable. The staff extended the comment period for an additional 30 days until January 31, 2002, in part, to provide additional time for members of the public to review appropriate documents relating to decommissioning. Currently, the NRC website has been re-established and the public has access to a large amount of information via the Internet. The subject of license renewal is outside the scope of this Supplement. However, if individuals have questions related to license renewal they should contact the project manager*

of the plant of interest. The NRC website can direct an individual member of the public to the NRC point of contact. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: It is essential to provide more meeting locations to gather public comments. Four locations is not enough, given that we have nuclear reactors that will eventually be decommissioned in many states and the public, as I've said, has had difficulty accessing the information...have more meetings. **(AT-A/7)**

Comment: Once again, that's where having other meetings outside of the area could gather some useful information that may have been missed, and maybe site-specific, that wasn't addressed earlier. **(AT-A/20)**

Comment: Thank you for holding these meetings in four locations around the country, and for encouraging public participation. **(CL-10/12)**

Comment: I'd like to invite you to come to Charlotte. We could, I think, fill up a hearing room so that you could hear from the citizens who are directly affected by your decision making that is on going. **(AT-B/13)**

Comment: Both the NRC and taxpayers would have been better served by sending the draft GEIS to all individuals and groups that have demonstrated interest in safety issues at nuclear plants over the last two decades, with a questionnaire, a comment section, and a self-addressed, stamped envelope. **(CL-53/6)**

Response: *The meeting locations were chosen to provide convenient locations across the country and in each NRC region. The NRC staff identified public interest groups and concerned citizens in the vicinity of all 22 power reactors undergoing decommissioning. Copies of the Draft Supplement were provided to all identified personnel and organizations. Additionally, the NRC and EPA published Federal Register notices identifying the availability of the Draft Supplement. The NRC included the Draft Supplement on the NRC's Web site, issued a press release, and made it available to members of the public through the electronic reading room. Finally, any member of the public seeking to gain a copy of the draft was provided a copy at no charge. In response to concerns expressed by members of the public, the NRC staff extended the public comment period again allowing additional public input. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: The GEIS needs to create a chronological list of all the decommissioning activities that accept public participation. All public participation opportunities such as meetings, hearings, oral comments, written comments, petitions, and interventions need to be listed. At later times when specific dates are known, this list needs to be advertised locally in the affected area. The licensee should also solicit public input on the formulation of decommissioning plans well before the decisions are made. **(CL-14/7)**

Response: *Section 2.2.1 of this Supplement provides a detailed discussion of the decommissioning process and regulations. Additionally, 10 CFR 50.82 describes the process necessary to decommission a facility and identifies instances when public participation is afforded. Also, within two to three months of the licensee's announcement of permanently ceasing operation, the NRC staff holds a public meeting in the vicinity of the plant to describe in detail the decommissioning process. At that time the opportunities for public input are identified. NUREG-1628, "Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Plants," provides a discussion on when and how the public can participate. Copies of the document can be obtained from the NRC Staff. Based on the above sources of information no additional listing of activities that accept public participation is necessary. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The public has not only the "right to know", but NRC and the industry has the duty to fully disclose all related impacts, short and long-term, on and offsite, direct and indirect, as well as cumulative effects resulting from decommissioning to citizens and members of the public living in local communities surrounding the nuclear plants. **(CL-44/15)**

Response: *The NRC staff examined the impacts of decommissioning activities at NRC-licensed nuclear power facilities for cumulative, short- and long-term, onsite and offsite, direct and indirect impacts. This analysis is contained in Section 4.0 of the document. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: NIRS reiterates and incorporates our previous comments and fundamental disputes with regard to the decommissioning GEIS as submitted in formal comments to NRC on July 11, 13 and 14, 2000. Our organizations request that NRC include with this submission all of our organizations' previous comments on this and related rulemakings (including but not limited to the environmental procedures on BRC and those that led to the development of 10 CFR 20 section E, the License Termination Rule). **(CL-48/1)**

Response: *The comments that were received during the scoping process that are within the scope of this document are discussed in Appendix A of the Supplement. Because the scope of this document, as described in Section 1.3, does not include Below Regulatory Concern issues*

or the License Termination process or related rulemakings, they are outside the scope and not addressed in the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: The NRC gave 10 individuals representing 10 different environmental groups only 5 minutes each to express their concerns. Furthermore, it is outrageous that the NRC located these proceedings hundreds of miles from the affected communities-and those who are most concerned about the decommissioning of nuclear plants. **(CL-53/5)**

Response: *At each public meeting, the public is asked to sign up for 5-minute time slots at the beginning of the meeting to ensure that everyone has the opportunity to comment. After these comments are received the remaining time is allocated for further public comment, either from those who did not sign up or for those who wished to express additional comments.*

The meeting locations were chosen to provide convenient locations across the country and in each NRC region. The Staff determined that meetings in additional locations would not have provided enough added value for the expense of holding the meetings. Public meetings was only one of several means for the public to share their comments with the NRC. The other means included email, mail, or hand delivery to the NRC in Rockville, Maryland. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: I would challenge you not to lose any of the comments that have been made about security or any other issue that you consider outside the scope. And make certain that those do surface somewhere. **(AT-B/20)**

Comment: I guess I'd like to just comment that to the public and to many non-profit organizations, generic means you may say this, you may not say that; this is on the table, that is not on the table. And what happens is that people do make comments that affect their communities and affect their safety and if they are indeed outside the scope of a particular process, I would truly love to believe that those comments are not lost. But at this point, my experience doesn't lead me to be sure that's the case. **(AT-B/19)**

Comment: I recognize that it has probably been a waste of my time and will be ignored, therefore I am not bothering to write it again with every paragraph in the right place. **(CL-20/113)**

Response: *All comments and questions received at the meeting became part of the transcribed record. Other comments received from three other meetings, emails and letters were included in the record; the disposition of all public comments makes up this Appendix.*

Comments that pertain to physical security issues have been forwarded to the appropriate NRC office for consideration. Other issues determined to be outside the scope of the Supplement were evaluated for their relevance to on going NRC actions and activities and forwarded to the respective NRC office if appropriate. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: Public participation must be instituted for the creation of the ISFSI. At present, the creation of an ISFSI falls into a regulatory no man's land. At the NRC pre-hearing on the Yankee Rowe LTP, the NRC administrative law judges were instructed by the commission not to address any contentions concerning the storage of high-level radioactive waste. The creation of the ISFSI has serious consequences for each reactor community that could last hundreds of years. That the public can not participate in the process - give comments, request hearings, intervene - is unreasonable and undemocratic. **(CL-50/24)**

Response: *The licensing of an ISFSI is outside the scope of the Supplement (see Section 1.3). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Each reactor community should have representatives trained in MARSSIM and other protocols by the NRC so that they can effectively comment and express their concerns about the adequacy of the procedures being used. **(CL-50/27)**

Response: *Because of the highly technical nature of designing, conducting, and evaluating final site surveys using the MARSSIM protocols, extensive training in statistics, health physics, physics, and mathematics are needed. It is unreasonable to expect the NRC to provide such training to members of the public at each facility location. Trained NRC experts are available to answer specific questions on the design, execution, and results of the surveys. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.5.3 Request for Additional Comment Period

Comment: Therefore, we feel it is important to both extend the public comment period until these documents can be made readily available.... But I think we do need to extend the public comment period to address the inability of getting the information easily. **(AT-A/6)**

Comment: There's a number of decommissioning related documents that have come out for review. And while I appreciate the NRC has been very busy, in addition to this GEIS supplement, the entombment proposed rule making, there's also I think, I got two documents this week regarding decommissioning cost reports and I think the cost estimate formats. If

there is any way that we could not have to get all the comments in the very short comment period, if it could be extended, I'd really appreciate it because it's going to be a very busy December for me. **(CH-D/13)**

Comment: This highlights the need for an extended comment period and careful analysis of this issue. For instance, I'm sure there are a number of nuclear security organizations worldwide that perhaps this draft and others within the NRC could be opened up to get their comments and maybe their suggestions of what they're doing in other countries or whatever, because we're looking at a global assault. **(AT-A/13)**

Response: *The comment period for the Supplement was extended an additional 31 days until January 31, 2002. The comments did not result in a change to the Supplement.*

O.5.4 Determination of Scope

Comment: The NRC scope is clearly associated with the radiological aspects of decommissioning. So, an issue such as rubblization, that has a radiological component, this seems clearly it's within the scope of NRC's review regulation. I do not see the removal of a cooling tower is within NRC's scope. **(BO-B/2)**

Comment: However, while the stated intent of the Supplement is to consider in a comprehensive manner all aspects related to the radiological decommissioning of nuclear reactor facilities, the Supplement sometimes deviates from this intent by delving into activities and impacts related to the removal of uncontaminated structures, systems, and components such as intake structures or cooling towers. While the consideration of these impacts may be useful and helpful, their inclusion without proper caveat may tend to blur the line of NRC jurisdiction. **(CL-04/2)**

Comment: And yet, I note in the document that you also include decommissioning--environmental impacts of decommissioning a nonradioactive system such as cooling towers and discharge pipes. I'd like to understand what criteria NRC will use to determine the acceptability of a licensee's plans in those areas. **(BO-B/1)**

Response: *The Supplement provides an environmental analysis of the impacts associated with the decommissioning process for nuclear power reactors. Clearly part of that decommissioning process involves the removal and disposal of structures, systems, and components that may not be radiologically contaminated. For completeness, and in the spirit of NEPA, the staff chose to include the dismantlement of all structures, systems, and components necessary for power generation on the site. As a result, cooling towers and the diesel generator building were included, but the site training center and visitor information center was not. During scoping, the NRC staff met with EPA and at their urging the staff agreed to look at*

the impacts from activities performed to support dismantlement of nonradiological structures, systems, and components (SSCs) required for the operation of the reactor. This is discussed in Section 1.3, "Scope of This Supplement." The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: The scope is just inadequate. **(CH-C/3)**

Response: *The comment can not be evaluated because it does not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Out-of-scope activities are identified and discussed in Section 1 and Appendix D. It is recommended that "Interim Storage of Greater than Class C Waste" also be identified as an out-of-scope activity, consistent with the final rule published in Federal Register Vol.66, Number 197, dated October 11, 2001. **(CL-06/2)**

Response: *Section 1 and Appendix D have been revised to indicate that the interim storage of Greater-than-Class-C Waste is an out-of-scope issue.*

Comment: Page 1-5, Section 1.3. This section states that except for decommissioning planning activities, the Supplement only considers activities following removal of the fuel from the reactor. The exclusions include "impacts that result directly and immediately from the act of permanently ceasing operations" such as the environmental impacts of ceasing thermal discharges to receiving waters which the Supplement states "is essentially a restoration of existing conditions." This ignores the potentially adverse effects that the thermal discharges may have had on the ecosystem while the plant was operating; and, while the affected ecosystem may recover from the thermal discharges, such recovery may not be the equivalent of restoration to the originally existing conditions. Also, a species may have become established and dependent upon the thermal discharge. **(CL-16/12)**

Response: *As discussed in Section 1.3, impacts related to the decision to permanently cease operations are outside the scope of this Supplement. Efforts to maintain an altered ecosystem appear contrary to the spirit of NEPA. Furthermore, the NRC has no regulatory authority to require the licensee to continue operating the facility in order to avert impacts form permanently ceasing operations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It is absurd that NRC states that "decommissioning activities do not include the maintenance, storage or disposal of spent nuclear fuel, or the removal and disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license.....

they are not considered as a cost impact because the licensees are not required to accumulate funds for these activities." (See p.4-42).The licensees must be held responsible and accountable for everything about and on the site and generated by the site past, present and future. **(CL-20/43)**

Response: *The Supplement does not state that the licensee is not responsible for the above-stated concerns, only that maintenance, storage, and disposal of spent fuel is not within the scope of this Supplement. The Supplement provides an environmental analysis of the impacts associated with the decommissioning process for power reactors. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It is murderous that potential radiological impacts following licensing/license termination that are related to activities performed during decommissioning are not in the Supplement. This allows the licensee to slowly murder a community as the radiological criteria for license termination by NRC was woefully inadequate anyway. **(CL-20/87)**

Response: *The radiological criteria for license termination are given in 10 CFR Part 20, Subpart E, and further addressed in NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." For a site to be released as unrestricted, the total effective dose equivalent to an average member of the critical group is 0.25 mSv/yr (25 mrem/yr). The NRC staff believes that these criteria are adequate to protect public health and safety. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I also utterly oppose stating that 10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496, are not part of the scope of this Supplement. **(CL-33/19)**

Response: *10 CFR Part 20, Subpart E, and NUREG-1496 are not part of the scope of this Supplement. The 1997 license termination rule relied on the environmental assessment contained in the "Generic Environmental Impact Statement in support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Facilities," Final report, NUREG-1496, dated July 1997. The public had the opportunity to comment on that draft GEIS and the rulemaking effort at the time that the rule was being developed. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: There are several issues in the Supplement which are briefly addressed and dismissed as "out-of-scope," which we insist need to be dealt with as site-specific issues for any thorough EIS on decommissioning, with full public rights to hearings, review, oversight, and

disclosure maintained. These include: 1. Spent fuel storage and maintenance - The public at each reactor site community should determine how irradiated/"spent" fuel is stored/ dispositioned. If a centralized high-level waste repository is opened at some future date to accommodate the irradiated fuel and high-level waste from a community's decommissioned reactor, the communities that exist along the possible transportation paths should also be involved in site-specific environmental impact reviews/assessments. To exclude spent fuel storage, maintenance, transport, and disposal away from the reactor location from the scope of this GEIS/Supplement, and the opportunity for site-specific EIS reviews, is arbitrary and capricious. 2. Low-level waste disposal at a LLW site - The concept of rubblizing and capping a reactor site and allowing it to function as a low-level waste disposal facility without having the appropriate permitting and licensing hearing process is a serious departure from past NRC licensing practices, and any such "rubblizing" proposal should not be approved without a site-specific EIS review. To exclude this or any similar proposal from a site-specific EIS review, and the scope of this GEIS/Supplement, is arbitrary and capricious. **(CL-47/18)**

Response: *Spent fuel storage is outside the scope of the Supplement, as are transportation and disposal of spent fuel. Both Skull Valley and Yucca Mountain were subjected to site-specific EISs. The staff has stated in the Supplement that the disposal of slightly contaminated rubble onsite (rubblization) would be subject to a site-specific review, as would entombment. Evaluation of the License Termination Plan in support of the rubblization or entombment would allow for a request for intervention on the part of a member of the public. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Nuclear facility operation results in significant offsite radiological contamination that is ignored under the current definition. For example, one known pathway occurs over the course of reactor operation as the direct result of fuel rod degradation giving way to pin-hole leaks, cracks and loss of rod integrity with radioactive contamination to the reactor coolant system. Primary and secondary coolant piping leakage results in radioactive contamination releases being deposited and accumulated as sediment on river and lakebeds and coastal receiving waters from deteriorated reactor coolant discharge systems. This is of particularly more concern for utilities that operated once-through cooling systems and/or boiling water reactor technology though not exclusively so. Some of our organizations are aware that reactor operators, as in one case of the Big Rock Point nuclear generating station, have argued that offsite radioactive sediment areas should not be disturbed by removal/decontamination efforts and are better left alone than decontaminated. The decommissioning definition does not require the utility to analyze the scope of this offsite contamination, consider its cleanup nor effectively regulate the enforcement of decontamination of residual radioactivity that has

migrated from the reactor site and accumulated off site in affected communities resources such as fresh water supplies. These advertent releases of radioactivity as the result of station operation need be covered within the scope and disclosure as environmental impacts within the decommissioning process.

NRC in its evaluation of the environmental impacts acknowledges "Levels of radionuclide emissions from facilities undergoing decommissioning decreased, because the major sources generating emissions in gaseous and liquid effluents are absent in facilities that have been shut down." Consequently, the NRC currently only considers radiological effluent impacts as a result of decommissioning operations while ignoring the potential need for mitigation of cumulative and persistent toxic radioactive materials deposited downstream over the decades of operation of a reactor. **(CL-48/13)**

Comment: This agency's definition of "decommissioning" is fundamentally flawed in limiting its scope of "property" to the site boundaries. The NRC scope needs to be broadened to encompass the decontamination or mitigation of "property" in addition to structures, systems, and components of the nuclear power station that exist beyond the fence line that have been contaminated nonetheless, as a direct result of station operation. **(CL-48/12)**

Response: *Routine releases from power plants do not result in offsite contamination that warrants offsite remediation. There are regulations in place concerning the release of any material from a nuclear power facility. The plants were licensed with the expectation that there would be routine releases to the air and water due to normal operations. The releases are limited to ensure public health and safety. Licensees are required to conservatively estimate offsite dose annually. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: This Supplement to the Final GEIS fails to address decommissioning of nuclear facilities other than commercial reactors. It therefore fails to take into account the subject of NUREG-0586: the environmental impacts of decommissioning nuclear facilities—all nuclear facilities. **(CL-52/2)**

Response: *NUREG-0586 is still valid for all facilities except nuclear power facilities. As stated in Section 1.1 (and unlike the 1988 GEIS), this Supplement covers only reactor facilities licensed by the NRC for commercial power production. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Moreover, in order to assess the full environmental impacts of each facility's decommissioning, it is necessary to take into account its impacts in concert with the impacts of all other nuclear facilities that contribute additive radiological and other contamination to the biologic system. **(CL-52/3)**

Response: *The environmental monitoring program and the licensee's Offsite Dose Calculation Manual would adequately characterize the cumulative radiological impacts associated with nearby facilities that are also light water reactors or that emit or release similar radioisotopes to those occurring in a light water reactor. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: For purposes of this GEIS, the NRC is only focusing on the environmental impact of the actual decommissioning activities between the cessation of operations and license termination. This approach completely and inappropriately ignores the environmental impact associated with any radioactive material remaining following license termination. **(CL-17/2)**

Response: *Any potential radiological impacts following license termination that are related to activities performed during decommissioning are not considered in this Supplement. Such impacts are covered by the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," NUREG-1496. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The NRC in this Draft says p. D-2 that the temporary storage or future permanent disposal of spent fuel at a site other than the reactor site is not within the scope of this Supplement. Why the hell not? It MUST BE, OTHERWISE THIS DRAFT IS EVEN MORE MEANINGLESS. **(CL-20/83)**

Response: *The Commission has independently, in a separate proceeding called the "Waste Confidence Proceeding," made a finding that there is "reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations" (54 FR 39767). The Commission has committed to review this finding at least every 10 years. In its most recent review, the Commission concluded that experience and developments since 1990 were not such that a comprehensive review of the Waste Confidence Decision was necessary at that time (64 FR 68005). Accordingly, the Commission reaffirmed its finding of insignificant environmental impacts, cited above. This finding is codified in the Commission's regulations at 10 CFR 51.23(a). The*

operation of a spent fuel pool or an ISFSI is not uniquely linked to decommissioning. All operating nuclear power facilities have spent fuel pools and some (with the number anticipated to increase) have ISFSIs generally located adjacent or near to the power reactor facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Our organizations have a fundamental dispute with the Commission's definition of decommissioning. Decommissioning should not permit the release of radioactive contamination from regulatory control and the control of some identified responsible party. At public meetings (in 1993 and in 2001) across the country on the issue of "clean-up," the public consistently called for continued regulatory control over any and all wastes, materials, properties and sites with contamination from nuclear power and weapons fuel chain activities. Rather than requiring the identification, capture and isolation of the remains of nuclear power operations, NRC is legalizing the release of contaminated sites, properties, materials and natural resources. By segmenting the portions of the decommissioning process into separate Environmental Impact Statements and supplements, the public is prevented from addressing the amount and method of identifying residual contamination of the environment, natural resources, the community and downstream and downwind ecosystems. The public is prevented from addressing and preventing the concept of allowable doses to the public from nuclear power operation, wastes and decommissioning activities. We protest the designation of issues related to allowable contamination levels and doses being deemed "out of the scope" of this document. **(CL-48/11)**

Response: *Various activities that are performed during decommissioning may seem intuitively to be part of the decommissioning process. However, they are not considered within the scope of this Supplement because these activities have already received a thorough environmental review during the promulgation of the NRC regulations governing such activities. They are reviewed and regulated by the NRC under other regulations. The public has had the opportunity to comment on the regulations and the environmental assessment during the rulemaking process. The radiological criteria for license termination are given in 10 CFR Part 20, Subpart E, and further addressed in NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities." For a site to be released as unrestricted, the total effective dose equivalent to an average member of the critical group is 0.25 mSv/yr (25 mrem/yr). The NRC staff believes that these criteria are adequate to protect public health and safety. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: CAN believes it is essential for NRC to continue to define decommissioning as a major federal action. As the Appellate Court opined".....it is undisputed that decommissioning is an action which, even under the Commission's new policy, requires NEPA compliance 10 CFR 51.95(b.)" **(CL-50/4)**

Response: *Decommissioning of power reactors was never considered a major Federal action. The staff agrees with the commenter that NEPA compliance is required. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Exclusion of licensee decisions and actions prior to certification that plant operations have permanently ceased means that the Supplement fails to consider factors that may have negative impacts on the quality of the decommissioning activities and on minimization of the quantity and condition of the wastes resultant from the handling and removal of radioactive materials from plant structures, systems, and components. **(CL-52/9)**

Response: *10 CFR 50.75(g)(1) requires that reactor licensees maintain records of spills or other unusual occurrences involving the spread of contamination in or around the facility, equipment, or site during operations. The staff chose to consider the environmental effect of those actions or decisions made prior to certification of permanent cessation of operations because those activities would be covered by the environmental assessment made at the time the facility was licensed to operate. Additionally, these records are available and referred to during decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Exclusion from consideration of the fate of contaminants post-license termination also renders this Supplement insufficient and not acceptable to account for the environmental impacts of decommissioning. **(CL-52/10)**

Response: *Any potential radiological impacts following license termination that are related to activities performed during decommissioning are not considered in this Supplement. Such impacts are covered by the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities," NUREG-1496. However, any potential non-radiological impacts resulting from decommissioning and occurring after termination of the license are considered within the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5.5 Definition and Discussion of SMALL, MODERATE and LARGE Impacts

Comment: As I understand your slides, they're not saying that all--that all sites, the water--the water use and quality and air quality and ecology are small. You're just saying the sites--those issues that are dealt with in the generic sense–are small issues. And then, there can be site-specific issues that could be SMALL, MEDIUM or LARGE? **(BO-A/6)**

Response: *Section 4.1.2 of this GEIS Supplement provides a definition of generic and site-specific. For each issue, a generic conclusion can be made if the potential impacts of all sites or subsets of sites are SMALL, MODERATE, or LARGE. Site-specific issues can be SMALL, MODERATE, or LARGE. The comment did not provide new information relevant to the GEIS Supplement and will not be evaluated further. This comment did not result in a change to the Supplement.*

Comment: Executive Summary, page xiv, line 20 - references 10 CFR 50.82(a)(6)(ii) which states that the licensee must not perform any decommissioning activity that causes any significant environmental impact not previously reviewed. The supplement at page 1-8 beginning on line 23 defines three levels of significance SMALL, MODERATE, and LARGE. At which of these significance levels does the requirement of 10 CFR 50.82 (a)(6)(ii) come into affect. This needs to be defined as several Environmental Issues, e.g. threatened and endangered species are listed as site-specific. **(CL-05/3)**

Response: *The definition of "significance" in 10 CFR 50.82(a)(6)(ii) is not related to the SMALL, MODERATE, and LARGE levels of significance used to evaluate impacts in the Supplement. The determination of significance for 10 CFR(a)(6)(ii) is based on comparison of the potential environmental impact of a specific activity with the bounds of impacts previously reviewed. If the impact of the activity is within the bounds of previously reviewed impacts, the activity may proceed as long as the other criteria of 10 CFR 50.82(a)(6) are met. If the impact is not within the bounds, then the licensee may not undertake the activity without a license amendment and environmental review. The SMALL, MODERATE, and LARGE significance levels refer to whether an impact is noticeable or not and whether the impact will destabilize the impacted resource. The Executive Summary was revised.*

Comment: After the explanation by the NRC staff at the public meeting in Atlanta, we further disagree with the process of using the significance levels of SMALL, MODERATE, and LARGE for a variety of issues at a variety of locations to come up with a generic, one-word answer. The classifications are generic in form, hard to understand, and it is difficult to figure out how the NRC came to those characterizations even after NRC staff attempted to explain it at the public meeting in Atlanta. If the NRC unwisely chooses to continue using this classification system, Georgians for Clean Energy urges that, at a minimum, layman's terms be used to define the levels and the methods used to categorize the issues. **(CL-08/5)**

Comment: The Supplement should distinguish better among certain of the small, moderate and large impact levels and better explain certain assumptions used in setting these levels. **(CL-16/3)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC sets arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site-specific analysis. **(CL-26/12)**

Comment: ...the vague and arbitrary use of Small, Moderate, and Large significance levels and the intent for use of these designations, which echoes previous attempted bogus designations such as below regulatory concern; **(CL-38/4)**

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC sets arbitrary and unsubstantiated (low, medium, and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site-specific analysis. **(CL-43/10)**

Comment: NRC's "Levels of Significance and Accountability of Environmental Impacts" assign values of risk to affected communities as "small," "moderate" and "large" as determinants for the denial or approval of a public site-specific review and, potentially, a public adjudication for environmental mitigation. Public Citizen maintains that these categories are excessively arbitrary and broad, and largely groundless for the following reasons: 1. The biological effects of ionizing radiation are destructive. No safe "threshold level" for exposure to ionizing radiation exists for the general population (including the fetus). 2. There is a long history of unresolved regulatory conflict over radiation protection standards that are utilized to determine NRC risk assessments. Federal regulators, including the NRC and the Environmental Protection Agency, have not reached a consensus on residual radiation criteria for decommissioning, with EPA standards being significantly lower (more protective) than NRC criteria. To our knowledge, this conflict has not been resolved and, therefore, it appears that the NRC has unilaterally and arbitrarily concluded what standards would apply in determining whether a risk is "small," "moderate" or "large." 3. The NRC risk assessment inappropriately ignores the population of children in its "critical group" evaluation as the population most vulnerable to residual radioactivity exposure from decommissioning operations. This runs counter to NRC's Organizational Value to a "Commitment ... to protecting the public health and safety." 4. The NRC has a documented history of significant lapses in effective oversight of decommissioning operations as reported by the General Accounting Office in a May 1989 report, "NRC's Decommissioning Procedures and Criteria Need to be Strengthened" (GAO/RCED-89-119). The GAO not only found that complete information does not exist for all licensed activities or buried wastes, but that NRC was found to have terminated a license with radioactive contamination in excess of its own guidelines. Further, the report noted that NRC regulations

lacked a time requirement for document retention. NRC's questionable past performance does not support the agency's move toward generic treatment of decommissioning nuclear facilities where affected communities are denied public review and full disclosure of contamination, the decommissioning plan and license termination plan. **(CL-47/13)**

Comment: NRCs "Levels of Significance and Accountability of Environmental Impacts" assign values of risk to affected communities as "small," "moderate" and "large" as thresholds for denying or conducting a public site-specific review and potentially a public adjudication for environmental mitigation. Our organizations argue that these broad categories established by NRC are largely baseless for the following reasons: 1. The biological effects of radiation are deleterious. No safe threshold for radiation exposure for the general population (including the developing fetus) has been established. 2. There is a long history of unresolved regulatory conflict over radiation protection standards assumed to determine NRC risk assessments. Both federal and state agencies have sought to provide greater protection than NRC requires. 3. The NRC risk assessment inappropriately ignores the population of children in its "critical group" evaluation as the population most vulnerable to residual radioactivity exposure from decommissioning operations. 4. There is a documented history of significant lapses in effective NRC oversight of decommissioning operations as reported by The General Accounting Office in May 1989 "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened" (GAO/RCED-89-119). The GAO not only found that complete information does not exist for all licensed activities or buried wastes, but additionally that NRC was found to have terminated a license with contamination in excess of its guidelines and NRC regulations lacked a time requirement for document retention. NRC's checkered history does not provide justification for the agency to move forward with generic treatment of decommissioning nuclear facilities where affected communities are denied public review and full disclosure of contamination. **(CL-48/26)**

Comment: NRC sets arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site-specific analysis. **(CL-48/45)**

Comment: I would like to have you expand somewhat on your definition of "small," "moderate," and "large" at this moment. **(SF-C/1)**

Comment: It seems a bit strange to me that the majority of the things are defined as "small." With my experience with radiation I would not think that most of them would end up being small, but that often comes down to a matter of scientific debate and opinions. **(SF-C/2)**

Comment: We disagree with the process—and it happened during the Hatch relicensing, too—the process of using the significance levels of small, moderate and large for a variety of issues at a variety of locations, to come up with a generic one-word answer. The classifications

are generic in form, hard to understand and even though it's small, moderate and large which sounds easy, I fundamentally have a hard time explaining that. **(AT-A/18)**

Comment: I also utterly oppose setting "low, medium, and high" environmental impact categories for each of the steps in decommissioning, to give the appearance that some things have negligible effects that don't warrant further consideration. **(CL-33/16)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow NRC to set arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now, and to prevent their inclusion in site-specific analysis. This use of this piecemealing approach in unacceptable. **(CL-44/10)**

Response: *The SMALL, MODERATE, and LARGE significance levels provide a method of describing the severity of impacts. These impact levels were established using the Council on Environmental Quality (CEQ) terminology for determining significance (40 CFR 1508.27), which requires consideration of both "context" and "intensity." Impacts that are of SMALL significance are either not detectable or are so minor that they neither destabilize nor noticeably alter any important aspect of a resource. MODERATE impacts may noticeably alter an important aspect of a resource, but do not destabilize the resource. And LARGE impacts are clearly noticeable and destabilize important aspects of the resource. The discussion of decommissioning impacts in Chapter 4 was changed to more clearly relate the impacts in terms of detectability and effect on resource stability.*

Comment: Page 1-8, Section 1.4. EPA encourages NRC wherever possible to make the Levels of Significance (small, moderate and large) used in the Supplement more definitive by including risk ranges, referencing the appropriate NRC regulations or providing examples of impacts. We note that in several cases the qualitative analysis is given in units of person-rem with no regulatory limit provided. **(CL-16/15)**

Response: *The discussion of decommissioning impacts in Chapter 4 was changed where needed to more clearly relate the impacts in terms of detectability and effect on resource stability.*

Comment: NRC has absolutely no basis to say whether impacts will be small etc. based on that sort of garbage. **(CL-20/6)**

Response: *Use of the levels of significance of SMALL, MODERATE, or LARGE is recognized as an acceptable and commonly used approach to ascribe a measure of significance to*

decommissioning impacts. These levels of significance are based on CEQ guidelines. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: (4.1.1) Terms of Significance of Impacts The Nuclear Regulatory Commission employed a "standard of significance" developed by the Council of Environmental Quality (CEQ). Context means that the significance of an action must be analyzed in several contexts, such as a society as a whole (human, national), the affected region, the affected interests, and the locality. However, no "electric utility" constructs, operates, or decommissions a nuclear station without economics being the paramount consideration. Yet, the NRC and CEQ have created a nuclear Potamkin [sic] Village where economic imperatives are subordinated to the behavioral science flavor-of-the-day. In the NRC's world, an "electric utility" can apply for a loan using NEPA as collateral. I hope that at the end of the GEIS process, the Commission, can provide me with an address so that I can relocate my family to a neighborhood-without-economic considerations. **(CL-02/44)**

Response: *The comment can not be evaluated because it does not provide specific information. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5.6 Time Frame for Assessing Environmental Impacts

Comment: It is not acceptable to give the option of using recent environmental assessments. What is the definition of recent?...So I would like a definition of what is recent and if we're talking about endangered and threatened species, that list is going to change when a lot of these power plants actually go through decommissioning because species are being put on and taken off those lists all the time. So what is recent? I would request—our organization requests that they always have a recent—a new, like that year that they decide to decommission—an environmental assessment. **(AT-A/23)**

Comment: Georgians for Clean Energy requests that the NRC require licensees undergoing or planning decommissioning to submit a new environmental assessment. We do not find it acceptable to give licensees the option of using "recent environmental assessments." **(CL-08/6)**

Comment: Page xv, Lines 37-38. The document identifies certain issues that are "site-specific for activities occurring outside the disturbed areas in which there is no recent environmental assessment." "Recent" should be defined by, for example, specifying a time frame or "shelf life"

for environmental assessments, so that licensees have clear notice of when they must prepare or update such a document for the disturbed area(s) in question. This same problem arises in Table ES-1, which refers to "current" and "recent" ecological assessments. **(CL-16/11)**

Response: *The text was revised throughout the Supplement to provide clarification and the phrase "recent environmental assessments" is no longer applicable or used.*

Comment: The time frame for assessing the magnitude of the environmental impacts is not clearly discussed. In some instances (terrestrial ecology page 4-20, lines 39-41), the draft acknowledges that some impacts will be temporary but once decommissioning is completed, not significant. The discussion of other issues is silent with regards to when the impact is assessed. For example, dewatering for a relatively short period while sub-surface foundations are removed would be performed in accordance with a National Pollutant Discharge Elimination System (NPDES) permit (section 4.3.2). However the impact on the water table during this period of decommissioning would probably be noticeable. Once dewatering has ceased the water table would most likely return to its pre-decommissioning level. The licensee would reasonably conclude that dewatering during decommissioning is a SMALL (not noticeable, does not de-stabilize any important attribute of the resource) impact once decommissioning has been completed and is addressed in this GEIS Supplement. The NRC should revise the GEIS Supplement to clarify that the magnitude of the impact should be assessed once decommissioning activities have ceased and the license is terminated. **(CL-01/2)**

Response: *The commentor proposes that the NRC assess the magnitude of impacts only after the decommissioning activities have been concluded and the license terminated. NEPA requires a Federal agency to consider in advance every significant aspect of the environmental impact of the proposed action and to take a hard look at the environmental consequences. Such consideration should occur even if the impact is temporary and minor. Additionally, the Federal agency is to evaluate the potential for mitigation of the impact. The staff believes that the consequences of an activity needs to be evaluated at or close to the time that it occurs, thereby complying with the intent of NEPA to provide full disclosure and also to allow for mitigation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5.7 Reactors Included in the GEIS Analysis

Comment: You said you had visited a number of facilities. I wondered if you'd visited any in New England, in particular, the Maine Yankee facility? So, you talked with some of the folks up there (Maine Yankee facility) and got a sense of what was--what were the issues and so on? **(BO-A/4)**

Response: *Maine Yankee was one of the reactors visited during the scoping and data collection process. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In Table J-2, the location of Peach Bottom is incorrect. Peach Bottom resides in Delta, and is located less than a mile from Lancaster County and the State of Maryland.

In Table J-2, the location of Three Mile Island by county is incorrect. Three Mile Island resides in Londonderry Township, Dauphin County. "Northampton" County is located in Northeastern Pennsylvania. In addition, there are four counties located within five miles from Three Mile Island, i.e. Cumberland, Lancaster, Lebanon, and York. **(CL-02/67)**

Response: *Table J-2 was revised and Dauphin County is given as the county in which Three Mile Island is located.*

O.5.8 Application of NEPA Process to Decommissioning

Comment: I am opposed to the following change to NUREG-0586: In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning: NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process. (The claim appears to be that this proposed Supplement 1 satisfied the Environmental Policy Act for most of the decommissioning issues.) **(CL-43/7)**

Comment: The National Environmental Policy Act was written for a purpose, your proposed rules side step that purpose. **(CL-25/9)**

Comment: I am opposed to the following proposal(s) in the EIS: NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process. **(CL-26/10)**

Comment: I also utterly oppose preventing the National Environmental Policy Act from applying to most of the decommissioning process. **(CL-33/13)**

Comment: NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process. (The claim appears to be that this proposed Supplement 1 satisfies the Environmental Policy Act for most of the decommissioning issues.) **(CL-48/42)**

Comment: But to the people in the affected communities, it is a problem and that problem is one that they're going to have to live with after the NRC has washed its hands of the site. So we do have some real problems with the fragmentation of the decision making process and the public participation opportunities, and believe that indeed that there are NEPA violations. **(AT-B/7)**

Response: *NRC does not exclude the decommissioning process from the environmental analysis expected under NEPA or the NRC's environmental protection regulations (10 CFR Part 51). The NEPA process allows for the development of programmatic and generic EISs where a "hard look" can be made for programs and issues that have common themes. Power reactor licensees cannot perform decommissioning activities that could result in a significant impact to the human environment that was not previously reviewed. Those activities are reviewed in the Final Environmental Statement (FES) or Final Environmental Impact Statement (FEIS) for construction and operation, Supplements to the FES or FEIS, the GEIS for license renewal, site-specific supplements for license renewal, and the GEIS for decommissioning. If any decommissioning activity might result in significant environmental impacts and that activity is not reviewed in one of these aforementioned documents, then the licensee must submit a request for a license amendment. A license amendment requires that the licensee must submit a Supplement to their environmental report and the staff conducts an environmental review on the request. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: It is important to address NEPA and "psychological stress." The reality is that "psychological stress" exists, and will continue to exist. In fact, if the NRC had revisited the issue of "psychological stress" and the TMI community, it would have found the following:...The D.C. Circuit Court decided psychological (psych) stress does not need to be covered during the restart hearings. However, the Court ruled, that under the National Environmental Policy Act (NEPA), psych stress must be addressed. The Court ordered an injunction on restart until a study on psych stress was conducted. However, on April 19, 1983, The U.S. Supreme Court reversed the D.C. Circuit Court's opinion on psych stress and ruled an environmental study is not necessary. Two months later, on May 5, 1983, GPU revealed for the first time to the NRC that management audits, including psychological evaluations, concluded by BETA and RHR, completed in February and March, 1983, were critical of plant operations and management. The NRC can hide behind NEPA or any other convenient acronym, but "psychological stress" is a verifiable fact of life for people who live and work, in and around, nuclear power plants. **(CL-02/43)**

Response: *No activity has been initiated to vacate the U.S. Supreme Court decision on this matter. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Appellate Court justices opined that your agency was in violation of its own regulations and Rulemaking process in approving the experimental decommissioning at the Rowe reactor without a decommissioning plan and an environmental assessment. In addition, the court has ruled that decommissioning is a major federal action and requires NEPA compliance. "An agency can not skirt NEPA or other statutory commands by exempting a licensee from compulsory compliance, and then simply labeling its decision "mere oversight"

rather than a major federal action. To do so is manifestly arbitrary and capricious." We believe NEPA compliance is mandatory for decommissioning. A Generic Environmental Impact Statement can not substitute for an individual EIS, as computer modeling can not substitute for actual testing. **(CL-50/3)**

Response: *As stated in Chapter 1 of the Supplement, one reason the 1988 GEIS was updated was to further the purposes of NEPA. The Appellate court did not rule that decommissioning was a major Federal action. Rather, the court ruled that the NRC had not followed its own regulations in allowing the licensee of Yankee Rowe to remove major components prior to the completion of the review of the Decommissioning Plan. The NRC revisited this issue as part of a rulemaking involving the public, and has determined that decommissioning is not a major Federal action. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.5.9 Opposition to Use of Generic Impacts

Comment: Existing nuclear power plants are not generically designed and, therefore, a generic program for decommissioning is completely inadequate to protect public health and safety. New and site-specific Environmental Impact Statements must be required to address how different power plants should be decommissioned (from the standpoint of historical operations, age-related degradation, salt water intrusion) in the safest manner possible for each location. In the case of Diablo Canyon, new seismic information should be sought to assure the public that the process would not increase the dangers of an already dangerously sited nuclear plant. **(CL-53/3)**

Response: *NRC staff recognizes that there is wide variability among nuclear power plants. However, based on the results of our analysis, the impacts resulting from decommissioning are similar regardless of plant characteristics. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Generic things sound good, but each plant is different. I was originally thinking well, they are all kind of the same system, so it wouldn't matter, they are on the same principle, but they're not. I mean, there are differences. **(AT-D/3)**

Response: *The generic approach is used (1) when impacts of environmental issues apply to all plants or a specific characteristic of that plant, (2) when a single significance level has been assigned to the impacts, and (3) when mitigation of adverse impacts associated with the issue have been considered in the analysis, and it has been determined that additional site-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation. If an*

environmental issue does not meet all three requirements, additional site-specific review is required. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Georgians for Clean Energy does not believe that a Generic Environmental Impact Statement regarding decommissioning of nuclear facilities is a sufficient tool for evaluating impacts borne to specific environments from decommissioning a nuclear power plant. **(AT-A/17)**

Comment: Again, we feel that a site-specific analysis must be done for each individual nuclear plant. This includes the area of the site itself, along with downstream and downwind regions and all areas within the ingestion radius of the facility. **(AT-A/32)**

Comment: Georgians for Clean Energy does not believe that a generic environmental impact statement (EIS) regarding decommissioning of nuclear facilities is a sufficient tool for evaluating impacts borne to specific environments from decommissioning a nuclear power plant. **(CL-08/4)**

Comment: I do not support any attempt of your agency to narrow the scope of site-specific issues by declaring them to be generic. **(CL-27/1)**

Comment: Some of my concerns about NUREG-0586 include:—the use of generic proceedings to eliminate site-specific evaluation of concerns; **(CL-38/2)**

Comment: Issues common to the process of decommissioning nuclear reactors should be raised with every reactor being decommissioned, not excluded from every specific reactor being decommissioned. These common issues have not been resolved. **(CL-28/1)**

Response: *The NRC has an obligation to implement effective regulatory practices that involve public participation. In this Supplement, the NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to perform an assessment of environmental impacts from each decommissioning activity to determine whether the impacts fall within the generic envelope described in the Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: We disagree with the NRC conclusion that most of the environmental issues they addressed are deemed as quote, generic and small for all plants, regardless of the activities and identified variables, end quote. **(AT-A/19)**

Response: *The commenter did not provide a specific example or basis to demonstrate that the conclusions were not characterized correctly. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: And again, we feel that site-specific studies should be conducted. The economy of rural Georgia is much different from that of urban New York. **(AT-A/41)**

Comment: Therefore, the safest alternative would be, first, to consider each reactor site individually rather than making a blanket policy to cover every site. **(CL-10/6)**

Comment: We again stress system need for site-specific EIS studies on decommissioning for nuclear power reactors. Our communities, from the people to the waterways, are unique and entitled to nothing less. **(AT-A/45)**

Comment: Georgians for Clean Energy firmly believes that a site-specific analysis must be done for each individual nuclear plant. This includes the area of the site itself along with downstream and downwind regions and all areas within the ingestion radius of the facility. As we mentioned at the public meeting in Atlanta, there are already elevated levels of some radioactive contaminants nearly 100 miles downstream of Georgia's Plant Hatch and Plant Vogtle. **(CL-08/17)**

Comment: We again stress the need for site-specific Environmental Impact Statements on decommissioning for nuclear power reactors. Our communities—from the people to the waterways—are unique and are entitled to nothing less. **(CL-08/35)**

Comment: Furthermore, a "generic" EIS cannot provide adequate assurance that the unique situation and condition of each nuclear facility have been fully analyzed and accounted for. Each plant is unique; each plant's impacts must be examined in relationship with all other nuclear facilities that affect the condition of the environment. In the real world environment, radioactive and hazardous materials are not necessarily static; they move; they interact with other materials; they accumulate; they may have their adverse impacts at or near their site of origin or far away from it. The totality of those impacts, upon both human and non-human inhabitants of the biosphere must be incorporated into an environmental analysis and accounted for fully also for adversely affected individuals in any cost-benefit analysis. All issues should be examined at each plant. **(CL-52/8)**

Response: *Site-specific analysis is required for those situations where an environmental review has not been conducted or where the impacts may be different from those previously analyzed. NRC staff recognizes that there is wide variability among nuclear power plants. However, based on the results of the analyses presented in the Supplement, many of the impacts resulting from decommissioning are similar regardless of plant characteristics. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: I oppose the use of "Generic" listing of issues. I support "Site Specific" listing so that local communities can still raise issues they have. **(CL-24/2)**

Comment: Many key issues that local communities face as reactors close and owners leave (liability-free) will be unchallengeable, because they are being listed as "generic" issues. **(CL-25/5)**

Comment: It is my understanding that the purpose, and certainly the effect, of the proposed supplement to NUREG-0586 is to reclassify many decommissioning issues as "generic" in order to avoid a community's right of challenge and to allow owners to depart without liability. I understand that the NRC supplement seriously limits a community's ability to challenge even those issues that are considered "site-specific." **(CL-36/3)**

Comment: If the changes pass, many key issues that local communities face as reactors close and owners leave (liability-free) will be unchallengeable, because they are being listed as "generic" issues. "Generic" decommissioning issues are ones that NRC determines apply to numerous reactors and which are supposedly being resolved with this Supplement to the Generic Environmental Impact Statement. "Site specific" issues are ones than can still be raised in local communities, but the opportunities to address even site-specific issues is being curtailed dramatically. I support the designation of environmental justice and endangered species issues as site-specific (not generic). I oppose Rubblization but support its designation as site-specific. **(CL-43/15)**

Comment: I am opposed to NRC regulations pertaining to Decommissioning which would allow NRC to make most aspects of decommissioning "generic" rather than site-specific so NRC cannot be legally reviewed or challenged at individual sites. **(CL-44/8)**

Comment: In establishing 80% (24 of 30) of the environmental impacts of decommissioning as being "generic" the NRC is doing the industry's bidding to restrict or eliminate the affected public's opportunities to comment on, guide, monitor and review the decommissioning of nuclear power reactors in their communities. **(CL-47/10)**

Comment: Regardless of any uniformity that may or may not exist as issues to consider at decommissioning reactors - and our position is that any concerns of the relevant communities are site-specific - the NRC's move to make most considerations within the decommissioning process "generic" is a thinly veiled project to eliminate public review and full disclosure through public hearings. **(CL-47/11)**

Comment: NRC cleverly makes most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites. **(CL-48/43)**

Comment: These events do not warrant nor should they instill public confidence in staff conclusions that the agency and the industry can reasonably make the leap to the generic treatment of environmental impact statements for decommissioning nuclear facilities and effectively take away a community's review and the full disclosure of the extent and location of radioactive contamination both on and off site. **(CL-48/6)**

Comment: We have a fundamental dispute with the NRC effort to eliminate public review and full disclosure through public hearings on decommissioning practices and mitigating environmental impacts based on arbitrary and capricious categories for determining "generic" and "site-specific" proceedings for nuclear power station decommissioning. **(CL-48/25)**

Comment: I think my concern is always to what extent a generic statement like this takes particular issues that are local out of the local decision-making process, out of the public hearing that has to be had for—or we were originally led to believe has to be had for each of these. **(AT-C/1)**

Response: *The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to perform an assessment of environmental impacts from each decommissioning activity to determine whether the impacts fall within the generic envelope. The description of impacts as site-specific or generic does not preclude local communities from participating. The commenters are referred to the Executive Summary for a description of "generic" and "site-specific."*

The public can raise issues using any of several methods. If the licensee has requested an action requiring a license amendment, then the process for intervening in this action is by requesting or participating in a hearing. The process is set forth in NRC's regulations in 10 CFR Part 2, "Rules of Practice of Domestic Licensing Proceedings and Issuance of Orders." If the action of concern does not involve a license amendment, then any member of the public may

raise potential health and safety issues in a petition to the NRC to take specific enforcement action against a licensed facility. This provision is contained in the NRC's regulations and is often referred to as a "2.206 petition" in reference to its location in the regulations (Chapter 2, Section 206 or 10 CFR). The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.

Comment: The above reasons illustrate the lack of a sound basis for staff conclusions that the decommissioning alternatives of entombment and rubblization are a"minor" environment impact and can be treated generically to avoid public review and full disclosure in formal public hearings. We therefore adamantly oppose such generic treatment. **(CL-48/35)**

Response: *Entombment is the focus of a current NRC rulemaking that would provide further guidance on this method of decommissioning a nuclear power facility. If a licensee pursues the ENTOMBMENT option, there will be activities necessary to ready the facility for the entombment. The impacts from the activities to prepare the facility for Entombment are considered generic. A site-specific assessment required by a proposed restricted release would naturally focus on radiological issues.*

Rubblization is not considered an option for decommissioning, but a potential activity of decommissioning. The Supplement states that the radiological aspects of rubbilization on onsite disposal of slightly contaminated material would be addressed in a site-specific manner at the time that the LTP is submitted. The site-specific LTP will provide a mechanism for the NRC staff's evaluation of the licensee's plans to dispose of rubblized concrete on site. The radioactive material that remains at the site after the license has been terminated must meet the dose criteria for license termination given in 10 CFR Part 20.

The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement

O.6 General

O.6.1 Clarifications and Recommendations Related Specifically to Supplement 1

Comment: Second, we would like to see a place in the document where you're comparing the risks, environmental risks associated with dismantling the facility immediately, versus storing the material and keep putting the facility in safe store. It's referenced in the document that there are higher risks, sometimes, of dismantling immediately because the material is more radioactive. But it doesn't show a comparison of the risks associated with storing it versus dismantling it in the short-term. **(CH-A/13)**

Response: *The Supplement provides general advantages and disadvantages for the various options for decommissioning. Both long-term storage followed by decontamination and dismantlement and immediate decontamination and dismantlement were found to be acceptable approaches to decommissioning. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: There are some aspects of the regulations that are specific to light water reactors and I just think the document needs to reflect those rather than all reactors. **(CH-D/5)**

Response: *Section 4.3.11.1, "Regulations," has been revised to reflect that the minimum amounts required to demonstrate reasonable assurance of funds for decommissioning found in 10 CFR 50.75(c) apply only to light water reactors.*

Comment: Activities that require state or local permits or approval should be considered to have a SMALL impact under the GEIS. Licensees will be required to obtain approval from state and/or local agencies for several activities performed as a part of decommissioning and cite restoration. These activities may include routine discharge or non-radiological liquids, dewatering, removal or modification of circulating water conduits, and use of portable combustion engines. Typically, the regulations governing approval for these activities require that the regulatory agency perform an assessment of the environmental impact(s) and, as appropriate, establish mitigating measures as permit conditions. In the case of water quality issues, the NRC relies on the licensee's compliance with the NPDES permit to conclude that the magnitude of the impact(s) is SMALL. The NRC should revise the GEIS Supplement to clarify that the NRC will consider the impact of an activity to be SMALL and rely on the licensee's compliance with a state or local permit, including any mitigating conditions. **(CL-01/3)**

Response: *The determination of level of significance is specific to the evaluation of environmental impacts from decommissioning, regardless of State permits and approvals. The staff does not agree that just because the licensee has a State or local permit that impact of the activity will always be SMALL. NEPA requires an evaluation based on postulated impacts. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The potential impacts of removing circulating water conduits on water quality or aquatic ecology are not consistently discussed or are considered an exception from the staff's conclusions. The Executive Summary states that the "removal of uncontaminated SSCs (such as the intake structure or cooling towers) that were required for the operation of the reactor are included in the scope of the GEIS. However, chapter 4 does not discuss the potential impacts of removing circulating water conduits on water quality (section 4.3.3) and the staff considers

removal of these structures to be an exception to the generic evaluation for aquatic ecology (section 4.3.5). Similarly, the tables in Appendix H do not address this issue. Realistically, the licensee will have to comply with state and/or local regulations to remove the circulating water conduits or cooling towers. The state and/or local agency would perform an environmental assessment and, as appropriate, establish conditions in the permit to mitigate any environmental impact(s). As in the case of water quality issues, the NRC relies on the licensee's compliance with the NPDES permit to conclude that the magnitude of the impact(s) is SMALL. The NRC should revise the GEIS Supplement to clarify that the NRC will rely on the environmental assessment performed for and any mitigating conditions included as part of the state or local permit for removal of circulating water conduits. **(CL-01/5)**

Response: *The consistency of the discussion and the tables in Section 4.3, "Environmental Impacts from Nuclear Power Facility Decommissioning," of this Supplement have been addressed. The staff recognizes that removal of circulation water conduits or cooling towers will be conducted in accordance with State and local requirements. However, the NRC staff cannot reach a conclusion on the level of impact based solely on the presumed compliance with these requirements. Circulating water conduits and other SSCs that will be removed after operation, however, are not expected to detectably change or destabilize the aquatic environment. The staff conclude that the impact to the aquatic environment for these decommissioning activities is SMALL and no further mitigation would be required. The staff conclusion is based on the short duration of most deconstruction activities, the fact that the impact is to a previously disturbed ecosystem, and the potential use of mitigative actions, such as scheduling in-water activities during periods in which impacts to aquatic resources would be minimal, as well as provided oversight from State and local agencies. The staff's conclusions in this Supplement do not provide relief or exception from other laws and regulations related to any of the activities discussed in the Supplement. The staff relies on the licensee's compliance with other agency regulations, such as the NPDES, as an indicator of potentially causing detectable or destabilizing changes in the aquatic environment. Section 4.3, "Environmental Impacts from Nuclear Power Facility Decommissioning," was revised to be consistent with the above response.*

Comment: The GEIS's glossary superficially glosses over "Greenfield" and equates it with an end state of decommissioning ..."According to NRC Regulations, Greenfield is achieved when a nuclear generating station is returned to "original status" prior to licensing, construction, and generation of nuclear power. The NRC would then clear the site for "free release" and allow a "school or playground" to be constructed at the former nuclear power plant. **(CL-02/40)**

Response: *The definition of Greenfield in Appendix M, "Glossary," was revised to describe Greenfield as one possible end state of decommissioning and that NRC regulations do not require a greenfield end state.*

Comment: Appendix F Summary Table of Permanently Shutdown and Currently Operating Commercial Nuclear Reactors, PG. F-1, Table F-1 Permanently Shutdown Commercial Nuclear Plants {Total Site Area (ac.) For Maine Yankee: 741 (should be 820)}. **(CL-04/11)**

Response: *The revised area was included in Table F-1.*

Comment: 3.3.3 Decommissioning Process pg. 3-29, 2nd full para. This paragraph is redundant to the preceding and seceding paragraphs and can be deleted in its entirety. **(CL-04/17)**

Response: *Section 3.3.3, "Summary of Plants that Have Permanently Ceased Operations," was revised to remove redundancy.*

Comment: Appendix A Draft Generic Environmental Impact Statement Scoping Summary Report: Comments in Scope pg. A-2, Written Comment Letters: George A. Zinke is listed as the "Director, Nuclear Safety & Regulatory Affairs, U.S. Environmental Protection Agency." This reference should be revised to indicate; "Director, Nuclear Safety & Regulatory Affairs, Maine Yankee Atomic Power Co." **(CL-04/19)**

Response: *Appendix A was renamed Appendix N and Mr. Zinke's correct title included.*

Comment: Section 3.1.3, p 3-8 - add "The systems described are typical and may differ at specific facilities." to end of the 1st paragraph. **(CL-05/4)**

Response: *Section 3.1.3, "Description of Systems," was revised and the above phrase added to the end of the first paragraph.*

Comment: Section 3.1.3, p 3-10, 1st paragraph - add "or similar document" following "(ODCM)", since limits may be in Technical Specifications rather than an ODCM. Also, the description of effluent systems should include mention of an evaporator, since some facilities use evaporation to convert liquid waste to gaseous and monitor their discharge. **(CL-05/5)**

Response: *Section 3.1.3, "Description of Systems," was revised and the above phrase was added.*

Comment: Section 3.1.4, p 3-13, last paragraph - shipment of contaminated apparatus or hardware may also occur to support specific activities. **(CL-05/6)**

Comment: Section 3.1.3, p 3-13, last paragraph – Shipment of contaminated apparatus or hardware may also occur to support specific activities. **(CL-09/11)**

Response: *Typically, contaminated apparatus or hardware are considered routinely generated low-level waste (LLW) even if they were operated to support specific decommissioning activities. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Section 3.1.3, p 3-14, 1st paragraph - shipment may also occur on barges or other ships. **(CL-05/7)**

Response: *Section 3.1.3, "Description of Systems," was revised to include barges and other ships.*

Comment: Section 3.2, p 3-16 - the definition of SAFSTOR should more clearly define that it includes the final decontamination of the facility. This would be more consistent with definitions used elsewhere. **(CL-05/9)**

Comment: Section 3.2, p 3-16, lines 18-24 – The definition of SAFSTOR should more clearly define that it includes the final decontamination of the facility. This would be more consistent with definitions used elsewhere, such as in the original GEIS. **(CL-09/13)**

Response: *Section 3.2, "Decommissioning Options," was revised to clearly state that final decontamination of the facility is part SAFSTOR.*

Comment: Section 4.3.4.4, page 4-16, 1st paragraph - add the following sentence to the end of the paragraph: "Particulates produced by decommissioning activities within buildings will be filtered as needed so that air quality impacts will be small." **(CL-05/12)**

Response: *The staff has chosen not to include the comment in section 4.3.4.4, "Conclusions". Section 4.3.4.3, "Evaluation," does however address filtration systems to control the release of particulate material to the environment. The comment did not provide new information relevant to this supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.7, p 4-25, last paragraph - This conclusion indicates that the NRC will meet its responsibilities on a site-specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees. **(CL-05/16)**

Response: *The responsibilities under the Endangered Species Act (ESA) will be met through appropriate interactions among the licensee, the NRC, and the jurisdictional regulatory agency, either the U.S. Fish and Wildlife Service (FWS) or the U.S. National Marine Fisheries Service (NMFS), or both. Information required of the licensee will depend on the planned*

decommissioning activities and the species potentially present. The NRC staff will seek informal consultation with NMFS and the FWS shortly after the licensee announces permanent cessation of operation. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Section 4.3.14, pg. 4-61, last paragraph - This conclusion indicates that the NRC will meet its responsibilities on a site-specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees. **(CL-05/18)**

Response: *Section 4.3.14, "Cultural, Historical and Archeological Resources," was revised and identifies what activities can be generically evaluated and which require a site specific review. See section 4.3.14.1 for a discussion of the requirements and section 106 of the National Historic Preservation Act .*

Comment: Abstract, p iii, lines 16-17 – add "explicitly" before "consider" in the 5th sentence. The original GEIS did not explicitly cover reactors except boiling water reactors (BWRs) and pressurized water reactors (PWRs). However, other reactors were not explicitly listed in what was not covered by the GEIS. Also, other reactors were listed in the table of decommissioning reactors in the original GEIS. They have been considered covered for activities described in the GEIS. **(CL-09/2)**

Response: *The Abstract was revised and the above change made.*

Comment: Executive Summary, p xi, 3rd paragraph, 4th sentence, lines 31-32 – change to "It does not include research and test reactors or the decommissioning of reactors that were permanently shutdown as a result of an accident." This change provides consistency with the report and does not imply exclusion of all reactors that have been involved in an accident at some time during their operating history. **(CL-09/3)**

Response: *The Executive Summary was revised incorporating the phrase "it does not include research and test reactors."*

Comment: Section 3.1, p 3-2, line 21 – the LaCrosse Boiling Water Reactor site is smaller than San Onofre. McGuire Nuclear Station has two operating reactors rather than three. **(CL-09/4)**

Response: *The Lacrosse reactor is on approximately 1.2 ha (3 ac) with the total utility owned site of 66 ha (163 ac). The total site area for San Onofre is 34 ha (84 ac). The staff chose the total site area to contrast the various decommissioning facilities. The comment on the McGuire plant was correct and the staff chose to use the Turkey Point plant instead.*

Comment: Section 3.1.1, p 3-2, line 39 and 3-3, line 1 – Fermi 1 is in the final phase (decontamination and dismantling) of SAFSTOR. **(CL-09/5)**

Response: *Section 3.1.1, "Types of Nuclear Power Reactor Facilities," was revised and the above phrase incorporated in the text.*

Comment: Section 3.1.1.3, p 3-4, lines 10-14 – delete 2nd sentence and modify 3rd sentence. The Fermi 1 FBR used uranium as its fuel. The information on uranium capturing neutrons to produce plutonium is correct. Breeding rates are dependent on the FBR's specific design. **(CL-09/6)**

Response: *Section 3.1.1.3, "Fast Breeder Reactors," was revised and the above changes incorporated in the text.*

Comment: Section 3.1.1.3, p 3-5, line 1– add "commercial" before "FBR." The final decision on whether to permanently shutdown the FFTF, a DOE FBR, has not yet been announced. **(CL-09/7)**

Response: *Section 3.1.1.3, "Fast Breeder Reactors," was revised and the word "commercial" inserted before "FBR". On December 19, 2001 DOE announced the deactivation of the FFTF.*

Comment: Section 3.1.2, p 3-6, lines 18-19 – The Fermi 1 Reactor Building is a steel domed structure. Below ground, there is considerable concrete shielding, but the building is not reinforced concrete. **(CL-09/8)**

Response: *Section 3.1.2, "Types of Structures Located at a Nuclear Power Facility," was revised and the above changes incorporated in the text.*

Comment: Section 3.1.3, p 3-8, line 32 – Add "The systems described are typical and may differ at specific facilities." to end of the 1st paragraph. **(CL-09/9)**

Response: *Section 3.1.3, "Description of Systems," was revised and the above sentence added to the text.*

Comment: Section 3.1.3, p 3-10, line 7 – Add "or similar document" following "(ODCM)", since limits may be in Technical Specifications rather than an ODCM. Also, the description of effluent systems should include mention of an evaporator, since some facilities use evaporation to convert liquid waste to gaseous and monitor their discharge. **(CL-09/10)**

Response: *Section 3.1.3, "Description of Systems," was revised and "or similar document" added to the text after "ODCM".*

Comment: Section 3.1.3, p 3-14, lines 5-6 – Shipment may also occur on barges or other ships. **(CL-09/12)**

Response: *Section 3.1.3, "Description of Systems," was revised and the reference to barges or ships was included in the text.*

Comment: Table 3-2, p 3-27 – Add footnote "c" to Fermi 1. Detroit Edison informed the NRC in late 2001 per the requirements of 10 CFR 50.82, that the final decontamination and dismantling phase of SAFSTOR would be started for Fermi 1. **(CL-09/14)**

Response: *Table 3-2 was revised and footnote "c" added.*

Comment: Section 3.3.3, p 3-29 – Sentences are duplicated between the three full paragraphs on p 3-29. **(CL-09/15)**

Response: *Section 3.3.3, "Summary of Plants that Have Permanently Ceased Operations," was revised to remove redundant text.*

Comment: Section 4.3.3.3, p 4-12, line 16 – There appears to be a discontinuity between the previous paragraph and the paragraph starting on line 16. Is something missing? **(CL-09/16)**

Response: *Section 4.3.3.3, "Results of Evaluation," was revised to include the missing information.*

Comment: Section 4.3.3.3, p 4-12, lines 28-30 – Add "The processing of residual sodium products from an FBR is no more likely to result in water quality impact than decommissioning activities at a LWR." **(CL-09/18)**

Response: *The suggested wording does not add anything to or change the staff's conclusion. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.10.2, p 4-40, lines 12-14 – in the paragraph on FBR decommissioning activities, add that decommissioning a FBR involves removal of sodium and NaK, but that these decommissioning activities can be performed safely with the proper engineering controls. **(CL-09/27)**

Response: *The suggested wording does not add anything to or change the staff's conclusion. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Section 4.3.11.1, p 4-41, line 7 – add "LWR" before "licensee" in the third sentence. The formula for the specified minimum amount of decommissioning funds applies to LWR's. The other regulations on decommissioning funds and evaluation of adequacy do apply to all reactors, so there is no adverse impact of the formula applying only to LWR's. **(CL-09/28)**

Response: *Section 4.3.11.1, "Regulations," was revised and "LWR" was added before "licensee".*

Comment: Section 4.3.11.3, p 4-45, lines 4-5 – delete or reword "and is either undergoing decommissioning or is in safe storage awaiting decommissioning" from the second sentence. SAFSTOR or safe storage is a form of decommissioning. **(CL-09/29)**

Response: *Section 4.3.11.3, "Evaluation," was reworded eliminating the misperception that safe storage is not decommissioning.*

Comment: Tables 4-6 and 4-7, p 4-71 – footnote "d" is not used in the tables, but probably belongs next to the 960 value for the number of shipments from a PWR using SAFSTOR. **(CL-09/30)**

Response: *Tables 4-6 and 4-7 were extensively revised and footnote "d" referring to truck and rail shipments is no longer used.*

Comment: Section 4.3.18.2, p 4-72, lines 38-41 – other irretrievable resources include gases and tools, but these resources are also minor. **(CL-09/31)**

Response: *Section 4.3.18.3, "Evaluation," was revised and "gases" and "tools" were added to the text.*

Comment: Section 6.1, p 6-1 – for plants shutdown before existing decommissioning rules were adopted, the environmental reviews may not be in the PSDAR as discussed in this section. In such cases environmental aspects not previously addressed that need to be addressed will be covered in the LTP. **(CL-09/32)**

Response: *For plants that permanently ceased operation before the 1996 rule, the Decommissioning Plan and the Environmental Report become the PSDAR. Decommissioning activities at all permanently shutdown facilities are substantially underway. The major impacts, if any, that may not have been covered by the Decommissioning Plan and the environmental report (such as impacts to minority and low-income populations surrounding the facility) have already occurred. In addition, the staff has been sensitive to protected species at existing decommissioning sites with several informal consultations occurring over the past several years. The comment did not provide new information relevant to this Supplement and will not be* evaluated further. The comment did not result in a change to the Supplement.

Comment: Table F-1The site area for Fermi 1 is listed as 1,120 acres. That is the size of the Fermi 2 site; Fermi 1# is on a portion of that site. The original Fermi 1 site was 900 acres. Currently, the portion of the site considered to be the Fermi 1 nuclear facility on the Fermi 2 site is less than 4 acres. **(CL-09/34)**

Response: *The revised area values were incorporated in Table F-1.*

Comment: Fermi 1's cooling water source was Lake Erie. Saxton's area is listed as 1.1 acres, however, the text reported San Onofre as having the smallest site. Also, footnote "b" should be applied to the "Cooling System" header, rather than "Cooling Water Source." **(CL-09/35)**

Response: *Table F-1 was corrected to include Lake Erie as the Fermi 1's cooling water source. The staff chose to list the area of the original licensed site for Saxton. Footnote "b" was changed to "cooling system".*

Comment: Table F-2, p F-4 – Fermi is in Michigan, not Ohio. **(CL-09/36)**

Response: *Ohio was changed to Michigan for Fermi in Table F-2.*

Comment: Section G.2.1, p G-13 & G-19 – the conclusion reached that the doses for SAFSTOR and DECON are not substantially different is partly due to which decommissioning plants were selected to be evaluated. **(CL-09/43)**

Response: *In some cases, data for different categories of facilities were limited, and the data presented represents the best information currently available. All data received from decommissioning facilities was included in the estimates. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Tables E-3, E-5, H-1 and H-2 – some additional activities, for example, system dismantlement and large component removal, could potentially impact air quality. Provisions are needed for portions of these activities to prevent adverse impacts. **(CL-09/49)**

Response: *Typically, such activities are conducted inside enclosed structures with monitored release points and are considered under the category "Maintain Effluent and Environmental Monitoring Program." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Table H-2, p H-17 – in the "Impact and Summary of Findings" section, "water use" should be changed to "air quality." **(CL-09/50)**

Response: *"Water use" was changed to "air quality" in Table H-2.*

Comment: Section J.1.1, p J-1 – add, "selected" before "facilities" in the first sentence of the first paragraph. Identify the time period used for the comparison in the second paragraph. **(CL-09/56)**

Response: *The recommended revision has been made in part. The word "selected" has been added in the text. The time period considered in the analysis is from the shutdown of the plant. Section J.1.1 was revised.*

Comment: Table J-1 – add footnote "c" to Fermi 1. **(CL-09/57)**

Response: *Footnote "c" was added under Fermi 1 in Table J-1.*

Comment: Section 4.3.9.1, page 4-33, refers to the licensee's FSAR. Suggest adding the words "or equivalent" after "FSAR" since some licensees have a defueled safety analysis report (DSAR) instead of a FSAR. **(CL-15/2)**

Response: *The phrase "or equivalent" was added after "FSAR" in Section 4.3.9.1, "Regulations".*

Comment: Section 4.3.12.1, page 4-47, second line – Add a period after the word "effects" and begin the next sentence with the word "Socioeconomic." **(CL-15/3)**

Response: *The text was revised in Section 4.3.12.1, "Regulations," consistent with the above comment.*

Comment: The following Conclusions sections discuss environmental impacts that may have

small, moderate or large impacts: 4.3.1.4 (Onsite/Offsite Land Use), 4.3.5.4 (Aquatic Ecology), 4.3.6.4 (Terrestrial Ecology), 4.3.9.4 (Radiological Accidents), 4.3.10.3 (Occupational Issues), 4.3.12.4 (Socioeconomics). The FGEIS is not clear what, if any, actions a licensee should take depending on if the impacts are small, moderate or large. **(CL-15/4)**

Response: *The Supplement was revised to explain those issues that are considered generic and have more than one level of significance. Section 4.3 was changed for clarification.*

Comment: It is not always clear when a particular decommissioning activity or site/operating condition falls within the envelope of environmental impacts described in Section 4.0 and when that activity or condition would require further analysis. **(CL-16/2)**

Response: *Chapter 4 was extensively revised to more clearly define the envelope of generic impacts. However, the comment is too general to provide a specific answer. The comment did not provide new information relevant to this supplement and will not be evaluated further. The comment did not result in a specific change to the Supplement.*

Comment: The Supplement should address how the environmental analysis of decommissioning activities takes into account changes in the environmental parameters of the site during plant operation. **(CL-16/4)**

Response: *The Supplement has taken into account the changes in the site environment during the plant's operation. A generic environmental impact statement is a method of evaluating the impacts of similar activities at similar facilities resulting in similar impacts. Changes in the site environment during the plant operational period are not so significant as to cause the impacts of similar activities at similar facilities to be significantly different. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The Supplement should provide more specific guidance to licensees regarding the level of a particular decommissioning activity, or the site conditions in which an activity is occurring, which would trigger a site-specific NEPA analysis of the activity by the licensee. For example, with regard to levels of activity that would require a site-specific analysis, the Supplement should more specifically define what constitutes a major transportation upgrade. With regard to site conditions, it should define how much time may pass after the previous disturbance of an aquatic or terrestrial ecosystem before a site-specific analysis is necessary, or how recent the ecological assessment of that ecosystem must be to rely on the Supplement instead of a site-specific analysis. This will facilitate both licensees' evaluation of environmental impacts in required submissions such as the Post Shutdown Decommissioning Activities Report (PSDAR) and the License Termination Plan (LTP), and NRC's development of site-specific NEPA documents. **(CL-16/6)**

Response: *Chapter 4 was extensively revised to more clearly define when a site specific analysis is required.*

Comment: Response to Comment No. 6-C, page A-13, indicates that impacts from potentially contaminated sediment are addressed in the Supplement, but we did not find this information. **(CL-16/8)**

Response: *The staff response in the scoping summary report (see comment 6-C, page A-13) referred to evaluation of the impacts of potentially contaminated sediment within the site boundary. Onsite contaminated sediments are normally addressed in detail during the license termination plan review and is not addressed in any detail in this Supplement. The NRC staff does not normally require remediation of offsite sediments unless they pose a threat to public health and safety. The plants were licensed with the expectation that there would be routine releases to the air and water due to normal operation. These releases are limited to ensure the public health and safety. Offsite contamination is monitored and remediation is not warranted. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 2-5, Section 2.2, Line 10. This section should note that state or local requirements may be more restrictive than NRC's. **(CL-16/16)**

Response: *The text in Section 2.2, "Summary of Current Regulations," was revised to recognize that state or local requirements may be more restrictive than NRC's requirements .*

Comment: Page 3-17, Section 3.2.1, Lines 32-33. Please revise the document to clarify that while the evaluation of ISFSIs is outside the scope of the GEIS, it should be noted that the DECON alternative does not necessarily completely eliminate the need for long-term security and surveillance of a facility; an ISFSI at a decommissioned facility will require long-term security and surveillance. **(CL-16/21)**

Response: *It is stated (Table 1-1) that ISFSI maintenance is an activity that may be separately licensed under 10 CFR Part 72 and is out of scope. It is further discussed in Section 1.3, "Scope of This Supplement." The statement in Section 3.2.1, "DECON," is correct. The facility being referred to is the reactor facility and not the ISFSI, which is considered as a separate facility. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 3-29. Lines 29-39 repeat lines 11-21. **(CL-16/22)**

Response: *The redundancy in the lines has been eliminated.*

Comment: Page 4-57, Section 4.3.13.4, Lines 36-38. The environmental sections of some PSDARs submitted to date have not provided detailed information. The Supplement should elaborate on the "appropriate information" that licensees should provide relating to environmental justice in the environmental section of their PSDARs to enable NRC to obtain sufficient information on potential environmental justice issues at decommissioning facilities. **(CL-16/68)**

Response: *The requirements for submitting the PSDAR can be found in 10 CFR 50.82(a)(4)(I). Guidance on what should be in the PSDAR can be found in Regulatory Guide 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," dated August 2000. The staff plans to update Regulatory Guide 1.185 subsequent to publishing Supplement 1 to NUREG-0586, with guidance on including environmental justice considerations in the PSDAR. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-69, Section 4.3.17.2, Line 5. What is meant by "not large enough to destabilize the important attributes of the system?" **(CL-16/71)**

Response: *In terms of transportation impacts, MODERATE impacts are those that would result in noticeable changes such as increased traffic or increased road maintenance requirements, but would not result in the need for major transportation system modifications, cause substantial changes in local traffic flow, or cause a significant increase in traffic fatalities or public radiological dose. Section 4.3.17.2 was consistent with the above explanation.*

Comment: Pages 4-72 to 4-73, Section 4.3.18. The discussion of irretrievable resources more properly belongs in a section that summarizes environmental consequences. The Supplement could benefit from having such a section as was done with the recently issued draft NMSS guidance document on NRC preparation of NEPA documents. **(CL-16/72)**

Response: *This section summarizes irreversible environmental consequences for impacted areas. The reader is referred to Table ES-1 for a summary of the environmental impacts of decommissioning. NRC has not determined that combining the discussion of irretrievable resources with a summary of environmental consequences would substantially improve the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Page 4-72, Section 4.3.18, Line 9. It seems inappropriate to include concrete as an irretrievable resource. **(CL-16/73)**

Response: *Section 4.3.18, "Irretrievable Resources," was revised and concrete was eliminated as an irretrievable resource.*

Comment: Page 4-72, Section 4.3.18.1, Line 14. The Supplement states that there "are no regulations that deal specifically with the concept of irretrievable resources." It is unclear what is meant by this statement. The following statutory and regulatory provisions pertain to irreversible and irretrievable resources in the NEPA context: —NEPA ' 102(2)(C)(v), 42 U.S.C. ' 4332(2)(C)(v);—40 CFR 1502.16 (CEQ regulations); and,—10 CFR, Part 51, Subpart A, Appendix A (NRC regulations). **(CL-16/74)**

Response: *Section 4.3.18.1, "Regulations," was revised. The first sentence was removed and the pertinent references were added to the section.*

Comment: We would like to comment on the draft NUREG to correct an error in Table 4-3, line 21 regarding the Cost Impacts of Decommissioning for Rancho Seco. Line 21 should read:

Rancho Seco 913MWe PWR DECON $394.

Please refer to our letter submitted to the NRC Document Control Desk dated 3/26/01 entitled Rancho Seco Report on Decommissioning Funding Status. On page 2 of the letter we stated:

"...Their [TLG] estimate was $495.4 million in 2000 dollars. The portion of this total that is non NRC-defined decommissioning activities related to non-radiological dismantlement and management and storage of spent fuel is $101 million, most of which is related to fuel storage costs..."

SMUD, when it first established its decommissioning fund, included radiological dismantlement costs and costs related to storing spent fuel. Therefore, $495m -$101m leaves $394 million for equivalent cost discussed in Table 4-3 of the NUREG. **(CL-18/1)**

Response: *Table 4-3 was revised to reflect the new estimate for decommissioning.*

Comment: The Figure 1-1, "Decommissioning Timeline" should also reflect the 60 year window, mentioned in 10CFR50.82(a)(3), that starts from the permanent cessation of operation. **(CL-30/2)**

Response: *Figure 1-1 was revised to reflect the sixty year period for decommissioning.*

Comment: Revise the first part of the last sentence on page 1-5 to read: If a licensee chose to operate the ISFSI under a Part 50 license, they could choose to continue under the Part 50 license, or by way of license amendment request. **(CL-30/3)**

Response: *Chapter 1, "Introduction," was revised to accurately reflect the requirements in 10 CFR Part 50 and Part 72.*

Comment: Under the description of the Turbine building (on page 3-6) revise the last two sentences to read: Primary coolant is not circulated through the turbine building systems in PWRs. However, it is not unusual for the turbine building to become mildly contaminated during power generation at PWRs. **(CL-30/5)**

Response: *Section 3.1.2, "Types of Structures Located in a Nuclear Power Facility," was revised and the last two sentences in the description of the "Turbine building" were changed as proposed above.*

Comment: Add the following sentence to the first paragraph in section 3.1.4: Most of the contamination in the reactor coolant system is from the activation of corrosion products and not fuel. **(CL-30/6)**

Response: *Section 3.1.4, "Formation and Location of Radioactive Contamination and Activation in an Operating Plant," was revised and the above sentence was added to the text.*

Comment: Revise the second to last sentence on page 3-15 to read: The entire structure (or portions) must be removed..... **(CL-30/7)**

Response: *Section 3.1.4, "Formation and Location of Radioactive Contamination and Activation in an Operating Plant," was revised consistent with the above comment.*

Comment: The last sentence on page 3-15 is only true if corrosion products are included. The sentence should be revised to read: If corrosion products are included, the radioactive decay..... **(CL-30/8)**

Response: *Radioactive corrosion products are the result of activation and can be considered activation products, therefore the staff chose not to make a change to the text of the Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The last two paragraphs on page 3-15 need to be rewritten. The discussion of contamination and activation needs to be clarified. If requested, CYAPCO will work with the Commission to rewrite this text. **(CL-30/9)**

Response: *The staff has determined that for the purpose of this Supplement the explanation of contamination and activation is adequate. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Yankee Rowe should be added to the list of plants mentioned in the second to last paragraph of page 3-26. The Yankee Nuclear Power Station was one of the plants in the AEC's Demonstration's Program. Yankee Rowe's license number is DPR-3. **(CL-30/10)**

Response: *Section 3.3.1, "Plant Sites," was revised and Yankee Rowe was added to the list.*

Comment: The second to last paragraph on page 3-32 discusses the creation of nuclear islands. Nuclear islands are not primarily created because of security reasons. The real benefit in creating nuclear islands is to not interfere with spent fuel storage. The purpose for creating a nuclear island is to provide a facility for the safe long-term storage of spent fuel, which is independent of the remainder or the rest of the facility. The purpose of the modifications is to divorce the spent fuel cooling function from dependence on systems which must be dismantled as part of the overall decommissioning process. **(CL-30/11)**

Response: *Section 3.3.3, "Decommissioning Process," was revised to more accurately describe the reasons for establishing a nuclear island.*

Comment: Expand the discussion about Stage 4 of the decommissioning process. This discussion should contain as much description as the descriptions under stages 1 through 3. **(CL-30/12)**

Response: *The staff chose not to expand the discussion of Stage 4 of the decommissioning process. Activities during Stage 4 result in minimal environmental impact and focus on demonstrating that the previous decommissioning activities have resulted in site radiological conditions that allow termination of the license. The comment did not provide new information relevant to this supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Delete "groundwater" from the first sentence in section 4.3.3.4. Releases are not made to groundwater under NPDES permits. NPDES discharge points discharge to surface water locations. **(CL-30/13)**

Response: *Section 4.3.3.4, "Conclusions," was revised and the term "releases" was removed from the first sentence. Section 4.3.3 does consider impacts to groundwater due to decommissioning; therefore, it is appropriate that the "Conclusions," Section 4.3.3, include groundwater.*

Comment: On Pg 3-17 there is a discussion of the advantages of the DECON alternative for decommissioning. One advantage of DECON is not discussed and should be. Generally speaking the shorted lived nuclides are easier to detect because of their beta/gamma emissions, versus the alpha emissions of longer lived nuclides. The difficulty of detecting the alpha emitters will increase analysis costs and increase the difficulty of performing surveys. Ultimately the cost of providing RP coverage and of performing the Site Characterization and Final Status Survey will also be increased. **(CL-31/6)**

Response: *Section 3.2, "Decommissioning Options," provides a very general comparison of the various options for decommissioning, including the advantages and disadvantages of each option; therefore, the staff has determined that the suggested change provides detailed advantages not consistent with the other options.*

Comment: Table F-1 lists the total site area for Peach Bottom Unit 1 to be 620 acres. 620 acres is the total site area reported in the Peach Bottom Unit 2 and 3 Updated Final Safety Analysis Report. However, Table F-2 reports the total site area for Peach Bottom Units 2 and 3 to be 618 acres. Table F-2 should be changed to reflect the total site area for Peach Bottom Units 2 and 3 to be 620 acres. **(CL-31/14)**

Response: *Table F-2 was revised and the value 620 acres was used.*

Comment: On page L-6 of Appendix L, line 4 refers to criticality accident monitoring requirements described in 10 CFR 7.24. Criticality accident monitoring requirements are described in 10 CFR 70.24. This typographical error should be corrected. **(CL-31/16)**

Response: *The reference was corrected to 10 CFR 70.24.*

Comment: On page L-6 of Appendix L, line 17 refers to 10 CFR 50.73 as requiring a licensee event report within 30 days. 10 CFR 50.73 was recently revised to require a licensee event report within 60 days. This change should be made to Appendix L. **(CL-31/17)**

Response: *Appendix L was revised to reflect the 60 day limit.*

Comment: All spent fuel at Dresden Unit 1 will be moved to dry storage on site by the end of the first quarter of 2002. This change needs to be reflected in Table 3-2. **(CL-31/19)**

Response: *Table 3-2 was revised to indicate that all the Dresden Unit 1 fuel is in dry storage.*

Comment: And speaking of Appendix F, by the way: please note in Table F-2 that the Callaway plant is located in Missouri, not in Montana. **(CL-51/6)**

Response: *Appendix F was revised and Montana was changed to Missouri.*

O.6.2 Clarification Questions

Comment: I had a question on the difference between the 1988—or one of the differences between the 1988 version and this supplement. The scope of facilities that are being addressed is much smaller, it's mainly just nuclear power reactors and I wanted to know for all the other facilities that were referenced in the '88 document and some of those included like the MOX facilities. How will those be addressed? Are they going to be addressed in a different type of document down the road or—I'm just asking along those lines. **(AT-A/1)**

Response: *This Supplement only addresses permanently shutdown commercial nuclear power reactors. The environmental analysis for the other facilities in the 1988 GEIS is still valid. As deemed necessary and appropriate, NRC will update the environmental impact assessments for the decommissioning of other facilities evaluated in the 1988 GEIS but not included in this Supplement. MOX fabrication and utilization facilities will have a separate environmental assessment prepared by the NRC staff. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The last paragraph in the Conclusions section of the Executive Summary, and page 2-3 of Section 2.2.1, state that a licensee would have to submit a license amendment request if environmental assessments are outside the bounds of the GEIS or if the environmental impacts of a decommissioning activity have not been previously reviewed. What is the licensing document that should be modified in the license amendment request? Section 2.2.1 states the Environmental Report should be revised, but the PSDAR may be a more appropriate document. **(CL-15/1)**

Response: *The Environmental Report is the appropriate document that needs to be updated. The PSDAR requires a discussion of the reasons for concluding that the environmental impacts associated with site-specific DECON activities will be bounded by previously issued environmental impact assessments. It does not require the analysis of specific impacts related to specific activities. However, based on the results of the licensee's environmental review, the PSDAR may also require updating. The license amendment would request the incorporation of*

a license condition in the license that would allow the activity to proceed. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: Will this Supplement replace entirely the previous NUREG-0586? **(SF-A/1)**

Response: *No. This Supplement will entirely replace the evaluation of environmental impacts from decommissioning activities of nuclear power facilities. The Supplement will be a stand-alone document and supercedes the environmental impacts to power reactors described in the 1988 GEIS. This Supplement goes beyond the 1988 GEIS and considers the permanently shutdown high-temperature gas-cooled reactors and the fast breeder reactors. This Supplement does not cover research and test reactors or power reactor facilities that have shut down due to major accidents (i.e., Three Mile Island). It also does not cover other types of fuel-cycle facilities. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I'm a little confused because if a licensee is outside the bounds or in an area that is beyond what has been previously reviewed, we're required to submit a licensee amendment request. Now I'm confused, since you've got, for these different criteria, a small impact, and a moderate impact, and a large impact, what is the bounds? **(SF-A/2)**

Response: *If the evaluation of any activity indicates that it could potentially result in an environmental impact that is greater than that predicted by the Supplement, then the licensee needs to submit a license-amendment request. For example, if the change to the facility would result in a moderate impact to the environment and the Supplement predicts a small impact, then the licensee needs to submit an amendment request. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: In reaching your findings about these impacts, these environmental impacts, the generic issues and impacts, I'm wondering what the baseline you were using was to measure those impacts against. In other words, were you comparing the impacts to the site before the nuclear facility was built or during its peak period? And in that case were the impacts considered cumulative or stand alone? **(SF-B/1)**

Response: *The impacts were compared against those that existed at the time the facility permanently ceased operation. The impacts identified at the time that the facility permanently ceased operation are cumulative impacts from plant construction through operation. Therefore, comparing decommissioning impacts to impacts at the time the plant ceased operation would*

include cumulative impacts. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.

Comment: My question concerns the last comment that you just made about that no activities can be performed during decommissioning that would result in significant environmental impacts not previously reviewed. Would you determine this from the submission of the PSDAR? Is that how you would determine if anyone was going to do anything that wasn't previously reviewed? **(CH-A/1)**

Response: *When the licensee prepares the PSDAR, they will identify the major activities that they plan to perform during decommissioning. They must evaluate the environmental impacts from decommissioning activities and compare those impacts to the results of the GEIS on decommissioning and other site-specific environmental impact statements. The licensee is required to evaluate any planned decommissioning activity against any previous environmental assessments prior to undertaking that activity [10 CFR 50.82(a)(b)(ii)]. the requirement for the evaluation is contained in the facility's written procedures. Documentation that such an evaluation has been conducted is available for NRC review during a site visit or inspection. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Once the work is performed, is there monitoring to make sure they're in compliance with the PSDAR? If they're actually acting, doing what they said they were going to do? **(CH-A/2)**

Response: *During the decommissioning process, NRC inspectors will periodically conduct special inspections of specific activities at the site. Site visits and inspection will be more frequent for plants that are undergoing decontamination and dismantlement and less frequent for plants that are in storage mode. Since the PSDAR is primarily an information document prepared to inform the public and NRC of the licensee's plans and schedule, it is not normally utilized by the NRC to determine compliance with regulations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: You said that a licensee could go ahead and dismantle without formal approval and I thought that the licensee based on the document, the licensee had to submit the PSDAR and then there was a 30-day public process. Were you not counting that because that didn't directly relate to the question? **(CH-A/16)**

Response: *Initial decommissioning activities such as draining systems, removal of some components, pumps, tanks, disposal of resins, and surface contamination removal can occur at any time, including immediately after permanent cessation of operations. However, no major decommissioning activities may take place until 90 days after the PSDAR has been submitted. Major decommissioning activities are defined as "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater that Class C waste." A description of the decommissioning process is given in Section 3.2. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: What I was asking you was then cumulative impacts in terms of the plant during its operating period with the decommissioning activities added onto it, or do you mean something else? **(SF-B/2)**

Response: *For discussions of cumulative impacts, the NRC considered the terminology defined in 40 CFR 1508.7: "Cumulative impact is the impact on the environment which results from the incremental impact of the action [in the case of this Supplement, that is decommissioning activities] when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Using this definition, the staff examined the impacts of decommissioning activity at NRC-licensed nuclear power facilities and made a cumulative assessment of decommissioning activities and other past, present, and reasonably foreseeable future activities at the sites. Section 4.0 of the Supplement has been changed for clarification.*

O.6.3 Statements for or Against Nuclear Power

Comment: Georgians for Clean Energy promotes the shutdown of our unsafe nuclear power plants here in Georgia and the phase out of nuclear power nationwide. **(AT-A/8)**

Response: *Shutting down operating facilities is outside the scope of this Supplement, which deals with facilities that have permanently ceased operations. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: I'm now concerned about the costs, about all the broken promises, because these all sound—all these systems sound so good. But I can remember—I'm old enough to remember when this was going to be clean, safe and cheap. Electricity was going to be too

cheap to meter. That sticks with me. And we know that it's as expensive as anything possibly could be when you consider the whole—the whole cycle from the mining of the uranium to what happens afterwards. There's a huge process. **(AT-D/10)**

Comment: The nuclear issue is the most important issue facing humanity and has been since the atom was first split. The nuclear issue is the Sword of Damocles over the planet and all future generations should we survive the next decade. **(CL-20/2)**

Comment: Furthermore, no new nuclear plants should be allowed or built as they will just add to the existing contamination, and all operating plants should be shutdown to stop further "waste" - such as plutonium-generation. **(CL-20/115)**

Comment: The nuclear power industry was a colossal mistake to begin with, as we all know. **(CL-33/2)**

Comment: The NRC must resist the pressure of the nuclear industry. If their profits are waning, they have had their turn. The citizens of the U.S., who pay everyone's way, have a right to expect a healthy environment, and a right to fight for it within the United States legal system. (But what a shame that a fight is ever needed.) **(CL-36/8)**

Comment: It ought to be equally obvious that without public subsidy (via Price-Anderson) nuclear power is economically untenable. **(CL-42/4)**

Comment: It ought to be equally obvious given these factors the complete phase-out of nuclear power should be a high priority. Alternative power sources such as wind, solar, hydrogen fuel cell [and conservation] should be vigorously pursued in its stead. **(CL-42/5)**

Comment: The enterprise of electricity generation using nuclear fission requires public subsidy. Without Price-Anderson protection, nuclear power would be economically untenable. **(CL-46/5)**

Comment: Consideration of these factors must be fully and publicly discussed before exposing our citizens to additional exposures through development of new nuclear generation facilities. The complete phase-out of nuclear power should be considered based on objective analysis of health and economic effects including probability evaluation of all possible accidents and incidents, and comparison of all potential energy sources such as wind, solar, hydrogen fuel cell and including conservation. **(CL-46/6)**

Comment: As we have stated earlier, the methods used to decommission a nuclear plant will affect not only the communities of today but also the livelihood of future generations. The nuclear industry is leaving humankind a legacy of devastation—epitomized by its long-lived and

highly dangerous nuclear waste. They are unable to solve their waste problem and now, when faced with the eventual shutdown of their plants, are unwilling to take measures to ensure that the public is protected. **(CL-08/32)**

Response: *The comments relate to nuclear energy in general and are outside the scope of this Supplement. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: Bush is stripping us all of those safeguards we all need to protect citizens--and this includes you. He has only corporate interests--the nuclear power industry being one. **(CL-34/3)**

Response: *The missions of the NRC include the protection of public health and safety and protection of the environment. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

O.6.4 Comments in Support of Decommissioning

Comment: I certainly heard Eva loud and clear, that the amount of exposure for decommissioning is less than for operating reactors. So our organization is certainly in favor of decommissioning. Let's just do it right. **(AT-B/18)**

Comment: We'd like to see the decommissioning of nuclear plants go forward, and we want it to go forward in the safest, most environmentally sound manner. **(CH-A/4)**

Comment: As a preliminary matter, we support the prompt decommissioning of nuclear power plants and urge the U.S. Nuclear Regulatory Commission ("NRC") to ensure that decommissioning goes forward in the safest, most environmentally sound manner. **(CL-11/1)**

Comment: We would like to make it abundantly clear that we see decommissioning to be the most appropriate and responsible action to take with all nuclear reactors. **(CL-47/3)**

Comment: Certainly, every reactor shut down is another step away from further creation of radioactive waste, the ever-present possibility of nuclear terror (be it a reactor accident or terrorist attack) and the continuing irradiation of our everyday lives. **(CL-47/5)**

Comment: Our organizations are fully supportive of the permanent closure of nuclear power reactors. **(CL-48/7)**

Comment: Our goal is to require that nuclear facility owners and operators, to the best of their ability, function as the good neighbors and responsible corporate citizens they claim to be. That would include fully encapsulating and isolating all of the wastes and radioactively and chemically contaminated materials resulting from their operations and decommissioning. It includes doing everything possible to: 1)Prevent public exposures in the current and future generations to radiation and chemicals from nuclear power production, waste management, transportation, "cleanup" and decommissioning; 2)Prevent additional environmental contamination both onsite and offsite and to remediate and minimize that which has already occurred. **(CL-48/8)**

Response: *The comments are in support of safe, efficient, and timely decommissioning of permanently shutdown power reactors. The comments did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

O.6.5 General Comments

Comment: I think this is a good beneficial effort to have this generic supplement. I think it's going to help do evaluations of the environmental consequences of what we're doing. It's going to make sure in some cases that we look at the right things and don't skip anything. I do agree with the overall conclusions of the document. And also, I agree on what should be considered generically and what is site-specific because there are some site-specific issues. **(CH-D/1)**

Comment: For the next comment, for older plants, in some cases, there are some differences in the physical configuration from what was described and assumed. An example is like there may not be active ventilation systems. We are just going to have to install those systems as needed to properly protect the air quality and so forth. **(CH-D/9)**

Comment: Also, in the licensing arena, our documents may not include what has already been assumed to be in the documents for plants that recently shutdown. And in those cases, like for the environment hazards, if we don't have it already covered in the document, we're going to have to cover it in the license termination plan. So, I think what will be covered is just, it may not already be covered in the document. **(CH-D/10)**

Comment: Overall, Maine Yankee (MY) believes that the Supplement provides a fair update of the sections of the 1988 NUREG versions relating to pressurized water reactor, boiling water reactors, and multiple reactor stations. **(CL-04/1)**

Comment: Draft supplement 1 represents a useful update of the environmental impacts of decommissioning based upon over 200 facility-years' worth of actual decommissioning experience accumulated by nuclear facilities since the NRC published the initial GEIS in 1988.

NEI concurs with the GEIS conclusions, which found that for the "...environmental issues assessed, most of the impacts are generic and SMALL for all plants regardless of the activities and identified variables..." **(CL-05/1)**

Comment: Overall, Detroit Edison agrees with the conclusions in the draft NUREG-0586, Sup 1. The supplement will be helpful and updates the previous Generic Environmental Impact (GEIS) on Decommissioning to accommodate changes in regulations and experience gained in recent decommissioning activities. **(CL-09/1)**

Comment: In conclusion, Detroit Edison thinks the draft supplement to the GEIS on decommissioning of nuclear facilities is a good effort and agrees with the overall conclusions. Some details should be revised to improve accuracy and to ensure planned decommissioning activities, intended to be covered by this supplement, are fully addressed. This will avoid future questions on whether activities are covered and/or bounded by this GEIS supplement. **(CL-09/58)**

Comment: EPA supports the approach NRC has taken in the Supplement of establishing an envelope of environmental impacts resulting from decommissioning activities and identifying those activities which can be bounded by a generic evaluation and those which require a site-specific analysis. This approach concentrates the environmental analysis on those activities with the greatest likelihood of having an environmental impact. EPA also commends NRC for drafting a Supplement which facilitates public understanding in its use of plain English and explanation of technical terms. **(CL-16/1)**

Comment: Also, based on information presented in various industry forums, several numbers quoted for some of the other plants may be inaccurate. Each plant should verify the numbers for accuracy. **(CL-18/3)**

Comment: Just as anyone with common sense can tell this Draft Supplement 1 to NUREG-0586 will have dire consequences if implemented in its current form. **(CL-20/3)**

Comment: Exelon continues to maintain that providing guidance, which addresses environmental issues generically, provides the highest standard the public at large can use effectively to challenge industry to return power plant sites to beneficial use upon facility retirement. **(CL-31/2)**

Comment: Excelon believes the proposed Draft Supplement correctly concludes that most of the environmental issues assessed result in impacts that are generic and SMALL for all plants. We reach this conclusion based upon our experience decommissioning one BWR (Dresden 1),

two PWR's (Zion Station), one HTGR (Peach Bottom 1), and our observation of other industry decommissioning projects. We have not seen to date - and currently do not expect to find - environmental impacts different from those addressed and bounded by this Supplement to the GEIS. **(CL-31/1)**

Comment: In general the draft supplement meets the goal of updating the GEIS to current decommissioning practices and dismantlement options. **(CL-30/1)**

Comment: There is still time to correct all the serious problems in the Draft, still time for the NRC to turn from the path of wickedness and ruin the Draft Supplement and GEIS will lead to if passed as is. **(CL-20/118)**

Comment: I would point out that on pages C-1 and C-2 are the names of those responsible for this abomination for reference in case of future lawsuits, so the public should make a note of that (this is, after all public record, what I have written). **(CL-20/117)**

Comment: It appears that the nuclear industry has written its own ticket, as usual, on the issues in the Draft. P. E-5 notes the help from the Nuclear Energy Institute in gathering information. **(CL-20/64)**

Comment: The NRC is charged to protect the quality of the human environment and we ask that they can—that they do all they can to uphold that charge. The current draft GEIS is not protective and needs major improvement. **(AT-A/44)**

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:] Planned Operating Life of a Nuclear Generating Stations. **(CL-02/4)**

Comment: [In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including:] Plant Valuation. **(CL-02/8)**

Comment: Did the Nuclear Regulatory Commission "encourage" its economists, accounts, and actuaries to ignore the impact of deregulation and plant devaluations on local communities? Is it unreasonable to ask the NRC to view decommissioning through a global lens that accounts for economic reality, objective science, and fiduciary accountability? Or is the Commission intent on viewing radiological decommissioning through surrealistic prescription monocles prescribed by the Nuclear Energy Institute, the Edison Electric Institute, Electric Power Research Institute, and the Institute for Nuclear Power Operations? **(CL-02/14)**

Comment: At some point, the NRC will have to create a decommissioning vessel the incorporates reality as its guide. Frankly, the GEIS resembles a script for "Abbott and Costello" prepared by Norman C. Rasmussen, Bernie Snyder and Ken Lay. **(CL-02/16)**

Comment: The document can be condensed in to three words, namely: "DUMP AND COVER." **(CL-20/1)**

Comment: Deregulation has already had serious negative impact on local municipalities this will be just another blow. **(CL-25/12)**

Comment: To even think that decommissioning nuclear power plants' regulations via presidential fiat is acceptable is beyond logic and reason. **(CL-34/1)**

Comment: I find the proposals in Supplement 1 to the Generic Environmental Impact Statement on Decommissioning unrealistic when it comes to the health of United States citizens at the time of decommissioning and to those living years later. **(CL-39/1)**

Comment: I guess one of the reasons I wanted to comment on this "Draft Supplement" is because it so dramatically reflects the backward world of Alice in Wonderland and of commercial nuclear power: "Sentence first --- verdict afterwards." Make a permanent mess first --- try to figure it out afterwards. **(CL-51/27)**

Comment: We concur with and adopt by reference the comments of the Nuclear Information and Resource Service, submitted by Paul Gunter. **(CL-52/1)**

Comment: I don't really know why I am bothering to write all this, as the NRC will ignore it anyway, but hope springs eternal as they say. If we don't have comparisons, we can't have at least some idea of what constitutes the start of a return to a more unpolluted site, and we can't establish what needs bulldozing and taken to a radioactive waste national sacrifice area. **(CL-20/11)**

Comment: Additionally, Public Citizen is concerned that the provisions outlined in the Supplement might allow owners and operators of nuclear power reactors to reduce or completely evade their civic, environmental, economic and legal responsibilities. **(CL-47/2)**

Comment: (The Western Shoshone Nation, AKA the Nevada Nuclear Test Site) that blew radioactive fallout across the nation causing serious illness, birth defects and cancers, besides doing the same to some nearer the site in Nevada. The only thing Las Vegas worried about, was if the tests shook their gambling tables according to press reports. When the wind blew towards Las Vegas they tried not to test. For Nevada to now whine that they don't see why they should get the spent nuclear fuel as they have no reactors-power reactors-is obscene,

considering that a huge Curie quantity of the spent fuel was generated making/creating the plutonium and the tritium for the nuclear weapons most of them supported and didn't care that the fallout dumped on their fellow planetary citizens. The fact that there were, and are, some small groups who were, and are against the weapons and the testing and the horrors of nuclear power does not alter the fact that the state didn't protest. The states current protests, even if valid for other reasons, ring hollow against that history of nuclear collaboration, when they use the "no power reactor" excuse to keep the waste out. It is time history was set straight. **(CL-20/82)**

Comment: Have you all no shame? **(CL-20/108)**

Comment: This is ridiculous! **(CL-22/1)**

Comment: You do not need to further endanger our lives while the polluters go scott free. **(CL-34/5)**

Comment: These admonitions have been presented to the NRC repeatedly in many Commission and staff meetings, agency panels and workshops, public meetings, legal proceedings. Until they are heard, adopted, and adhered to, this Supplement, the Final GEIS on Decommissioning of Nuclear Facilities and the Decommissioning Rule and NRC's radiation protection standards will continue to be inadequate and in violation of the applicable laws, including but not limited to the AEA, NEPA, and APA, cited above. All four should be withdrawn and entirely rewritten to provide true protection from radiological contaminations. **(CL-52/25)**

Response: *The comments are general in nature and did not provide new information relevant to this Supplement and will not be evaluated further. The comments did not result in a change to the Supplement.*

Comment: We support the NRC's current efforts to update the GEIS for nuclear power plants to reflect the industry's experience in decommissioning and to more fully consider issues like partial site release and re-use of concrete rubble as fill. **(CL-01/1)**

Response: *Rubblization and partial site release are evaluated and discussed in the scope of the document in Section 1.3 and further addressed in Chapter 4, as appropriate. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: As the NRC evaluates the comments received on the GEIS, it should look beyond the actual decommissioning process and focus on what condition the site would be in following license termination. **(CL-17/10)**

Response: *Regulations regarding license termination are in 10 CFR 20, Subpart E. These regulations and ultimate goal of decommissioning is to ensure that the site will be in a condition suitable for future use in either a restricted or unrestricted capacity. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: If the possibility exists that radioactive material will remain onsite under an unrestricted or restricted use condition the GEIS should consider the associated long-term environmental impacts. **(CL-17/11)**

Response: *Regulations regarding license termination are found in 10 CFR 20, Subpart E. For sites that have been released for unrestricted use, there would be no mechanism for future contamination or radiological releases. Therefore, long-term environmental impacts would be negligible. In the event that the site is released for restricted use, the site would continue to be monitored until the levels have been reduced below 10 CFR 20, Subpart E limits. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: Public Citizen is very concerned about several aspects of this supplement to NUREG-0586, specifically those that could pose risks to public health, the public's right to participate in decisions that affect them, and environmental quality. **(CL-47/1)**

Response: *The description of impacts as site-specific or generic does not preclude local communities from participating. The commenter is referred to the Executive Summary for a description of "generic" and "site-specific." The public can raise issues using any of several methods. If the licensee has requested an action requiring a license amendment, then the process for intervening in this action is by requesting or participating in a hearing. The process is set forth in NRC's regulations in 10 CFR Part 2, "Rules of Practice of Domestic Licensing Proceedings and Issuance of Orders." If the action of concern does not involve a license amendment, then any member of the public may raise potential health and safety issues in a petition to the NRC to take specific enforcement action against a licensed facility. This provision is contained in the NRC's regulations and is often referred to as a "2.206 petition" in reference to its location in the regulations (Chapter 2, Section 206 or 10 CFR). The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: The potential use of plutonium fuel at the McGuire and Catawba reactors is not adequately addressed in decommissioning—in this decommission document. In fact, the costs of decommissioning are nowhere to be found. So we would request that there be a supplement right away before mistakes are made in licensing the use of plutonium fuel at the McGuire and

Catawba reactors because the decommissioning impacts, including costs, and also including the additional radioactivity, the additional waste, those are real impacts that are basically left unaddressed in the generic environmental impact statement for decommissioning. **(AT-B/9)**

Response: *If a MOX Fuel program is adopted in this country then it may be considered in the next Supplement to the GEIS. However, at the present time the use of MOX fuel is speculative at best. The comment did not provide new information relevant to this Supplement and will not be evaluated furthers. The comment did not result in a change to the Supplement.*

Comment: The Oconee plant, which I'm near, which we've gone to visit, it scares me. I mean the reactors look like they're really solid. One thing they're going to do is cut into the wall to take—to change the steam generator. They're only going to put it back and somehow—is it going to be as strong as it was before? **(AT-D/8)**

Response: *The replacement of a steam generator at an operating facility is outside the scope of this Supplement. The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Comment: It has come to my attention that the Nuclear Regulatory Commission is possibly compromising the security of our nation's future by making way for further build up of nuclear waste that will theoretically be safe in so many thousands of years. **(CL-41/1)**

Response: *Spent fuel maintenance and storage are outside the scope of this Supplement as discussed in Section 1.3, "Scope of this Supplement." The comment did not provide new information relevant to this Supplement and will not be evaluated further. The comment did not result in a change to the Supplement.*

Appendix P

Public Meeting Transcript Excerpts and Written Comments

Contents

Appendix P

1. Transcript of the Public Meeting on December 4, 2001, in San Francisco, California

[Introduction, Mr. Cameron]
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[Questions answered by Mr. Masnik]
[Questions answered by Mr. Zalcman]

SF-A Mr. Sokolsky: David Sokolsky with Humboldt Bay Power Plant.

SF-A-1 Will this Supplement replace entirely the previous NUREG-0586?

Mr. Scaletti: It will replace in entirety -- or it's a standalone document for nuclear power reactors, yes.

Mr. Sokolsky: Okay.

Mr. Scaletti: The other facilities within -- NUREG-0586 is still applicable to those facilities.

Mr. Sokolsky: All right. That was my understanding in looking at this Draft Supplement, that anything from the previous NUREG is included in the Supplement that's applicable.

Mr. Scaletti: That's correct.

Mr. Sokolsky: So when we respond we no longer have to look at the previous issue, just this Supplement.

Mr. Scaletti: That is correct.

Mr. Sokolsky: Okay. Thank you.

SF-B Ms. Cabasso: My name is Jackie Cabasso. I'm the Executive Director of the Western States Legal Foundation.

SF-B-1 And I have a question for Eva which is that in reaching your findings about these impacts, these environmental impacts, the generic issues and impacts, I'm wondering what the baseline you were using was to measure those impacts against.

In other words, were you comparing the impacts to the site before the nuclear facility was built or during its peak operating period? And in that case were the impacts considered cumulative or standalone?

Ms. Hickey: Okay. Let me make sure I understand your question. You want to know what the baseline was that we were evaluating against --

Ms. Cabasso: Um-hum.

Ms. Hickey: -- and then whether we looked at the impacts cumulatively.

Ms. Cabasso: Um-hum.

Ms. Hickey: What we were comparing against was, we would look at the impacts that were identified in any previously-written environmental impact statements, final environmental statements that the licensee had published, and any other environmental assessment that had been conducted during the operation.

So we were weren't necessarily looking at the impact; we were looking at the way the impacts might change from during operation, not necessarily from the way the plant was prior to operation. So we were comparing those impacts with other environmental impact statements that had previously been written.

And, yes, we did look at cumulative impacts.

SF-B-2 Ms. Cabasso: Now just could you elaborate on that a little bit? Because what I was asking you was then cumulative impacts in terms of the plant during its operating period with the decommissioning activities added onto it, or do you mean something else?

Ms. Hickey: Well, we looked at it in a variety of ways. We would look at whether the impacts from all of the activities -- well, okay. The radiological was kind of an easy one to establish. The impacts from all of the activities individually and then how cumulatively the radiological impact to the environment would end up.

We also looked at them across the issues, so we would look at activities -- at an activity and see -- I'm sorry. I'm having a hard time describing this. But we would look at them from -- at an activity and then look at water quality and how water quality might impact potentially air quality or any of the other issues. So from that perspective we looked at it cumulatively across all the issues.

And then, like I said, we looked at the impacts from the environmental statements that had previously been written and how the environment might change from that point in time.

Do you have any other -- okay.

Ms. Cabasso: Could I? While I have the microphone, this is just an out-of-left-field question, but there's one -- on the handout for the viewgraphs, there's one sort of orphan at the end which --

Ms. Hickey: Oh, yes. Thank you for bringing that up.

Ms. Cabasso: -- and I wondered if somebody was going to talk about that.

Ms. Hickey: Yeah, I appreciate you bringing that up.

When we had our scoping meetings we talked a lot about the different options of decommissioning that are used. And I just felt like that -- even though I didn't want to go into that, I wanted to give that information and have it handy in case anybody brought up questions that related specifically to the option, SAFSTOR, DECON, or ENTOMB. And so that's -- yeah, that's an orphan. Thank you.

Ms. Cabasso: Well, I would appreciate it if you would just -- I was at the scoping meetings when those came up -- or the scoping meeting when that came up, but I'd appreciate a little review.

Ms. Hickey: Oh, okay.

Ms. Cabasso: Yes, my colleague would.

Ms. Hickey: Let's do that then.

Okay. There are three options for decommissioning that NRC has described. And one of the things I'd like to point out -- well, let me discuss them separately.

DECON is an option where the plant would shut down and immediately start the decommissioning activities and would complete decommissioning in, say, five to ten years.

SAFSTOR is an option where the plant would shut down and then wait some period of time before it completes the decontamination and decommissioning activities in order -- well, there's

a number of reasons, but it's typically to let radioactive decay occur. But there can be other issues, too.

And then ENTOMB is an option where the plant would shut down, go through some level of decontamination, and then be put in a long-term -- a stable environment, but -- and then it would have restricted access.

Now the way the decommissioning experience has gone is most plants have not -- and there's no plants currently, no power reactors currently doing ENTOMB. But most of the plants have not used just DECON or SAFSTOR.

So what we've found is that a plant may shut down and wait three to five years for either decay or some other reason, and then -- and that would be a short SAFSTOR period -- and then they'll go back and do their final decontamination and decommissioning activities.

So what we're seeing is that most plants are combining the two DECON and SAFSTOR options.

SF-C Mr. Nesbitt: Sure. I am Dale Nesbitt. I am on the Board of Western States Legal Foundation, also active with Peace Action, and a retired staff engineer from Lawrence Berkeley Laboratory.

SF-C-1 I would like to have you expand somewhat on your definition of "small," "moderate," and "large" at this moment. I know it's in Chapter 4, which I haven't read yet. Maybe it's all there. But why don't you take the opportunity to expand on that?

That to me is a very untechnical term.

Ms. Hickey: Yes. I agree. And that's why we tried to give some definition in the document.

In Chapter 1, on page 1-8, we give the Council on Environmental Quality's definitions for "small," "moderate," and "large." And this is what we based our analysis on.

"Small" pretty much means that there's no detectable, observable changes to the environment from the activity in the issue that we evaluated.

"Moderate" would mean that impacts are sufficient to alter noticeably but not destablize the attributes of the resource.

And then "large" would be that there would be a noticeable change to the resource.

I know that doesn't sound very specific, but back in Chapter 4, for every issue that we evaluated, we tried to characterize that.

I know the Socioeconomics is pretty well defined because those are areas where we look at the same sorts of issues for other environmental analyses that we've done. So if you take a look there, you may see the specific criteria that we used.
And, Mike, maybe if you could talk a little bit about the Terrestrial and the criteria, how you did your analysis for the Terrestrial Ecology.

Mr. Cameron: And Mike give us your full name and affiliation, please.

Mr. Sackschewsky: Mike Sackschewsky, PNNL.

I prepared the Terrestrial Ecology sections. In that case and for every case for each issue, we would define what we mean by "small," "medium," and "large" impacts.

In the case of Terrestrial Ecology, a small impact is one basically that you would not be able to detect any changes in the local plant, or animal populations, or community structure, or ecological functioning in the vicinity of the facility.

A moderate impact would be one that has some detectable changes in one of those factors, but not enough to drastically alter the functioning of it. You could see it, but they're still functioning normally.

And then a large impact would be one that's causing a dramatic change in the function of the plant, plant/animal populations or ecological functions.

Mr. Cameron: Dale, do you have a follow up on that or... Let me get you.

Mr. Nesbitt: Well, I understand what he said. That's helpful. I'd have to go into more detail.
SF-C-2 But it seems a bit strange to me that the majority of the things are defined as "small."

With my experience with radiation I would not think that most of them would end up being small, but that often comes down to a matter of scientific debate and opinions.

Mr. Cameron: To just follow up on that, perhaps it might be useful for people to actually get an idea of what the implications of this Generic Environmental Impact Statement are.

If you took an impact that was labeled as "generic," can you give us an example of how would a licensee who was preparing an environmental report for decommissioning, how would one of those generic impacts be considered in their environmental report?

I just want to make sure that people know what the implications of labeling an impact as generic is in terms of the decommissioning process.

Is that clear, Eva?

Ms. Hickey: Well, I guess, let me give an example that I think help defines it. And the radiological examples to me are the easiest ones.

When a plant determines their activities and how they're going to decommission the plant, they do an assessment of the dose to the workers from all the activities.

One plant in particular that we looked at determined that they could not meet the guidelines in the original GEIS, the 1988 NUREG-0586, using the methods that they were going to use. So they did a chemical decontamination of their facility in order to bring the doses down so they could be within the GEIS, within the envelope of the GEIS.

Now they didn't necessarily have to do that, but what they would have had to do is then a separate analysis in order to explain why their doses were outside of those bounds.

So I hope that kind of characterizes. If the licensee looks at an activity and they fall within the boundary in that activity, they don't have to do any additional analysis. If they are outside the boundary, outside the envelope on that particular activity, then they'll have to do a site-specific analysis.

Mr. Cameron: So that they definitely have to take a look at each particular type of impact to see whether they're within the generic bounds that this is establishing.

Ms. Hickey: Right. Right.

Mr. Sokolsky: David Sokolsky again with the Humboldt Bay Power Plant. And I don't have more information, but I have more questions.

SF-A-2 I'm a little confused because if a licensee is outside the bounds or in an area that is beyond what has been previously reviewed, we're required to submit a licensee amendment request.

Ms. Hickey: That's --

Mr. Sokolsky: Now I'm confused, since you've got, for these different criteria, a small impact, and a moderate impact, and a large impact, what is the bounds?

Ms. Hickey: Okay. If we've defined something, an activity as generic, and the significance is moderate, that's our generic assessment of it. It doesn't mean that you need to make the impact small. Is that answering your question?

What we're saying is we expect that impact to be moderate.

Mr. Sokolsky: Well, for example, with staffing and its impact on population, you give percentages that would result in either a small, a moderate, or a large impact --

Ms. Hickey: Right.

Mr. Sokolsky: -- on the area's population. So if in our situation we have a large impact or a moderate impact, do we need to submit a license amendment request? Do we need prior NRC approval on this?

Ms. Hickey: If, for that particular issue, that particular aspect of the socioeconomic issue, if it states that the impact is moderate and you're small or moderate, then it's fine. If you're large, we've determined that that's not generic.

So you need to -- yes.

Mr. Sokolsky: That makes sense, but I didn't --

Ms. Hickey: Okay.

Mr. Sokolsky: -- and I haven't read this thoroughly. Is that criteria described in here or defined in here?

Ms. Hickey: You know, I think that's a good -- okay, Mike.

Mr. Cameron: Let's get this on the record. I think that some of these questions are raising what are actually comments. And I just want to assure people that these will be treated as

comments. But I think what we're trying to do here is to figure out what's the implications of a generic finding, particularly when those generic findings might be stated in terms of "small" or "moderate."

Ms. Hickey: And one of the things that I'm really interested in comments from the public is -- we've tried to make this clear. And if we haven't presented it clearly, that's what we want to know, so we can go back and try to redefine it.

Mr. Cameron: Okay, Mike.

Mr. Sackschewsky: Mike Sackschewsky, PNNL.

In partial answer to your question, the definition of a "generic" impact also includes -- well, it has the three aspects

One, it's applicable to a number of sites.

Two, it has the same level of impact at each site. And then,

Three, after looking at it, it was determined that available mitigation measures were either technically infeasible or economically infeasible. And so therefore they're not warranted to mitigate the effects of those impacts.

So even if the impact is large, then it's determined that there's nothing that can be really done about that, and you're decommissioning the plant anyway. So that's partially what's answering your question.

And there are just a couple of issues where there are actually more then one level of impact, but that's for specific cases. And in that case you just have to determine which situation meets your case, you know, the population percentage, or whatever.

SF-D Ms. Olson: Great. My name is Patricia Olson, and I'm with TriValley CAREs in Livermore, California. We appreciate the opportunity to provide input at the hearing, but we do support holding the hearings in reactor communities in California.

SF-D-1 We're concerned that the use of the proceeding may be used to eliminate site-specific evaluation of local concerns. And our concern is the right of local residents will be preempted from raising concerns during the license termination plan review.

SF-D-2 Now I've talked earlier with people about the scope of this hearing and to what extent the

radioactive contamination levels that are permitted to be released from regulatory control for decommissioning are being used to release radioactive materials routinely.

SF-D-3 From what I understand, this is not the case. But if that were in fact true, we would oppose any release of contaminated materials during decommissioning or other times.

I think the questions about the small, moderate, and large significant levels have already been discussed. So that's all. Thank you.

Mr. Cameron: Thank you very much, Patricia.

Dale.

Mr. Nesbitt: Okay. I had not prepared anything beforehand, so this will be ad lib. Just to add to the little background, yes, I am a mechanical engineer retired from Lawrence Berkeley Laboratory, where I had a great deal of contacts with various radioactive concerns.

In addition to that, it just happens that my oldest brother, who's 15, 16 years older than I am, is retired from the Atomic Energy Commission, where he was in charge of the radioactive waste facility at Hanford.

I have another brother who spent a good share of his career designing nuclear power plants.

Now when I finished the university I was certainly one of those that was convinced -- this was back in the '50s, early '50s -- that nuclear power was the wave of the future and indeed that would produce power so cheap we wouldn't have to meter it, and all that stuff.

Well, slowly over the years, and part of it from what I've learned from my oldest brother, I've started to learn more and more about some of the bad sides of nuclear power; and over the years became concerned of course about the nuclear weapons.

But what I want to address here, and it's a question, I don't have any doubt that on a technical level the work that's represented in this is very thorough and very conscientious. I have been responsible for similar things; I know how hard it is.

SF-C-3 But I think that there is an overall concern, which I know that this doesn't address, and that is the vulnerability of nuclear power plants to various acts of terrorists. And I don't think it should be ignored, and I think that we should be very concerned about it.

SF-C-4 Now I would be -- just as background, before September 11th, I probably felt that the SAFSTOR approach was one of the best things, to let them sit for 10, 20 years, and let the radioactive level decrease significantly before you try to disperse it.

I no longer think that. And yet I just heard, well, the licensees have 60 years to decide, and they can do anything they want. And I don't think that that's a danger that the public should put up with.

And I also feel over the years, and one of my brothers also spent a great deal -- he's retired from your facility at Hanford, and he worked on the vitrification process. And so I also know quite a bit about that.

SF-C-5 But my concern here is I don't think there's any good way to treat the long-term storage of radioactive waste. I don't think Yucca Mountain is the answer, for darn sure, for various reasons.

Also at Lawrence Berkeley Lab the group that's the Earth science group has done the study on groundwater transportation. And I know from some of my associates there that they think it is not a satisfactory location for long-term storage.

SF-C-6 But now the point I want to make, that the danger to the public from a terrorist act is a function of the total level of radiation that exists on one given site. We cannot do anything about the total level of radiation in a global sense, but through government regulations we could do something about the amount of radioactive material that is stored at any one location.

And I believe that that's where the very concerted effort of the Nuclear Regulatory Commission should be in the immediate future. And I'm not so much concerned about this document as it stands, but I am concerned about the overall global effects.

Thank you.

SF-C-7 Mr. Nesbitt: As a response to that, and whether or not it applies to this document at all, I realize it was outside of what was scoped for this particular document, I do not think it's outside of the scope of this particular document to have some regulations about the speed, let's say, of how the total amount of radiation on a given site was reduced. I think that would be perfectly within the scope of this document.

SF-B-4 Ms. Cabasso: Yeah. This is not a formal comment, but just I understand that spent fuel is dealt with in a different GEIS. And I haven't read anything except the Executive Summary of this one so far, so I am partly speaking out of ignorance.

But I think I raised this concern during the scoping. The 60-year period presumes a lot of things.

SF-B-5 And one of the things it presumes is that there's going to be a viable option for removing the spent fuel from the site. And I'm just wondering if anybody could talk a little bit about the relationship there, because I am one of many people who believe that Yucca Mountain is not a foregone conclusion, although probably that is not your view here, but there is significant opposition to it from some rather more powerful actors than us in the state of Nevada.

And, you know, I'm just wondering like what -- you know, if you can talk about that relationship, then what kinds of long-term planning is going on with the NRC in case that 60-year window doesn't work out.

Mr. Cameron: Again I guess is there something -- Mike, can you also address, I think Jackie was asking maybe some information about how this document does consider spent fuel storage, either pools or otherwise. But you heard Jackie's question to you.

Dr. Masnik: The document actually talks about long-term storage of fuel on the site. It was included in the document, even though technically it is outside the scope. And we did that because we know that there is a lot of interest in that area, obviously.

The history of this is quite interesting. When the Commission first started thinking about decommissioning, it was in the '70s. And the 1988 GEIS and the regulations that were passed in 1988 presumed at that time that spent fuel wasn't going to be a problem, and it never even addressed it.

And the presumption was there because we assumed that there would be a high-level waste repository and the high-level waste would be removed from the site actually during decommission.

Well, we all know that didn't happen. And we don't have a high-level waste repository. So what the Agency did was enact some regulations that allowed for interim storage of that spent fuel on the site.

Now the regulations allow for wet storage of the fuel in the spent fuel pool. And the Commission has come to the conclusion that that fuel can be safely stored onsite in wet storage for, I believe, 20 years additionally. Is it 30? Well, 30 years additionally. Thirty. Thirty? Okay.

Mr. Cameron: Forty plus 30.

Dr. Masnik: Yes. Additionally, the Commission enacted some regulations that allowed for dry storage of the fuel onsite. And, in fact, a number of licensees have built these dry-storage facilities, they're called ISFSIs -- it's an acronym -- but basically the fuel is placed in a canister and then placed inside of a concrete overpack and kept onsite.

It remains to be seen what will happen with Yucca Mountain. There are some other options that are being explored. There may be some interim surface storage of the fuel as well. I think you probably know about it, but it is a problem and we're wrestling with it.

Mr. Cameron: And I believe that the document does talk about the Commission's Waste Confidence Decision. And indeed if Yucca Mountain was not -- if there was no license application for it or if the license was denied, then I think the Commission would have to go back and revisit that Waste Confidence Decision.

And let's go to Steve Lewis.

Mr. Lewis: Mr. Nesbitt, let me offer an additional --

Mr. Cameron: Give us your name and --

Mr. Lewis: Steve Lewis, Office of General Counsel.

Mr. Nesbitt, let me try another sort of perspective, to try to respond to your question and maybe the questions of others, too, I think.

(Sounds of cheers from neighboring ballroom.)

Mr. Lewis: I'm sure that's not for me.

Nothing that the Commission is doing nowadays post September 11th of this year is being done in isolation. It's extremely important that we have heard your comment today.

And although it's going to fall under the framework of what we have to do with or what we decide to do with respect to this document, other people in the Agency are going to be looking at what we say in this document. And they're going to be thinking about the comments that we received on this document.

And those other people are doing a very disciplined review that Barry Zalcman referred to previously, about this top-to-bottom review of our whole regulatory regime in light of what appear to be very changed circumstances, regarding terrorist threats.

And what I would encourage you to think of is that your comment is extremely important. It's important for this document. It's also important for the Commission in general because we are embarked on a really serious and intensive attempt to try to figure out what we need to do in light of the September 11th events.

And the last thing I will say is that the direction from the Commission includes that we look at the entirety of what might need to be done, including whether or not we need to propose any legislation; whether or not we need to change our regulations in any way.

So it's conceivable that although this particular document is dealing with 5082 as it currently exists, it may well be that the kinds of comments that you have offered today and that many other people are offering to us in other forums may cause us to change our regulations in a number of respects, including possibly 5082.

Ms. Cabasso: Just a general comment which is that I want to thank the NRC and encourage the NRC to push for more openness right now with the public, as your last comment suggested, rather than less, which is what's happening with some of the other agencies.

I was on a conference call today with some people who are -- other people working on Department of Energy facilities, where we've had a real problem with a shutdown of information.

And it was pointed out that, in a number of specific cases that we can document, public input was critical in actually significantly improving public health and safety because of discrepancies that were found in documents or perspectives that were not being recognized by the agency.

So I was very encouraged by what I heard tonight here. And I just want to really encourage the NRC to fight that trend and to talk to us and solicit ideas from the public.

And maybe some of the things that we've been saying, like there shouldn't be anymore nuclear power because we don't know what to do with the waste, is becoming a more salient point now that needs to be really looked at from a fresh perspective. So thank you.

Appendix P

2. Transcript of the Public Meeting on December 6, 2001, in Chicago, Illinois

[Introduction, Mr. Cameron]
[Presentation by Mr. Scaletti]
[Presentation by Ms. Hickey]
[Questions answered by Mr. Masnik]
[Questions answered by Mr. Zalcman]

CH-A
CH-A-1

MS. MUSIKER: Sure. I'm Debbie Musiker with the Lake Michigan Federation. My question concerns the last comment that you just made about that no activities can be performed during decommissioning that would result in significant environmental impacts not previously reviewed. Would you determine this from the submission of the PSDAR? Is that how you would determine if anyone was going to do anything that wasn't previously reviewed?

Mr. Scaletti: Well, the licensee has to take a hard look at his decommissioning process as required by 5082. In there, he must look at the activities, look at the environmental impacts that had previously been established and reviewed and determine whether or not the activities are covered by those previously issued environmental impact statements. And we will, we go out following the submission of the PSDAR and do a fairly robust look-see at their records to determine whether or not we agree.

CH-A-2

Ms. Musiker: And then, once the work is performed, is there monitoring to make sure they're in compliance with the PSDAR? If they're actually acting, doing what they said they were going to do?

Mr. Masnik: Let me go back to your first question, too. I just, I want to make it clear that what happens is, oh, I'm sorry. Mike Masnik. Licensees in decommissioning actually take the plant apart. And our regulations require that if you make any changes to the plant, you have to do certain reviews. And one of those reviews, of course, we look at it, we require the licensees to look at any changes to the facilities from the standpoint of safety because that's a big concern. If they make a change in the plant, will it affect the safe operation in the facility?

But in that process, they look at a whole host of other activities. Will it change the fire protection program? Will it change, you know, quality assurance issues? It is one of those things that they look at every time they make a change in the plant, and what they have is a procedure.

And that procedure says, is this activity going to result in any impacts outside the bounds of these particular documents. So, the licensee does that check before the actual change to the facility is made.

We, the NRC, receive annually a list of those changes to the facility, and we do inspect that process by which they do this screening as we call it. So, just to amplify that it's done at that point, and then, as Dino said, when the PSDAR is submitted, we typically look behind the licensee's assertion that the plan that is proposed by the PSDAR will not result in any impacts outside the bounds of any previous evaluation. We actually send an inspector out and he looks at the materials that the licensee relied on to come to that conclusion.

Now, as far as any monitoring to determine whether or not in fact there was any impact, well, certainly from a radiological point of view, there's a lot of monitoring that goes on and that if they had missed the mark, you know, it would be determined or discovered by them. We don't require, for example, monitoring of aquatic systems, let's say. That's under state control. And what we have found is that typically, there are no offsite impacts associated with decommissioning that would affect, that would have a non-radiological effect, let's say, on fish or wildlife in the area.

That's one of the things that Eva will talk about actually. Does that answer your question? Okay.

CH-B
CH-B-1 Mr. Gaynor: Hi, I'm Paul Gaynor from the Environmental Law and Policy Center of the Midwest. My question is with regard to the site-specific issues. One of the site-specific issues is threatened, I'm sorry, aquatic and terrestrial ecology. And it says, the rationale, activities occurring beyond previously disturbed areas. And I'm wondering what the definition of a previously disturbed area is. Is there a time frame or how that is defined?

Ms. Hickey: By previously disturbed, we mean an area that's already been used on the site during operations. So, they've already plowed it, dug it up, built something on it, made a parking lot, had a building placed on it as opposed to an area that's still forested or a meadow. Does that clarify it?

Mr. Gaynor: So, it's at any time during the operation? So, if they –

Ms. Hickey: Right.

Mr. Gaynor: Had the initial 40-year license period and then a 20-year extension --

Ms. Hickey: Right.

Mr. Gaynor: Any previously disturbed area within that time frame?

Ms. Hickey: Right.

CH-A-3 Ms. Musiker: I have a follow up question. So, could you explain to me what that would mean for an intake for water for cooling at the facility. Would that, does anything happen to that intake position during decommissioning?

Ms. Hickey: That's a good question. I can't recall exactly, go ahead, Mike. You obviously –

Mr. Cameron: Okay, Mike. I'll bring this over to you.

Mr. Masnik: Michael Masnik, NRC. What we have found at most facilities is the intake and discharge structure, first of all, are structures that are not typically taken out of service for some time. They're usually kept in place for the majority of the decommissioning. The ultimate goal of the licensee will depend, will determine what will happen to that intake and discharge structure.

For example, typically, these plants become valuable industrial locations, and having an intake and discharge structure might be of value to some future use of the facility. And since it is a permanent structure, licensees probably would like to keep them if they can. As was mentioned earlier though, there are some States that require them to dispose of all structures on the property, in which case, the intake and discharge structure would be removed.

To answer your question, and that is that would be considered previously disturbed areas. Now, those kinds of activities, in-river activities of course are normally very closely watched by the coastguard and also by the state. So, there would be some oversight on those activities as well.

Ms. Hickey: Yes, there's another issue there. Sometimes the structures are not on the site. And that was one of the issues that we discussed in determining scope, is that we were looking at decommissioning the activities that actually occur on the site. And so, if those structures are outside of the site, then they're not considered in this document.

Mr. Cameron: Eva, you mentioned the term, you used the term envelope and I guess that gives me an opportunity to see if everybody understands how, if this GEIS were finalized the way it is, how a NRC licensee would use the document, particularly would use the generic impacts, how that envelope would apply to the analysis that they did. Can you give people an idea of how that works?

Ms. Hickey: Yes. Yes, if you're looking, when the licensee is beginning or before they conduct an activity, they would look at the GEIS and do an evaluation. And if all of their impacts for all of the environmental issues fall within our statement, what we state as our envelope, then they will not have to do a further analysis. They can conduct that activity. On the other hand, if they are outside of the bounds that we've identified in the document, and those are all expressed in detail in Chapter 4, that's where the detail is, then they would have to do a site-specific analysis.

Now, another point would be is if they perform an activity or if a new technology comes along that's not evaluated in this document, then they would have to do a site-specific analysis because it would be outside of the envelope that we've identified in the supplement.

CH-C Mr. Klebe: Well, first of all, on behalf of the Department of Nuclear Safety, first of all, my name is Michael Klebe. I'm with the Illinois Department of Nuclear Safety.

First of all, on behalf of the department, I'd like to welcome the Nuclear Regulatory Commission to Chicago and hope that your stay here is pleasant. And oh, by the way, since we're having a little bit of financial problems in the state, spend as much as you can so we can maximize the tax revenue that we can gain from you folks.

I will try to be brief, but for those of you that know me, that's not a strong suit. So, I will try to keep my remarks to five to ten minutes per comment.

Mr. Cameron: We're going to send out for coffee. All right.
Go ahead, Mike.

Mr. Klebe: All right. One thing really jumped out when I was reading this voluminous document that almost destroyed my printer. Under Chapter 4, Environmental Impacts, Section 4.3.8, and it's located on page 4-26, and that's of the version that I downloaded out of the Adams website rather than the one that you have. If you do it a chapter at a time, it works out much better. If you try to do it in the two block one, it just freezes up.

CH-C-1 The thing that really jumped up and disturbed me was about middle of the paragraph. It says, "All decommissioning activities were assumed to determine their potential for radiation exposures that may result in health effects to workers and the public.

This section considers the impacts to workers and the public during decommissioning activities performed up to the time of the termination of the license. And potential radiological impacts following license termination are not considered in this supplement. Such impacts are covered by the generic environmental impact statement in support of rulemaking on radiological criteria for license termination of NRC licensed nuclear facilities." NUREG-1496, NRC document dated 1997.

I don't think that you can remove the long-term radiological impacts of using entombment as a decommissioning method from this environmental impact. I understand that this document pretty much worries about, you know, what sort of problems are you going to have while you're tearing down the structures, while you're -- parking lots, buildings, whatever.

But if you're going to pursue entombment as a disposal option which according to your slide in the 1988 draft or '88 GEIS was assumed not to be a viable alternative, you really need to look beyond license termination into the long-term radiological impacts because that stuff is going to be there forever until it decays away.

CH-C-2 And depending upon what system structures and components you put into the containment building, that time period of potential radiological hazard may be relatively short, it could be really long. And so, I think this, the scope, the basic premise of these radiological impacts are understated.

CH-C-3 The scope is just inadequate.

CH-C-4 And the other, well, and also talking about that, if you take a look at the date of this NUREG-1496 being 1997, that was also in a time frame when entombment really wasn't being talked about. NRC held their first meeting on entombment as a viable reactor decommissioning option in December of 1999. So, I doubt that those long-term radiological impacts are assessed in this EIS, referenced in NUREG-1496.

CH-C-5 So, I don't think that anyone has answered that question as to what it is. So, what I see happening here is you're setting yourself up with entombment, whether it be entombment 1, entombment 2, entombment 3, 12, whatever, is you're not looking at the long-term radiological impacts to the residents of the state of Illinois or the residents of Connecticut or whatever state it may be.

Mr. Cameron: I'm going to make a suggestion. Before you guys jump in, we're going to let Michael finish his comments, so he can entirely set out his statement on the record -- If there are clarifications that the NRC has to offer, and I'm saying clarifications rather than debate, then I would appreciate it if you could provide that later. But let's let Michael finish.

CH-C-6 Mr. Klebe: So, in that regard, I don't think the long-term radiological impacts are being addressed and the scope of this document is inadequate as it relates to radiological impacts. And I realize that that could be site-specific or just generic, but I think in generic terms, that should be addressed. I mean, you have some general idea of entombment 1, what sort of nuclei inventory you may have or entombment 2, what sort of nuclei inventory you would have. And then you would be able to give some idea as to what are those impacts.

CH-C-7 Now, the other place where, and I admit that some of my comments are maybe not germane to this specific EIS, but they do relate to entombment as a decommissioning option. One of the things that your GEIS did not consider is termination of a license under entombment.

CH-C-8 Entombment is basically the isolation of contaminated reactor stuff from the environment. Now, if you, and that's just a rough estimate on a definition. But if you look at definitions of disposal, it's going to be pretty similar.

CH-C-9 Disposal is defined as isolating radioactive material or radioactive waste from the biosphere from the environment in a facility suitably designed. Now, the one thing that this did not, this GEIS did not consider is regulatory authority as to whether or not the NRC can license the disposal or in essence allow entombment as a reactor decommissioning option in agreement states because in agreement states, it's those states such as Illinois that has licensing authority over the disposal of low-level radioactive waste in the state.

CH-C-10 So, your GEIS does not consider the give and take between the federal government and the agreement states as to who really has the authority to say that yes, you can entomb a reactor. And from the state of Illinois' perspective, it's not you folks, it's us. Because what you are proposing in this GEIS as an allowable decommissioning option is the disposal of low-level radioactive waste.

It's not residual contamination as identified under Sub-part E of Part 20 because let's face it, if it was a residual contamination, it would be low activity, probably high volume there because of accident, and it would not be something that you would, some system structure or component that you'd be deliberately picking up and putting in a containment building and then grounding it in place or somehow, you know, preventing intrusion into it. So, in that regard, it's just a basic fundamental philosophy that you folks don't have the regulatory basis to allow that in agreement states, while you may in non-agreement states. You don't, at least from my perspective, our department's perspective, have that authority in Illinois.

CH-C-11 In addition, entombment could potentially, in the state of Illinois, create seven disposal facilities. And your GEIS does not address the potential conflict with other state or other federal statutes as it relates to authority of disposal of low-level radioactive waste. That being the federal low-level radioactive waste policy act of 1980 as amended in 1985 which specifically gave states the responsibility for providing for the disposal of low-level radioactive waste generator within their states.

And the kicker, the great benny that the federal government, the Congress gave to the states to do this is the ability to form regional compacts specifically to limit the number of radioactive waste disposal facilities in the country instead of every, you know, 15 states having one. The idea is there would be a couple. And what this GEIS is proposing to allow to happen, not necessarily requiring to happen but allowing to happen, is the potential to do bunches of these. Seven in the state of Illinois, if you look at the reactor stations that we have in the state.

CH-C-12 And I realize that this only relates to the nuclear power stations, but in previous NRC federal register notice, they specifically asked whether or not entombment should be allowed for non-reactors as well. So, I can see this really running far afield or far counter to the federal act. And I think, in terms of authority as it relates to those federal acts, you know, there's no talk here in this GEIS about consultation with regional compacts.

The Central Midwest Compact Commission, having a meeting here in Chicago on Saturday on how specifically, the specific authority to say where low-level radioactive waste generated within the state of Illinois will be disposed of. It can either allow it to be exported from the region to go to an out-of-state facility or it could require it to remain in-state. So, I see your GEIS as not addressing those issues in terms of, again, authority as to who can really say something can happen.

So, those are just the general ones on top of my head. I would refer you back to correspondence that we have sent you regarding entombment and the wisdom of it and how it relates to state's authority and to 10 CFR Part 20, license termination. We've, you know, sent you guys correspondence on this before. I don't think any of our comments have ever been addressed in those regards because we seem to keep asking the same questions.
But anyway, I would love to have a dialogue with you folks from the NRC and from PNNL and I would like to hear what sort of comments you have back. And let's start the discussion.

Ms. Musiker: Thank you. I'm Debbie Musiker with the Lake Michigan Federation. The Lake Michigan Federation is an environmental organization with offices in Illinois and Michigan. And our mission is to work to restore fish and wildlife habitat, conserve land and water and eliminate toxic pollution in the watershed of America's largest lake.

Mr. Gaynor: I'm Paul Gaynor from the Environmental Law and Policy Center for the Midwest, also known as ELPC. ELPC is a Midwest regional public interest environmental advocacy organization working among other things to achieve cleaner energy resources and implement sustainable energy strategies.

CH-A-4 Ms. Musiker: We want to make clear that we'd like to see the decommissioning of nuclear plants go forward and we want it to go forward in the safest, most environmentally sound manner. Because our 18 nuclear reactors on the United States side of the Great Lakes which represents almost 20 percent of the world's freshwater supply, we have taken a preliminary look at this document and we want to provide a voice for the lakes. As decommissioning plants go forward, we will be monitoring them and commenting on them as appropriate.

CH-A-5 Today, we wanted, I have three points to make on behalf of both organizations and then we had several questions as well. First, we don't believe you should allow nuclear reactor owners under safe store to store waste for 60 more years after operations cease. We think the document should narrow the parameters.

Why? Because we have many concerns, some of which relate to institutional memory. In the document, it mentions that one advantage of going forward with decontaminating and decommissioning the facility right away is that you have people on the site that know about the facility. They know how it was put together. They know how it was operated and they can better advise operations for decommissioning.

CH-A-6 Second, we're concerned about the financial viability of the companies that own these sites. During a 60-year period, the companies may go bankrupt and that may leave the sites unaccounted for. We're also worried about the uncertainty associated with the cost of disposing radioactive material later. We understand that safe store is preferred because of lower costs later, but because of Yucca Mountain and other uncertainties about disposal, we're concerned about those hanging costs. Excuse me.

CH-A-7 We're also concerned about safety. With reduced staffing as mentioned in the document, there's an increased risk of accident or the threat of attack on these sites with huge environmental and human consequences.

CH-A-8 With regard to the threat of attack, I think this relates to our second point. This document was prepared after September 11th. It doesn't, thank you so much.

The document was prepared after September 11th, but it doesn't seem to respond to September 11th. We think the document should be responsive to the events of September 11th. What is NRC going to do to make sure that facilities are protected and secure during decommissioning? Has that changed in response to the threat of terror attack? We think it should.

CH-A-9 My understanding is that releases are, if there is the possibility of release during decommissioning, then that should be something that should be accounted for especially in light of concerns of attack.

CH-A-10 Finally, considering the importance of the Great Lakes to the world and to this region, we think that the impact should be addressed specifically. It is not appropriate to lump them under a generic impact analysis.

CH-A-11 I also have a fourth issue that I have after hearing the opening talk by Dino Scaletti. The new issues that he raised as the basis for this document, the list of three, "rubblization", et cetera, to me reflect a sense that NRC is looking for ways to make it easier to finish the decommissioning process rather than thinking about ways to make it safer or more environmentally sound. And that concerns me. It seems to be driven by how we can facilitate the process, making it happen more quickly or with less cost as opposed to considering the safety issues. All of those issues relate to doing it more quickly and less costly.

CH-A-12 Those are my comments. We do have a couple of questions to you that we wanted to put on the record. And I hope, when we have an opportunity to have a conversation, they can be answered. On page 1-6 of the document, it references that, there's literature saying that materials can be stored safely for 30 years, yet safe store can go on for 60 years. And I don't understand how you can reconcile that. There may be a way but I just don't understand it from the document. There maybe a way that you can make that more clear in the document.

CH-A-13 Second, we would like to see a place in the document where you're comparing the risks, environmental risks associated with dismantling the facility immediately versus storing the material and keep putting the facility in safe store. It's referenced in the document that there are higher risks sometimes of dismantling immediately because the material is more radioactive. But it doesn't show a comparison of the risks associated with storing it versus dismantling it in the short term.

CH-A-14 That relates to our last question about safe store and that number, 60 years, and our question is what was the technical basis for establishing a 60-year period? And is it still appropriate?

Mr. Gaynor: And then, I just wanted to add one other question that I thought of while listening to Eva Hickey's presentation which is, I understand that in determining the generic EIS, you analyzed the variables at particular sites and this relates to a point that Deb made which is, a

CH-B-3 question I have is what consideration was given to the location of the facility as a variable in determining?

CH-B-4 I saw on PowerPoint, there was one of the, it was Other, and I don't know if the site location was included in as an Other in the variable. And I'd be interested in what kind of depth of analysis went into that if it was a variable that was considered.

CH-D Ms. Goodman: Hello, I'm Lynne Goodman. I'm responsible for decommissioning Detroit Edison's Fermi I facility. I am going to submit detailed comments. These comments here will be at the summary level. They'll give you a flavor of what kind of comments I have. And hopefully, that can at least give you an idea and provide some benefit.

CH-D-1 I'd like to start by saying I think this is a good beneficial effort to have this generic supplement. I think it's going to help do evaluations of the environmental consequences of what we're doing. It's going to make sure in some cases that we look at the right things and don't skip anything. I do agree with the overall conclusions of the document. And also, I agree on what should be considered generically and what is site-specific because there are some site-specific issues.

CH-D-2 My detailed comments, I'm going to have some comments on the details of my facility, Fermi I, ranging from the status of our decommissioning since we are inactive, the final act of decommissioning, what kind of fuel the plant used, the type of containment, some of our systems. We are cleaning up sodium residues. While that's not real different than other decommissioning activities, I'd like that stated in the report. It is one of the type of chemical activities and chemical hazards that are being done as part of decommissioning.

CH-D-4 And also, I'll talk about, I'll have comments on the site's size.

CH-D-5 So, other areas, oh, and one other item is there are some aspects of the regulations that are specific to light water reactors and I just think the document needs to reflect those rather than all reactors.

CH-D-6 For example, the specific formula for the decommissioning cost. Not that we don't have to have plant's decommissioning fund and have to look to the adequacy because the regulations do require that and we do that. But the formula doesn't apply to non-light water reactors.

CH-D-7 Okay, now, to take another area, I think there are some additional hazards that have to be addressed in the discussion of the hazards. Some of these are addressed, but I think there are additional hazards. I don't think these would affect the overall conclusions of the document. But I think there is more detail, and to some extent, some hazards that are not fully addressed in the document. And some of these are in the areas of occupational hazards.

There's a lot of decommissioning work that you have to be very careful about. In my position, industrial safety is actually the thing I spend the most time on. And it can be done safely, but most aspects of decommissioning involve an occupational safety issue.

CH-D-8 I think the document needs to address fires, chemical hazards, particulates, spills. And I'll provide more detailed comments in writing on how I think this needs to be addressed. But again, I don't think that affects any conclusions. I just think there are more issues that need to be addressed in the document.

CH-D-9 For the next comment, for older plants, in some cases, there are some differences in the physical configuration from what was described and assumed. An example is like there may not be active ventilation systems. That doesn't mean we aren't going to be monitoring our releases and filtering them as needed. We are just going to have to install those systems as needed to properly protect the air quality and so forth. But we may not have those systems still in process.

CH-D-10 Also, in the licensing arena, our documents may not include what has already been assumed to be in the documents for plants that recently shutdown. And in those cases, like for the environment hazards, if we don't have it already covered in the document, we're going to have to cover it in the license termination plan. So, I think what will be covered is just, it may not already be covered in the document.

CH-D-11 I have one very specific comment. And this is something in Appendix G that I wanted to put on the record. And I was very surprised to read of excess malignancies that have been experienced at doses of 10 REM. This is contrary to the health physics and radiological health handbook and other material that I've read over the more than 25 years I've spent in this industry. And I think that needs to be addressed and reevaluated.

CH-D-12 One last comment I want to make is that I recommend highly that in future efforts of this sort, the communications to get information about specific plants be with those specific plants or otherwise actions be taken to ensure that all plants are covered. I know in this case that some plants were not contacted, and other plants were contacted with very little time to respond. And I think you'd have a better document if you get everybody's input up front.

So, I do plan to submit detailed comments on the document. I really think it is a good effort. And I think it will help those of us that are decommissioning or during environmental reviews, ensure that what we are doing is covered or know that we need to cover it specifically.

Mr. Cameron: Okay. Thank you very much, Lynne, for those comments. Because I think we're probably, when we go to what I would call clarification in terms of some of the points that Michael raised might lead us into a wide-ranging discussion, why don't we see if we can provide information on the two questions that we had, that is, the 60 years? What's the technical basis for the 60 years? And if we need to go back to Debbie to clarify what the question is, we'll do that. And then, to Paul's question about how location was considered.

I'm assuming that the NRC was taking note of those questions. Can we have someone who can address the basis for the 60 years? Michael, all right.

Mr. Masnik: I can honestly say that I can't, and I don't think there is a really good explanation of how the agency arrived at 60 years. As we were talking for a few minutes before the meeting, I have heard, and I don't know if this is really the way it happened. They assumed that cesium had a half life of 40 years, and they figured a half life and a half would be a significant reduction in the facility and would make a significant difference in the occupational exposure as you dismantled it. But, you know, I've looked into this before and I really can't find a good explanation. None of the other NRC personnel here have an opinion on this.

There was one other question that you had, one other issue raised and that was on the bankruptcies. I don't know how familiar you are with our regulations, but we do have a requirement that the money be collected and placed in a secured trust. And that money is basically unreachable by the licensee. There are very strict limits as to when, for example, the licensee can access that money.

We've had a number of license transfers where the ownership of the plant has changed. That, it's been pretty clear that that fund transfers with the facility and that the losing entity no longer has any claim over that money. Yes?

Mr. Cameron: And if you could just give us your name again for the transcript?

Ms. Musiker: Sure. Sure. Debbie Musiker, Lake Michigan Federation. That makes sense to me if a facility has a full life or the expected life. But what happens to a facility that shuts down prematurely and they haven't actually collected sufficient funds for what's necessary for decommissioning and then, they go bankrupt? And that situation still poses a risk.

CH-A-15

Mr. Masnik: That is a very good question. The requirement to put aside money for decommissioning trust fund was part of regulations that were put into place in 1988. Very shortly after that, we had a series of plants that shutdown that had essentially insufficient money in their decommissioning trust fund. And it was a significant concern to the Commission.

What has happened is, in some cases, the licensee has placed, we believe, we don't know for certain, but we believe that the licensee had chosen safe store for several years or a number of years to accumulate funds in their trust fund. Fortunately, the PUC's, the state PUC's allow the collection of that money, and as a result, those funds have solidly been built up even in the plants that have permanently ceased operation shortly after 1988.

You know, as we enter the second millennium now, we've had roughly 13 years. Those funds of the remaining plants that are still operating now are, I wouldn't say fully funded, but significantly funded. And it appears that they will be funded to a level where we won't have to worry about whether or not there is sufficient money.

You know, if the money is not available, there are other remedies. We discussed this back when Three Mile Island had an accident. And ultimately, the responsibility falls on the federal government although we've never had to exercise that, so, at least not in power reactors.

Mr. Cameron: And Mike, do you want to try to answer Paul's question about location or should we turn to someone else on that? And do we need Paul to address that again, to just repeat what his question is?

Ms. Hickey: Okay. I think the question was did we use the location of the plants as one of the variables. And in fact, we did do that. We looked at location from the perspective of does it sit on a lake, on an ocean, and also from a perspective of population. So, we did in fact include location, and I guess the variabilities that location would have on the decommissioning activities. Is that adequate? Okay.

Ms. Hickey: Yes. I want to make one clarification point on one of your initial comments on entombment. And if you look at what we say is in scope in the document, we are only looking at activities that lead to termination of a license for unrestricted use. And entombment would not end up there. You would have a restricted use when you get to the point of license termination.

So, what we did is we evaluated the impacts for preparing a facility for entombment. And in fact, a site-specific analysis would need to be done at the time of license termination for entombment. So, I'd like to just make that as a clarification. I know you had a number of other issues.

Mr. Cameron: And Michael, do you want to either give us an additional comment or find out what exactly Eva meant by that?

Mr. Klebe: Mike Klebe, IDNS. I have no problem just starting up this dialogue because what you just said really perplexes the bejeebers out of me. And I'm not, for the court report, I'm not
CH-C-14 quite certain how you spell bejeebers. So, what you're saying is you're going to set something in motion, i.e., entombment in motion, you're going to allow a nuclear plant operator to take all the contaminated system structures and components, put them in a containment building as part of this GEIS and you're not concerned at what's going to happen at license termination? Because that's in essence what you just said.

Mr. Masnik: Let me back up a little bit. First of all, the 1988 GEIS didn't come to the conclusion that entombment was probably not a viable option at that time. Since that time, since 1988, there has been some interest on the part of industry and there's been some interest on the part of the staff to explore the possibility of entombment. The staff was directed by the Commission to take a look at this.

There is an additional parallel effort within the agency, and I know you're, I'm sure you're familiar with the fact that we just put out an advanced notice of proposed rulemaking on entombment, which is inviting the public to assist the staff in coming up with a possible regulation that addresses this. Now, to be honest with you, we were put in a position of looking at environmental impacts on an activity in which the Commission has really not decided what direction to go, that it should go in.

And what we decided to do was look at the environmental impacts associated with the activities related to preparing the facility for entombment, knowing full well that there would likely be future rule making that dealt with the issue of entombment and the issues of, the other issues that you raised during your presentation. So, I think what Eva was trying to say was that restricted release, which is allowed by 10 CFR Part 20 Appendix E, would require a site-specific analysis. And therefore, it could not be considered generically by this document. And therefore, we're not evaluating it. Okay.

Now, the rule making that would potentially allow for some sort of entombment would also require some environmental assessment and could likely result in an environmental impact statement that would deal with the issues that you raised, the long-term effects and the issue of whether or not the states would be involved in the process, which I assume they would be but I'm not sure how that would occur.

Mr. Klebe: Okay. Mike Klebe, IDNS. Just so I understand, so you've got, you just said that because this is going to lead to a restricted use license or release under restricted use limitations –

Mr. Masnik: Let me, we, the staff, made the assumption that it would be restricted release. You have to understand we're --

CH-C-15 Mr. Klebe: Okay. That's fine. That's fine. And you said that for that restricted release use is going to need analysis on a site by site basis. Then why are you dealing with entombment in a generic EIS? Because just by your statements, entombment is not a generic activity. It is a completely site-specific activity. Maybe I'm just not seeing the picture right but –

Mr. Cameron: Let's try to answer that.

Mr. Masnik: Again, a very good question. The way the regulations are set up, when a plant shuts down, they can begin to decommission the facility. They can do that without any specific authority by the NRC. In other words, we don't have to grant them approval to begin to dismantle the plant.

The licensee essentially can perform the majority of the decommissioning without any formal environmental review and approval which would involve an environmental assessment. Towards the end of the decommissioning, when you get close to the end of decommissioning, the licensee has to submit a license termination plan. And that license termination plan is an amendment to the license and it contains the requirement to do an environmental assessment at that point.

However, from the period of time that they permanently cease operation until the license termination plan which would be typically a couple of years before they plan to terminate the license, and that could be a seven to ten to 50-year period, there is no environmental assessment required. So, what this generic environment impact statement does, if the licensee so chooses to entomb and if the NRC has regulations in place that would allow for the entombment, it covers the period of time that the plant permanently ceases operation until the site-specific analysis is done under the license termination phase.

CH-C-16 Mr. Klebe: Mike Klebe, IDNS. Doesn't that set the utility up for a great risk exposure to go down the path of entombment and find out that 40, 50 years, whatever time frame they elect when they try to terminate their license of someone saying, no, you can't do that? I mean, because of the radiological impacts?

CH-A-16 Ms. Musiker: Because you said, Debbie Musiker, Lake Michigan Federation. You said that a licensee could go ahead and dismantle without formal approval and I thought that the licensee based on the document, the licensee had to submit the PSDAR and then there was a 30-day public process. Were you not counting that because that didn't directly relate to the question?

Mr. Cameron: And I think you were just doing some shorthand there. And besides the PSDAR, you may want to revisit the statement that Dino had on the slides about there are certain things that they have to be within a framework. Okay, if you could just give us a summary of that, Mike?

Mr. Masnik: Yes. The regulations, I'll give the summary first and then I'll answer your question on PSDAR. The regulations are very specific and they say that you cannot perform any

activities outside the scope of any previously issued environmental assessments. And that forces the licensee, as I mentioned earlier, to do this review each time they make a change to the plan.

However, the 1996 change to the regulations established the post-PSDAR as the vehicle for telling the NRC and the public what they planned to do with the facility. There is a requirement to submit a document. This document is typically 15 to 20 pages long. It talks about schedule. It talks about what they plan to do. There's some discussion on funding and there is some discussion on environmental impacts.

But that document is submitted to the NRC and it is not submitted as a licensing action. We do not review and approve it. It's given to us, and 90 days after the NRC receives that document, they then can begin major decommissioning activities, major decommissioning dismantlement activities. But there is no review and approval of that document.

One other thing I might mention, there is a license, there are things called tech specs. And periodically, during decommissioning, the licensee will change that license. Those changes to the license require licensing documents to be submitted to the NRC and it's a license amendment. And that procedure allows for an opportunity for hearing and it also requires the staff to do an assessment.

But it's only on that particular change to the license. There's no overall assessment of the plan to decommission or how they plan to decommission the plant.

CH-D-13 Ms. Goodman: Lynne Goodman. I just have one additional request, I'll put it. Within the last short period, there's a number of decommissioning related documents that have come out for review. And while I appreciate the NRC has been very busy, in addition to this GEIS supplement, the entombment proposed rule making, there's also I think, I got two documents this week regarding decommissioning cost reports and I think the cost estimate formats.

If there is any way that we could not have to get all the comments in the very short comment period, if it could be extended, I'd really appreciate it because it's going to be a very busy December for me.

3. Transcript of the Public Meeting on December 10, 2001, in Boston, Massachusetts

[Introduction, Mr. Cameron]
[Presentation by Mr. Scaletti]
[Presentation by Ms. Hickey]
[Questions answered by Mr. Masnik]

BO-A Mr. Dierker: Sure. Carl Dierker with the EPA in Boston.

I had a couple of questions on Eva's presentation.

BO-A-1 If the life cycle of the plants has the decommissioning activities out as far as 60 years, what's the scenario that might involve?

Is that a scenario such as Millstone, where you've got this facility in SAFSTOR, while the other facilities are up and running?

Or is there actually a facility that would be not running, nothing's going on at the facility, and there's no decommissioning going on for 60 years?

That seems awfully long.

Ms. Hickey: The regulations require that the decommissioning be completed within 60 years.

So, there could be a SAFSTOR period in there, and then, the final decommissioning would actually have to take place within that 60 years.

But, yeah. There's a number of plants that are shut down and that have associated operating plants with them. And they are waiting until the other units shut down before they go through their decommissioning.

BO-A-2 Mr. Dierker: But, at least, in your experience, have you seen facilities -- You haven't seen facilities where the only facility that's been operating has been shut down, and then they're just sitting there waiting.

Ms. Hickey: Yeah. There's -- There's a number of them that are just in SAFSTOR. Zion, which has just recently shut down is in SAFSTOR.

LaCrosse is in SAFSTOR.

And then, there's a number of facilities that have been shut down. And most of -- There are several that are now going through decon, so they haven't stayed in SAFSTOR up to the 60 years.
But, Rancho Seco and San Onofre were both in SAFSTOR for a period.

BO-A-3 Mr. Dierker: And just -- It seems like it's taking a substantial land mass out of sort of useful life for a long period of time.

Ms. Hickey: Right. And this is–

Mr. Dierker: For someone's generation -- Really a generation of life.

So, that's my only question.

Ms. Hickey: Yeah. There's a discussion in here on -- on some of the benefits and disadvantages of using SAFSTOR or decon.

And one of the disadvantages of SAFSTOR is, yes, that land is in -- not available for other uses.

Mr. Dierker: That makes sense in the Millstone situation, obviously.

BO-A-4 You said you had visited a number of facilities. I wondered if you'd visited any in New England, in particular, the Maine Yankee facility?

Ms. Hickey: Yes. We went to Maine Yankee. That was--

Mr. Dierker: So, you talked with some of the folks up there and got a sense of what was -- what were the issues and so on?

Ms. Hickey: Right.

Mr. Dierker: Okay. That's good.

Ms. Hickey: And we list the plants in the supplement that we visited. There is a listing there.

Mr. Dierker: Great.

BO-A-6 Now, on the findings on impacts -- issues and impacts, you have, next to the -- the impacts that you expect from these facilities, these aren't -- As I understand your slides, they're not saying

that all -- that all sites, the water -- the water use and quality and air quality and ecology are small. You're just saying the sites -- those issues that are dealt with in the generic sense are small issues.

And then, there can be site specific issues that could be small, medium or large?

Ms. Hickey: If -- Right. If they -- If they fall within the bounds of a small -- If it's generic and we say it's small, and they fall within the criteria of that, then they can be considered generic and they don't have to do any other analysis.

Mr. Dierker: Got ya. That's all the questions I have. Thanks.

BO-B Mr. Williams: Thank you. Carl Williams, I'm from Maine Yankee.

I've got a question in scope.

Clearly, NRC scoped evaluating environmental impacts associated with the radiological aspects of decommissioning.

BO-B-1 And yet, I note in the document that you also include decommissioning -- environmental impacts of decommissioning a non radioactive system such as cooling towers and discharge pipes.

I'd like to understand what criteria NRC will use to determine the acceptability of a licensee's plans in those areas.

Ms. Hickey: Okay. Let me explain. When we looked at those systems, what we did is, we said, if -- if a system was not radiologically contaminated, but was required for reactor operation, then we included those within the scope of our document in -- in assessing environmental impacts.

So, that's -- that's why you'll see some of those -- some of those systems and buildings and what not that would not -- that are not contaminated.

And so, I guess -- I think, then your question is, if NRC -- if there were impacts beyond what we described in our GEIS for those non contaminated or uncontaminated buildings or systems, what would NRC's -- what would they do if they -- if you weren't within the envelope, I guess.

Because, if you're within the envelope that we've defined, then it wouldn't be an issue.

That's a good question, I think, I will--

Mr. Cameron: Tom, do you -- Maybe you want to just elaborate a little bit on the implications of what you're talking about, and then, we can go to someone else to perhaps give us some more information?

Mr. Williams: Clearly, a decommissioning involves a lot of agencies. It involves EPA. Maine Yankee's going through a very large closure process.

It involves historic preservation commissions, Atlantic Salmon Commission. It involves everyone that you can possibly imagine that has a stake in environmental issues.

BO-B-2 The NRC scope is clearly associated with the radiological aspects of decommissioning.

So, an issue such as rubblization, that has a radiological component, this seems clearly it's within the scope of NRC's review regulation.

I do not see the removal of a cooling tower is within NRC's scope.

Mr. Cameron: Let's find out what the rationale was for including that within the scope. Mike?

Mr. Masnik: Mike Masnik, NRC.

We started this project almost three years ago. And for the first two years, this was an issue that we argued a lot, as to where do we draw the line.

Clearly, the regulations say that decommissioning involves the radiological decommissioning or decontamination of the facility.

But, to be honest with you, there was a lot of -- a lot of interest on the part of the public and other federal agencies to go beyond just those systems that are radiologically contaminated.

You know, where do you draw the line? And that's a good question.

We chose to draw the line at -- at those systems necessary for the safe operation of the facility.

But, for example, the training facility, or an administrative facility that's on the site, would -- would -- we decided would be outside the bounds of this analysis.

When a plant is licensed, non radiological issues are -- are evaluated. And it seemed reasonable that at this -- at this point, that those particular impacts also be evaluated.

That's -- That's how we got to that -- that decision.

Now, we have made some predictions on things like noise and -- and dust. And -- And we established an envelope.

Mr. Dierker: Good evening. My name is Carl Dierker. I'm regional counsel at the Boston office of EPA, or New England office of EPA.

I've a brief statement to read today.

I would like to start by thanking the Nuclear Regulatory Commission for coming to New England, a region that is in the forefront of commercial nuclear power plant decommissioning, to give interested stakeholders here an opportunity to comment in person on its Draft Supplement 1 to the generic environmental impact statement on decommissioning in nuclear facilities.

As an aside, I'm a little disappointed we don't have a better turn out for you all here. We certainly have a lot of people interested in this issue.

And I'm disappointed we haven't had more people.

As you know, four nuclear power plants presently are in various stages of decommissioning and dismantling. Maine Yankee, Connecticut Yankee, Yankee Rowe in Massachusetts and Millstone Unit 1 in Connecticut.

EPA New England has been following the decommissioning process at each of these facilities closely in order to ensure that the cleanups at these four sites are comprehensive and integrated to the maximum extent possible in order to leave these sites available for safe -- for safe reuse far into the future.

Congress has given EPA an independent role in reviewing other federal agencies' compliance with the National Environmental Policy Act. And we at EPA's New England Regional Office take this role seriously.

EPA has four primary responsibilities with regard to NEPA. One, providing advice to federal agencies that are developing NEPA documents. Two, advocating for early and substantive opportunities for public involvement in the development of these documents.

Three, evaluating the adequacy of federal agencies' environmental reviews which are the basis of these NEPA documents.

And four, recommending whether projects undergoing environmental review should be modified or mitigated based on projected environmental impacts.

Where EPA finds that a proposed action is unsatisfactory from the standpoint of public health or welfare or environmental quality, the Environmental Protection Agency administrator has the responsibility to refer the matter to the President's Council on Environmental Quality for resolution.

EPA, and a variety of stakeholders agree with the NRC that the GEIS for decommissioning that was published in 1988 needs to be revised and updated.

That was one of our -- one of the primary concerns we raised when we first got involved in the NRC decommissioning process in New England back in January of 1999.

EPA applauds NRC's initiative in preparing Draft Supplement Number 1 and issuing it for public comment.

Moreover, we generally support the approach NRC has taken in this draft document of analyzing environmental impacts and determining which can be reviewed generically for all decommissioned facilities, and which require site specific review.

In conjunction with EPA headquarters in Washington, we are currently reviewing the draft supplement and we'll be providing specific comments on NRC analysis and suggesting where additional discussion or clarification may be needed.

EPA looks forward to working with NRC as it continues to develop this important document.

We believe that early and thorough public participation is critical to reaching the best solution in environmentally complex issues. Solutions that will have credibility with and maintain support from the affected communities.

This meeting, and the opportunity for public -- for the public to submit written comments on the draft supplement by December 31st, are significant parts of the public outreach and participation process that should be ongoing at every decommissioning facility.

Thank you again for coming to New England and providing a forum for comments for our citizens, who will be extensively involved and affected by the decommissioning process in the months and years ahead.

Thank you.

Appendix P

4. Transcript of the Public Meeting on December 12, 2001, in Atlanta, Georgia

[Introduction, Mr. Cameron]
[Presentation by Mr. Scaletti]
[Presentation by Ms. Hickey]
[Questions answered by Mr. Masnik]
[Questions answered by Mr. Zalcman]
[Questions answered by Mr. Lewis]
[Questions answered by Mr. Neitzel]

AT-E Mr. Genoa: Thank you. Paul Genoa with the Nuclear Energy Institute.

At one point, Dino, you mentioned that the scope was to include three new areas. You mentioned rubblization, entombment and partial site release. The entombment is clearly identified as a section in the report. Could you direct us towards the part of the report that would deal with rubblization or partial site release?

Mr. Scaletti: Rubblization in general is considered from the standpoint of disposing of clean material on site and the leachability of that material, et cetera and that's covered in every section of the report.

Mr. Cameron: Mike, do you want to offer something on this?

Mr. Masnik: I can give you a page number for the first one, and that's rubblization.

Name is Mike Masnik.

On page 1-7, lines 20 through 33, it talks about rubblization.

Mr. Masnik: Mike Masnik again.

For partial site release, the Commission just recently issued a draft rule for comment on the proposal to release portions of the site prior to approval of the license termination plan. That's out for comment at this time.

Additionally, recently the Commission also issued an advance notice of proposed rulemaking for entombment and that also is a solicitation for public comment.

Mr. Scaletti: Partial site release is talked about on 2-7.

Ms. Zeller: I'm Janet Zeller, Blue Ridge Environmental Defense League. I'd like to know what issues or areas of concern or specific information the NRC would evaluate in determining additional rulemakings, whether they are needed.

Mr. Scaletti: Well, this document -- right now, the one rulemaking activity we have going on is -- the notice of advance rulemaking is entombment.

Ms. Zeller: Right.

Mr. Scaletti: Now we did evaluate a range of entombment options at both ends of the spectrum. And there's information in there that could be used for the entombment rulemaking. I expect there'll be a lot more done but certainly this would go to support it if it was necessary.

Ms. Zeller: Okay, and are there other possible areas of new information that could be presented in this process by the industry or the public that would result in additional rulemakings, other than those now underway?

Mr. Scaletti: I'm not sure. Would you like to address that, Barry?

Mr. Zalcman: Good evening. My name is Barry Zalcman, I'm also with the Office of Nuclear Reactor Regulation.

I try and characterize our regulations as always being interim regulations in that we try to perfect them all the time. There are experiences that we get through plants and operation as plants go into decommissioning and events that occur and obviously the events of September 11 have a bearing on this as well.

So the agency is always receptive to interest on the part of the public in the way we should shape our rules. There's a mechanism allowing the public to participate that way. But let me at least provide you some insight that certainly in the case of security, the Commission has already directed the staff to do a top down review of security issues, not only in plants that have been permanently shut down but also for operating nuclear power plants as well.

So that's a fertile area, it's likely to be changed in the years to come. The agency has taken additional actions as well in the interim, but certainly we're talking about entombment, there's an initiative underway of the partial site release rule. You can expect that there would be changes in the security arena as well. The key is we can't forecast where all those changes are going to be, but we have an organic set of regulations in that we attempt to improve them as we have more and more experience, engaging the stakeholders, and that's the public and the industry and licensees, throughout that process.

AT-A Ms. Barczak: Sara Barczak with Georgians for Clean Energy.

AT-A-1 I had a question on the difference between the 1988 -- or one of the differences between the 1988 version and this supplement. The scope of facilities that are being addressed is much smaller, it's mainly just nuclear power reactors and I wanted to know for all the other facilities that were referenced in the '88 document and some of those included like the MOX facilities. How will those be addressed, are they going to be addressed in a different type of document down the road or -- I'm just asking along those lines.

Mr. Scaletti: The 1988 EIS is still intact with the exception of nuclear power plants, all of the information in there is still valid. We have excerpted all of the information and we have repeated it if necessary so that the supplement is a standalone supplement.

As far as the timing and the necessity to revise the other portions of NUREG-0586, if someone else can address that, certainly not me.

AT-B Ms. Zeller: Okay. Janet Zeller, Blue Ridge Environmental Defense League.

AT-B-1 Okay, we searched the document to determine what the actual acceptable risk is to the public for the activities addressed in your process. And what we determined is that it's a pretty wide range, from three to 21 person rems.

AT-B-2 Can you explain what the differences are between the actual impacts on a population of say 10,000 for the two options of non-restricted use and restricted use at the end of the decommissioning?

Ms. Hickey: Well, let me see if I can repeat it back so I make sure I understand. You're looking at the variability that we've shown in the dose to the public from the decommissioning activities and so your question is what -- why is there that variability? And then you had a question related to restricted release and unrestricted release.

Ms. Zeller: Okay, yeah. What is the absolute level of acceptable risk -- and I know it ranges in the experiences that the NRC has had at different decommissioned power plants. And so there were different doses identified at different plant locations and I know some of the variables that went into that.

What is the absolute level of acceptable risk that NRC will allow for decommissioning activity in general -- that's number one. And number two is what are the two levels of acceptable risk for the two options of leaving the site -- leaving the site really clean, which is unrestricted use, or leaving the site restricted.

Ms. Hickey: Okay, I think I understand.

The first question is related to the actual time when decommissioning is occurring, and what we did, we looked at the collective dose to the public during the time of decommissioning and we found -- what we did is we compared it with the dose to the public during operation. And we found that for the most part, that dose was lower than during operation. There may be some activities, some times when the releases would be similar to operation, but the plant must meet the regulations for release of effluents the same as an operating plant. And so that's why we compared it to those of the operating plant.

Now, the second question is related to actual license termination and our document only looked at -- we only considered in scope license termination for unrestricted release. If the licensee goes in for a restricted release, then that would require a site-specific evaluation.

For an unrestricted release, the criteria is 25 millirem per year. So for the --

(Inaudible question from Ms. Zeller.)

AT-B-3 Mr. Cameron: The question was 25 millirems where?

Ms. Hickey: Okay. Maybe the best way to do that is to read what it actually says in the requirements and then I can try to explain it, if I need to.

"Unrestricted use means that there are no NRC-imposed restrictions on how the site may be used. The licensee is free to continue to dismantle any" -- okay, let me go down to this --

"The Commission has established a 25 milliservert (ph) per year, which is 25 millirem per year total effective dose equivalent to an average member of the critical group as an acceptable criterion for release of any site for unrestricted use."

And I won't describe exactly what the critical group is, but that's described in here. So that means in one year there is a group, an individual that would be outside of that reactor site and they would have to receive less than 25 millirem per year. That's total effective dose equivalent. So for the entire year, on site -- I'm sorry, on site -- so for the entire year, somebody located on site could not receive more than 25 millirem per year.

AT-B-4 Ms. Zeller: Okay, so who's responsible then for a site that has restricted use? Because I couldn't quite tell. Who would actually protect the public?

Ms. Hickey: -- if I can just tell you that those descriptions are on page 2-5 and 2-6 of the supplement and that's directly out of the regulation, 10 CFR Part 20.

Steve.

Mr. Lewis: Steve Lewis, Office of General Counsel at the NRC.

The major comment I wanted to offer was that the question of who will be responsible for a restricted release, which I think was the most recent question you posed as a question, the answer to which you are not going to find in this document. This document didn't address it. It's really NUREG-1496, a 1997 document, which was the basis for the license termination rule that addresses those types of issues.

As far as the particular numerical requirements that go along with restricted release, I think they are as set forth. Eva pointed to you where in the document those are specifically laid out.

AT-C Mr. Martin: My name is Ed Martin, I'm a lawyer in Atlanta. I have represented or worked with people concerned about facilities for most of the past 30 years, off and on for the past 30 years. And I'm always concerned in these processes about where the public ends up.

The very first question I ever had about NRC operations was in the licensing of the Vogtle Nuclear Plant when the public comment -- or public hearing was scheduled, and of course, that plant is near Augusta, Georgia, the nearest major city. The public hearing was scheduled in Atlanta on the weekend of the Masters golf tournament. We had to get Senator Talmadge's
AT-C-1 office to move that back. And I think my concern is always to what extent a generic statement like this takes particular issues that are local out of the local decision-making process, out of the public hearing that has to be had for -- or we were originally led to believe has to be had for each of these.

AT-C-4 A lot of my work has been based on concern about the cost of these facilities relative to the amount of electricity or other benefits they provide on a life cycle basis, and that seems to be something that's a subtext of this statement.

AT-C-2 I think going back 25-30 years, the notion was well, we're going to build these things, we're going to run them and then we're going to cover them up in concrete and post guards around them and they'll be safe. Well, now we have rubblization. Suddenly entombment was the floor, now it's become the ceiling, we won't see it because it's too expensive. Money moves too fast and, you know, how can we do it cheap, how can we do it quick.

And of course, our concern is, you know, it may be quick and cheap for the licensee, but for people in the immediate area, people downstream, people on the Savannah River, on the Altamaha River, my concern is that they not be unduly saddled with costs that should be taken into account and that those local concerns be maintained in this process.

AT-C-5 Let me just see, I had -- I think the one other question I had was as I recall when the first statement was issued, there was a discrepancy between the NRC radiation exposure floor, threshold level, and the EPA level. Is that still out there? I think yours is 25, theirs is 4 to 15 or something for the same exposure.

Mr. Cameron: Do you have anything else that you want to add before we sort of just close on your formal comment and then we'll see if we can answer that question?

AT-C-6 Mr. Martin: Okay. Yeah, that was just a question I had. No, I think my main issue is just, you know, having the costs on the table and having the costs be understood, because I think for me there's a moment I go back to in the late 1970s in a proceeding before the Georgia Public Service Commission around the Georgia Power rate hike and this is prior to the Vogtle plant or anything else coming on line.

The power company presented a decommissioning report by the Bechtel Corporation, which was a consultant of theirs, that estimated that the cost to decommission a plant was going to be $270 billion in then current dollars. And of course, that was, you know, 30 years, 50 years down the road. So we're talking about dollars that are worth less than dollars in 1978 or whenever that was. And my number was always -- my benchmark number was always that the supply of money in circulation in the United States at that time was $360 billion.

And I think there's got to be some explicit discussion of those sorts of economic issues, and it
AT-C-3 seems like they're not really out there. You know, I think if people thought we're going to be rubblized and have a waste dump out there, they might not have been so welcoming to these facilities.

Thank you.

Mr. Masnik: Yes. It has been a controversy for a number of years now. The EPA has proposed 15 millirem per year and we've proposed 25 -- actually not proposed, but our regulations state 25. We're still working with EPA to try to resolve the differences. We've had a number of facilities that have agreed to clean up to a lower standard and in fact, what we find is that for those plants that are nearing the end of the clean up, they're not really near any of those numbers, they're much lower than even the EPA numbers.

So hopefully in the not too distant future, we'll resolve the disagreement between the two agencies, but meanwhile, the industry is working towards a number that's actually below that.

Can I just quickly address one or two other comments that he had? Or do you want --

Mr. Cameron: Well, since Ed does have to leave, I think the one comment that everybody would probably like to -- I mean Ed's comment was basically how does the locality, how does the community around the facility participate in decommissioning, how do such questions as cost get considered. I don't want to go into a big long thing now, but Mike, if you could just talk about how that happens and just reiterate the fact that this Generic Environmental Impact Statement, although it is important, is only just one piece of the decommissioning process.

Mike.

Mr. Masnik: Our Regulations 50.75 require licensees to put a certain amount of money aside. That trust fund that the money is put into. Licensees are required, on an every two year basis, to notify the NRC the status of that trust fund.

At the time the plant permanently ceases operation, the licensee has two years to prepare a PSDAR, post-shutdown decommissioning activities report, and that requires a certain amount of information. It provides for notification to the public and the NRC of what the licensee plans to do with the decommissioning. It provides a schedule. It also requires a licensee to take a hard look at costs and also environmental impact. So that's another period of time.

Now when a plant ceases operation, what we have done in the past, about two or three months after the plant permanently ceases operation, we do have a public meeting in the area to kind of tell the public what the process is. At the time that the PSDAR is submitted, typically two years after shutdown, we also have another public meeting where we discuss this.

There is a requirement -- in fact, we're just recently publishing or have published some new regulatory guides on cost estimates and what kind of cost data the licensee has to submit to the NRC. So if you're interested, we could get you those. But that would give you some more detailed information on cost.

Your number of $270 billion mystifies me. I think you might have been off by a factor of 1000 on that. What we're finding is the numbers can vary anywhere from $250 to $400 million but we have to be very careful when we talk about cost because we're only concerned about radiological decommissioning costs, okay, what it costs to clean up the radiological hazard.

Very often, licensees lump fuel management costs in there, they lump costs associated with regulations required by the local community or the state. Green field costs to return the site to its pristine condition can add significant amounts of money to that.

So whenever anybody gives you a cost number, be sure you ask what exactly does that entail. But like I said, about $250 to $400 million, and it looks like most of the licensees are going to be, you know, within that range. And I think we even discuss that some in the document as well.

Ms. Barczak: I don't have a Power Point presentation. Can you hear me with this, because I didn't think it was amplifying before. Is this better? Okay.

My name is Sara Barczak and I'm the Safe Energy Director for Georgians for Clean Energy in our Savannah field office. We also have an office here in Atlanta. Georgians for Clean Energy is a non-profit conservation and energy consumer organization. We are statewide with members throughout Georgia and have focused on energy and nuclear concerns for about 18 years.

AT-A-2 I would like to start out by addressing the process and how it limits the ability for the public to effectively participate in this and other nuclear-related issues that impact Georgia communities. The technical nature of the issues and an ongoing resistance by nuclear regulators to share accurate information about nuclear threats has always made it difficult for the public to be involved in decision-making involving nuclear energy issues.

AT-A-3 But after the tragic events of September 11, this problem has escalated to a point where our organization believes it is highly irresponsible of our federal government to go forward with making crucial decisions that will affect generations and generations to come. The NRC's website, as many of you know, was not available for a time and is currently severely scaled back, making public access to important background information very difficult or impossible.

I have spoken with representatives of the U.S. Nuclear Regulatory Commission and they have echoed some of my concerns as they too have difficulty gaining information on nuclear industry activity. If people like myself who have the ability to research these issues on a full time basis along with staff members of the regulatory agencies are having a hard time, imagine the fate of a concerned citizen who has limited time to devote.

And I think all of us in this room know what I'm talking about, and it's a very real concern, it's very valid. And regardless of how much I try to get fishermen to use the ADAMS website down on the Altamaha, they are not going to do it. So this is a real, real problem that we're all dealing with right now.

AT-A-5 Moreover, the NRC's public notice, as an example, that went out on November 2 of this meeting, contained an inaccurate link to the public electronic reading room. I tried to access it and it didn't work, and fortunately I got ahold of Andy Kugler who works on the Hatch relicensing issues, and he gave me a current one.

Well, for a lot of people that got that link, that's all they'll do, they'll go to that link and it doesn't work and they think they don't know how to use their computer and then they just go home. So again, the accuracy of information that's going out right now, we have to be very aware of when there are mistakes made.

For citizens concerned about issues at Plant Hatch in south Georgia, unless they have a hard copy of the relicensing documents, it is difficult for them to look up concerns that would be relevant to today's meeting because those relicensing documents are no longer available on line. We did have a link to it on our website, but you know, we all know it's not working.

So folks that addressed me from the Darien, Brunswick, Baxley area that wanted to come to the meeting wanted to look at those notes. And you know, I can cut and paste what I wrote up and other things, but once again, you know, to keep people interested like that, they're not going to jump through hoops like that and none of us really should expect them to because we know how boring -- some of you are glazing over right now -- these meetings can sometimes be.

AT-A-6 Therefore, we feel it is important to both extend the public comment period until these documents can be made readily available.

AT-A-7 Also, it is essential to provide more meeting locations to gather public comments.

Four locations is not enough, given that we have nuclear reactors that will eventually be decommissioned in many states and the public, as I've said, has had difficulty accessing the information. We don't even have any nuclear reactors in Atlanta and nobody wants to come to Atlanta -- I don't want to come to Atlanta.

I like Savannah. It's a long drive and yet I'm doing this full time and 60 some years from now when Plant Hatch finally gets decommissioned, I'm going to be retired but I'm still going to be hobbling up to these meetings because I'm dedicated and I'm very concerned about it.

But I think we do need to extend the public comment period to address the inability of getting the information easily, and have more meetings. And I know that's a burden on the NRC staff because not a lot of people show up, but there are some very good comments that come out of these meetings and they're important.

AT-A-8 Georgians for Clean Energy promotes the shutdown of our unsafe nuclear power plants here in Georgia and the phase out of nuclear power nationwide.

AT-A-9 We also advocate for sound, systematic policymaking regarding decommissioning.

AT-A-10 Since many nuclear contaminants are extremely long-lived and dangerous to humans and the environment, decommissioning measures need to be handled most carefully, as our future generations literally will depend on how well the job is done today.

AT-A-11 The notion presented by industry and others that decommissioning is inherently safe because the plant is no longer operating is a deceptive argument that confuses the public. Due to the nature of radiation, even after shutdown, parts of the plant, as we know, remain highly contaminated and extremely radioactive. The nuclear waste, such as the spent fuel produced by the plant during operation generates heat and emits radiation for thousands of years after the plant is shut down. Therefore, there is risk to the workers at the plant and to the local communities during decommissioning.

AT-A-12 Getting onto a brief comment on security, as many things are being reviewed in light of September 11, the decommissioning of nuclear reactors should be no exception. From what I've heard today, it sounds like there will be some sort of analysis of security issues and I hope that's directly relating to this decommissioning document. As we know, the draft EIS is grossly deficient in ensuring that security measures are taken to protect our homeland security from threats of sabotage at a nuclear plant. Georgians for Clean Energy request that a thorough amended review of necessary security measures be compiled by the NRC and added to the supplement.

AT-A-13 Again, this highlights the need for an extended comment period and careful analysis of this issue. For instance, I'm sure there are a number of nuclear security organizations worldwide that perhaps this draft and others within the NRC could be opened up to get their comments and maybe their suggestions of what they're doing in other countries or whatever, because we're looking at a global assault now, not just one person down in south Georgia acting like a weirdo.

AT-A-14 It is now abundantly clear that nuclear materials are desired by terrorist organizations. Not only are our operating nuclear power plants terrorist targets but so too is the nuclear waste they generate. Since a decommissioned nuclear power plant would have a greatly reduced security force, the closed plant could provide an easier opportunity for terrorists to obtain nuclear material.

AT-A-15 In the case of plants like Hatch, that have outdoor storage of nuclear waste, the notion of a reduced security force is even more troubling.

AT-A-16 And I probably have a question in there because I wasn't sure, reading through the document itself, where, like the outdoor storage facilities at Plant Hatch and elsewhere -- how they are dealt with after the plant itself is decommissioned and if the license is terminated. I'm not sure how that works and who's responsible and I would like more clarification on that. So maybe I can get some of these cards afterwards.

And then getting to the site-specific concerns, and I didn't ask questions during Ms. Hickey's forum because I can't even formulate them because I'm so confused by that section.

AT-A-17 Georgians for Clean Energy does not believe that a Generic Environmental Impact Statement regarding decommissioning of nuclear facilities is a sufficient tool for evaluating impacts borne to specific environments from decommissioning a nuclear power plant.

AT-A-18 We disagree with the process -- and it happened during the Hatch relicensing too -- the process of using the significance levels of small, moderate and large for a variety of issues at a variety of locations, to come up with a generic one-word answer. The classifications are generic in form, hard to understand and even though it's small, moderate and large which sounds easy, I fundamentally have a hard time explaining that.

Crabbing season is listed, you know, as a small concern because it's a small aquatic problem. I can't even say that clearly because it's just very confusing; therefore, it is difficult to figure out how the NRC came to those characterizations.

AT-A-19 We disagree with the NRC conclusion that most of the environmental issues they addressed are deemed as quote, generic and small for all plants, regardless of the activities and identified variables, end quote.

AT-A-20 I would enjoy hearing the response to that statement from fishermen downstream of Plant Hatch on the Altamaha or Plant Vogtle on the Savannah. Once again, that's where having other meetings outside of the area could gather some useful information that may have been missed and maybe site specific that wasn't addressed earlier.

AT-A-21 As we saw in Eva's presentation, at least two site-specific environmental issues were identified, threatened and endangered species and environmental justice, with four other issues listed as quote, conditionally site specific. That is ludicrous.

AT-A-22 We request that licensees undergoing or planning decommissioning require a new environmental assessment. This will become more clear as I go on.

AT-A-23 It is not acceptable to give the option of using recent environmental assessments. What is the definition of recent? For instance, data from the 1970s on several fish and seafood species was originally used in the EIS for Plant Hatch relicensing.

Though newer data later emerged because of Fish and Wildlife Service and other people raising a bunch of concerns, we finally got new information. I don't have any safeguard that Plant Hatch won't use studies from the 1970s or from the year 2000 on the endangered species such as the shortnose sturgeon when they begin decommissioning decades from now.

So I would like a definition of what is recent and if we're talking about endangered and threatened species, that list is going to change when a lot of these power plants actually go through decommissioning because species are being put on and taken off those lists all the time. So what is recent? I would request, our organization requests, that they always have a recent, a new, like that year that they decide to decommission, an environmental assessment.

AT-A-24 Additionally each nuclear power plant has a different historical performance record that may have impacted the surrounding environment in ways that are unique to the facility. What makes it acceptable to ignore these operating histories when decommissioning?

AT-A-25 Furthermore, some nuclear plants, like Hatch, have overflowing volumes of nuclear waste that are now being stored outdoors which impacts the environment and could affect decommissioning.

AT-A-26 Likewise, there is no experience in decommissioning nuclear reactors that have operated beyond the original 40-year license period. Again, Plant Hatch may pose a unique example if the aging plant is relicensed.

AT-A-27 The degradation that will occur due to the constant bombardment of radiation could affect how the plant is dismantled and how the radiation exposures will be for workers and could easily add new accident scenarios. For instance, Plant Hatch has a cracked core shroud, and I know other plants do, too. But I don't know -- that's question, I guess, have any of those been dismantled? How will that deficiency affect decommissioning?

These factors, among others, must be incorporated in addressing the decommissioning of individual facilities.

Ed Martin touched on economic concerns and we have some similar and a couple different
AT-A-29 from his. Georgians for Clean Energy requests that all decommissioning costs be borne by the parent company of the licensee in perpetuity. The parent company should not be allowed to recoup the cost of decommissioning from the ratepayer or federal government through the taxpayer.

Ratepayers and taxpayers in Georgia have already had to pay far beyond their share of promised cheap nuclear power that has brought one of the largest rate hikes in the history of Georgia. Furthermore, private landowners, whether residential or commercial, farms, federal, state, county, city, community properties or others should not be responsible for the costs of monitoring, containment or clean-up.

AT-A-30 Georgians for Clean Energy is also concerned about economic impacts to the local communities associated with decommissioning. Currently, according to the NRC relicensing documents on Hatch, Appling County, where the plant is located, receives an unhealthy 68 percent of its tax revenue from Southern Nuclear. Provisions for environmental staff and maintenance staff be established in perpetuity and all costs be borne by the parent company of the licensee.

The local community should not have to shoulder these costs. In the case of Appling County, after they lose their tax base, they would not even be able to remotely afford any type of monitoring. Again, it is apparent that communities are left dealing with tremendous problems and little or no resources to address them properly. Quite a reward for being loyal to the company.

AT-A-31 Regarding economics, the NRC needs to pay attention to decommissioning costs proposed by Georgia nuclear utilities during rate cases and other proceedings so there is not a situation created where much needed monitoring and maintenance is ignored simply because there was no regulatory attention to the real cost of decommissioning.

I'm finishing up. My apologies for taking more than five minutes.

On the environmental side, we have several concerns with the environmental impact section of
AT-A-32 the draft. Again, we feel that a site-specific analysis must be done for each individual nuclear plant. This includes the area of the site itself, along with downstream and downwind regions and all areas within the ingestion radius of the facility.

AT-A-33 There are right now already elevated levels of some radioactive contaminants nearly 100 miles downstream of Plant Hatch and Plant Vogtle.

AT-A-34 It is hard to believe that decommissioning activities will have a small impact on water quality or air quality. Construction and demolition sites across Georgia, most of which do not have nuclear contaminants fortunately, contribute to the degradation of our rivers and air. How can an enormous project such as decommissioning an entire nuclear plant, which will involve the handling of nuclear contaminated materials have a small impact?

AT-A-35 We request a copy of the analysis that was done to make this determination.

AT-A-36 Additionally, a thorough analysis of groundwater impacts seems lacking. Given Georgia's current concern over the Floridian aquifer, it is again hard to believe that something fundamental to life , water, is being analyzed generically. Future generations will depend on the resources that we are polluting today.

AT-A-37 We adamantly disagree with the possibility of rubblization as a method of decommissioning. Chopping up a plant and storing it on site not only sounds ridiculous, but also is grossly negligent of the fact that there are facilities designed, built and licensed to handle radioactive materials.

Georgians for Clean Energy does not promote the idea of shipping nuclear waste to other people's backyards, but recognizes that although organizations critical of nuclear power often forewarned local communities of these potential dangers, plant owners never told communities near nuclear plants that they were also accepting a permanent nuclear waste dump. Rubblization is an egregious assault on the public participation process and a devious example of corporations casting aside those communities that supported them over the years.

AT-A-38 Georgians for Clean Energy also opposes any efforts by the nuclear industry or licensee of a decommissioning nuclear plant to "recycle" -- and I use that in quotes -- radioactive materials for release into the marketplace. It is appalling that there may be an option for companies involved in a technology that can cause its own facilities to become radioactive, to financially benefit from selling the hot garbage to unsuspecting citizens in the form of daily household products.

AT-A-39 Under health and safety. The nuclear facility's land, even after decommissioning, must not be allowed to revert to public or private use, even if the NRC believes that the radioactivity on the land is less than 25 millirems per year. Additionally, in no circumstances should future buildings, structures, etc. be built atop the former nuclear site.

The draft GEIS mentions that tourism activities are planned for the Trojan nuclear plant in Oregon after decommissioning. Under no circumstances should that be allowed at any of these sites. Bringing tourists or school groups to nuclear plants that are running now is not

acceptable. It's dangerous. I was just in Oregon for my honeymoon, and I just can't imagine going and touring that site. There are a lot of beautiful things in Oregon but the Trojan plant ain't one of them.

AT-A-40 Ms. Barczak: As we have stated in earlier comments, adequate attention to issues surrounding economic justice and the long-term negative economic implications of decommissioning plans in the community have not been thoroughly studied. Reactor sites are often contaminated and made undesirable and unsafe for future economic development.

AT-A-41 And again, we feel that site-specific studies should be conducted. The economy of rural Georgia is much different from that of urban New York.

AT-A-42 In conclusion, as we have stated earlier, the methods used to decommission a nuclear plant will affect not only the communities of today but also the livelihood of future generations.

AT-A-43 The nuclear industry is leaving humankind a legacy of devastation, epitomized by its long-lived and highly dangerous nuclear waste.

They are unable to solve their waste problem and now, when faced with the eventual shutdown of their plants, are unwilling to take measures to ensure that the public is protected.

AT-A-44 The NRC is charged to protect the quality of the human environment and we ask that they can -- that they do all they can to uphold that charge. The current draft GEIS is not protective and needs major improvement.

AT-A-45 We again stress system need for site-specific EIS studies on decommissioning for nuclear power reactors. Our communities, from the people to the waterways, are unique and entitled to nothing less.

Thank you very much.

AT-D Ms. Kushner: Thank you.

My name is Adele Kushner and I'm with Action for a Clean Environment, which is a group located in northeast Georgia -- very rural northeast Georgia. But all of our members live about 50 miles from the Oconee plant, so we're specifically interested in what's going on.

I'm not really prepared for this. Our group deals with so many issues, air quality problems from asphalt plants and feed mills and anything else that comes up. Also, I haven't even read that big fat supplement. So I'm just speaking in response to what I have learned, and the more I learn, I think the worse it gets. I would love to have a copy of Sara's comments because she hit on a whole lot of stuff that I would like to know more about.

What I do know, I learned from someone who lives and works near the Yankee Rowe plant in Massachusetts and told a group of us what happened when it was decommissioned and cut apart. You know, closed down and cut apart. She said the whole process was just horrendous.
AT-D-1 The cost is one thing. It was awful, very high cost, up in the millions. I don't remember how
AT-D-5 much. But things that shouldn't have been done did happen and things -- you know, when they were washing some of the surfaces to prepare for cutting apart and shipping the washwater -- I've spoken about this to some of the people already. It just went into the ground. It was supposed to be contained and it wasn't. And other things like that that happened that were not supposed to happen, but they do happen.

I don't know if it was the supervision, or the plan, or whatever it was. I understand this was after 1991 when there had been experience with some decommissioning. It was -- it was poorly
AT-D-2 done. There was danger to the workers. The workers were not prepared. They didn't -- whatever the -- the moonsuits they were supposed to wear or something, they often didn't. And it was -- I mean it's dangerous.

AT-D-6 This is a very dangerous material and the danger lasts for such a long time. If you're going to cut apart a plant and pack it and ship it, everybody along the route is exposed to the danger
AT-D-7 and whatever is left is an exposure to the people who still live there. You talk about burying it somewhere, well everybody is in danger when you do this kind of thing. So it doesn't make any
AT-D-9 sense to me to ship things off to someplace else. You need to keep it where it is and somehow seal it off, and then you have to monitor it for years and years and years because none of this goes away. So the whole process just seems like it's fraught with difficulty.

AT-D-3 Generic things sound good, but each plant is different. I was originally thinking well, they are all kind of the same system, so it wouldn't matter, they are on the same principle, but they're not. I mean, there are differences.

AT-D-8 The Oconee plant, which I'm near, which we've gone to visit, it scares me. I mean the reactors look like they're really solid. One thing they're going to do is cut into the wall to take -- to change the steam generator. They're only going to put it back and somehow -- is it going to be
AT-D-4 as strong as it was before? The excess storage -- I mean the storage in pools, but there's a whole lot setting out in dry casks very vulnerable to whatever comes along; whatever happens. I mean the whole thing is just -- I don't know how in the world they're going to deal with it.

AT-D-10 I'm now concerned about the costs, about all the broken promises, because these all sound -- all these systems sound so good. But I can remember -- I'm old enough to remember when this was going to be clean, safe and cheap. Electricity was going to be too cheap to meter. That sticks with me. And we know that it's as expensive as anything possibly could be when you consider the whole -- the whole cycle from the mining of the uranium to what happens

AT-D-11 afterwards. There's a huge process. It affects people's health. Workers especially who are not warned, who are not protected.

I'm not prepared but I'm going to learn some more.

AT-E Mr. Genoa: Yes, thank you, Chip. Paul Genoa with the Nuclear Energy Institute.

AT-E-1 The question goes to the issue of the rubblization and the language in the GEIS that puts part of it out of scope and part of it is discussed as being covered under the generic environmental impact statement supporting the license termination rule. The heart of the comment and question really gets at the issue that from our perspective is not yet covered in that license termination rule and the assumptions embedded in that GEIS. And that has to do with the scenario of what happens and what are the assessments for the radiological materials post license termination.

The rubblization is one angle that begs that question. A similar one is a technical issue we talk about as an embedded pipe. If you can imagine, a large nuclear facility with very thick walls. You know, three or four feet thick with piping that penetrates these walls. In fact, the piping is literally embedded within the concrete walls. The standard approach is to truncate that piping as it breaks into an open room. To clean that piping -- the length of that piping, to survey that piping, then to seal the ends of that piping and fill it with the grout or some other material to fix any residual radioactivity within -- inside of it.

The license termination rule would have you access the potential dose to a occupational worker in what they call the building scenario, or building occupancy scenario. We understand how you might address the potential exposure from this embedded pipe onto an individual who would work in that room. You might sum that direct exposure from the pipe with all other exposures that might occur from materials within the room, put them together, compare it to the standard, 25 millirem, and determine whether you meet the criteria or not.

The question is do you need to assume some refurbishment scenario post-license termination? Do you have to assume that someone determines it would be in their benefit to knock the wall down, to remove this embedded piece of pipe and to do something with it? You know, one could postulate that.

The question the industry asks is how do we address that. Do we come up with some scenario and refurbishment that would account for that? What would that scenario look like? We need that information so that we can do those assessments. Our understanding and reading of that GEIS and the license termination rule is that that refurbishment scenario is not limiting, that, in fact, the building occupancy scenario of someone working 40 hours a week, etc., etc., in that room is limiting if that's the case. That's what we wanted to know.

I draw the parallel because this is similar to the rubblization idea. Again, the idea that when you dismantle these buildings, knock them down, there will be basement structures. You're going to knock them down and you're going to end up with rubble on the side. You need to fill these basement voids. You either need to bring material from off site or you could potentially use some of this fill, this rubble fill as beneficial fill for these facilities. There could be residual radioactivity associated with it and it would be subsurface.

Again, the issue is post-license termination. How do you access a potential risk to a member of the public from that material? It's fairly straight forward to understand that the resident farmer scenario requires you to assume that that residual radioactivity could affect a resident farmer through groundwater pathways, inhalation and ingestion. You know, getting into crops, irrigation, all of that.

The question is, is there some unique pathway that needs to be assessed for this material, such as an intruder pathway? Do we have to assume post-license termination that someone comes in and digs up this material and uses it to build a pier or uses it for rip-rap or for a roadbed or some other material?

Clearly the industry could calculate the results of those scenarios. It was our understanding in reading the original GEIS for decommissioning back in '88, that that was considered and assumed to be non-limiting. That the resident farmer would be, in fact, limiting.

Our understanding was this GEIS would sort of beef that up because of this new idea; however, it appears that that was sort of left out of scope and appropriately maybe so. Perhaps that is in the scope of the license termination rule. But my point in all of this -- and I know it's rather technical and I'll be happy to express in layman terms anything that's not easily understood.

The industry wants to do the right thing. They need to know what the requirements are. This issue of what are these hypothetical potential pathways post-license termination, I believe, one easily addressed. We just need to know what the boundaries are and what the assumptions are that we need to impose, if any. We had hoped for some of that to come out in GEIS. It may still be appropriate to do so, otherwise perhaps other guidance is necessary.

AT-B Ms. Zeller: Okay. My name is Janet Zeller and I'm Executive Director of the Blue Ridge Environmental Defense League. We'll have our birthday -- 18th birthday as an organization in March. We work in North Carolina, South Carolina, Tennessee and Virginia and occasionally in north Georgia. I'm looking forward to coming back to Adele's community in February.

AT-B-5 We have some grave concerns about the process. I would like to just say that we would like to reiterate the comments so beautifully presented by Sara Barczak about the process. There is a real problem I think with public knowledge about the opportunities for input into NRC's decision making. And one of my favorite attorneys describes the NRC decision making processes and

AT-B-6 draft documents as whipsawing the public because it really may matter to you, Ms. Hickey that the license termination document details one level of exposure while the draft EIS on decommissioning details another level of exposure.

AT-B-7 But to the people in the affected communities, it is a problem and that problem is one that they're going to have to live with after the NRC has washed its hands of the site. So we do have some real problems with the fragmentation of the decision making process and the public participation opportunities, and believe that indeed that there are NEPA violations.

We are on record opposing the license extension for -- in fact, we've intervened in the license

AT-B-8 extensions for the Duke reactors, McGuire 1 and 2 and Catawba 1 and 2. We believe that the decommissioning document has definitely underestimated the impacts of the additional license extension period. In fact, the minimization of that impact I think is a major flaw in the document in that there needs to be a reassessment of all of the impacts, including cost, but also including the aging issues, including the waste issues and other off-site environmental impacts for license extension periods.

AT-B-9 The potential use of plutonium fuel at the McGuire and Catawba reactors is not adequately addressed in decommissioning -- in this decommission document. In fact, the costs of decommissioning are nowhere to be found. So we would request that there be a supplement right away before mistakes are made in licensing the use of plutonium fuel at the McGuire and Catawba reactors because the decommissioning impacts, including costs, and also including the additional radioactivity, the additional waste, those are real impacts that are basically left unaddressed in the generic environmental impact statement for decommissioning.

AT-B-10 We're familiar with some of the decommissioning models that the NRC is using. Believe me, Yankee Rowe, Connecticut Yankee and Maine Yankee are not good models for anyone to follow for subsequent decommissioning.

In fact, this is such an important issue that it really is inappropriate, I think, to make it up as you go along. We were able as an organization, with some help from our friends from the Citizens Awareness network in western Massachusetts to track the train carrying decommissioned parts of Yankee Rowe from western Massachusetts all the way to Barnwell.

Now this was supposed to be a dead secret, what route the train was taking through the several states, Pennsylvania, Virginia, et cetera, on its route to the burial ground near our Aiken, South Carolina office. It was very easy for us to, with little man and woman power, to do the train spotting for tracking -- no pun intended -- the route, the progress of this -- of this waste shipment.

So I hear in Rockville, Maryland at the Atomic Safety -- no Atomic Reactor Safety Board meeting and at the recent hearing in Rock Hill, South Carolina and again tonight that there is a top to bottom review of security and terrorism issues, yet the process of decision making continues unabated. We need a cessation in NRC decision making until there is this top down review of security and terrorism issues.

AT-B-11 If an organization like ours can spot a train carrying very dangerous radioactive waste, any terrorist organization can do the same thing. You've got to take that into consideration.

AT-B-12 The whole approach -- the whole probablistic approach to risk is inappropriate. You must assume that whatever can go wrong will go wrong and that should be the level at which your risks are evaluated, not some unrealistic dream-like assessment of probability that isn't real world anymore.

AT-B-13 I'd like to invite you to come to Charlotte. At the last hearing that NRC had in Charlotte, which is in the midst of four nuclear reactors, we had standing room only. Chip was there. One hundred and fifty people I counted before I stopped being able to count. We could, I think, fill up a hearing room so that you could hear from the citizens who are directly affected by your decision making that is on going.

AT-B-14 There are changing community conditions at these reactors. I don't mean to be disrespectful to the representative from NEI, but we don't have a problem in the Charlotte area of a resident farmer. We're more likely to have a golfer going on the site of a former nuclear plant to retrieve a golf ball because the -- against a unanimous decision by the Mecklenburg County Planning Board -- last night the Mecklenburg County Board of Commissioners approved a 4,000-plus home development by Crescent, which is, of course, Duke, around the Catawba reactor. So there are changing conditions at these nuclear power plants that deserve your attention and will not fit into any generic environmental impact statement.

AT-B-15 Twenty-five millirems additional per year of exposure added to an increasing background, which is certainly man made, and I say man made. I mean women had very little to do with the decisionmaking that went into increasing the background radiation that all of us are exposed to. But 25 millirems per year additional exposure is way too much.

Mr. Scaletti may have that kind of dose to salt his cells, and his gene repair mechanisms may be sufficient to withstand that dose and he may not get a fatal cancer. Mr. Masnik may get a fatal cancer from an additional 25 millirem per year dose. This is a roulette game. So the dose is way out of line for the restricted use, not to even mention the unrestricted use, which I'll get distressed if I do, so I won't.

So I do ask you to look at what we were promised by the PR in slick talking pictures in color when nuclear power was first laid out to decision makers and to the people of the North Carolina Electric Membership Corporation who -- well, unsuspecting, idealistic folks decided to buy two-thirds of Catawba 2 nuclear plant. Which actually I guess as a member of one of those coops, I own a piece of it as well.

AT-B-16 And we were tacitly or directly promised a 50-year cooling period for the nuclear power plants. I can go back and drag out some of those documents if you want to see that. And two-year cooling periods for Yankee Rowe before it's chopped up and decommissioned is unthinkable. You know, we will not approve of and we will fight diligently in every opportunity and arena we have a hot, quick and dirty decommissioning which violates the promise of future -- safety to future generations.

AT-B-17 So I'm really interested in this entombment rule making process and I promise you that we will have a lot to say about that because that really is the only option for what to do with these plants.

AT-B-18 I certainly heard Eva loud and clear, that the amount of exposure for decommissioning is less than for operating reactors. So our organization is certainly in favor of decommissioning. Let's just do it right.

AT-F Mr. Zeller: My name is Lou Zeller and I'm on staff of the Blue Ridge Environmental Defense League and I have been since 1986.

My comments tonight fall into several general areas, but I want to begin with one brief comment, which I think is worth quoting directly because it's so striking. Within the executive summary it talks about the potential radiological impacts following license termination related to activities during decommissioning are not considered in this supplement.

AT-F-1 Within the same paragraph it talks about the non-radiological impacts following license termination that are related to activities performed during decommissioning are considered in this supplement. We are considering in this supplement the non-radiological impacts following license termination, not the radiological impacts after a license termination. This is a radiological device, a nuclear reactor. I cannot understand how that could even be in the executive summary to describe the document which is under review.

AT-F-2 I do want to talk about the physical protections and the existing regulations under 10 CFR 7355. I guess I could state this as more or less of a question. For example, what measures will the Commission employ during decommissioning to protect against radiological sabotage?

AT-F-3 I understand fully that this document is to cover non-accident decommissioning activities, but once a reactor is decommissioned, I find nothing in this thick document where it addresses at all the generic, or under generic or site-specific issues the impact and the effects on the structure, systems and components of an event which happens during decommissioning.

AT-F-4 And, of course, the radioactive fuel pools are the principle source in that case of radioactive contamination. Even 10 CFR 73.55 falls short in our estimation in the preparations for such a scenario. 10 CFR 73.55 considers only primary physical security barriers for vehicles, for isolation zones, for access to the plant, for detection of intrusion and what not. For example, it mentions that there be bullet resistant walls, floors and doors in reactor control rooms. Well plainly this 10 CFR 73.55 needs to be updated because this is woefully inadequate to consider anything which is now possible after September the 11th.

Even within this existing rulemaking process for existing outline of environmental impact assessment, the actions to date which the Commission is taking leave me to scratch my head. For example, on November the 21st of this year, Maine Yankee received information regarding as classified, safeguards information that is, for the purpose of amending the license for an exemption from 10 CFR 73.55.

This document here, which was pulled down by my colleague from the Adams site, talks about it quite specifically. Although there's not a lot of detail here, it does talk about the fact that the independent fuel storage installation sabotage assessment performed by the staff in review of Maine Yankee Atomic Power Company's application for license amendment and exemption, Maine Yankee is undergoing decommissioning.

AT-F-5 Now my point in bringing this up is that the NRC cannot continue to allow rulemaking to be driven by exemption as it has been done in the past. It lowers the bar for all subsequent actions every time an exemption is made.

The second major issue that I would like to cover in my comments tonight -- and we will be submitting written comments before the comment deadline -- has to do with radiation effects during decommissioning operations. In appendix G there is a fair amount of detail about the Veer 5 (ph) report and the excess cancer deaths and the estimates from that.

Within appendix G, there is information which gives an estimate from radiation impacts to the public of 0.8 percent. That is 800 fatalities per 100,000 people. It's also outlined as 8 times 10 to the minus 4 fatalities per person rem. Those are stochastic effects, of course, only outlined in this report.

AT-F-6 One problem here is that the only non-stochastic effects considered in the GIS -- GEIS are those related to above threshold doses which cause such things as cataracts or other high dose morbidities. This is unacceptable. There are many morbidities which are associated with low dose radiation which do not rise to the level of effects on cataracts, such as the effect on the human immune system and many other non-cancer effects. This is missing from the generic statement.

Okay, to continue on to the effects outlined with regards to radiation protection considerations in decommissioning, the generic -- the appendix G on page G-4 says that in Veer 5, quote, in general, estimates of risk derived for doses of less than one gray or 10 rems are too small to be detected by direct observation in epidemiological studies.

Number one. The linear dose response model, which is outlined again in this document, does not meet reasonable conservative risk analyses which are based on the super linear dose response relationship, which is, I think, once again a conservative method of estimating the effects on the public as well as workers in a plant during decommissioning -- well at actually any time.

Continuing along these same lines, the risk factor here of 0.8 percent amounts to, as I said before, 800 fatalities per 100,000 people. If we look at the existing decommissioning estimates of 11-person rems from the Haddam Neck Plant in Connecticut, this would amount to 8,800 fatalities per 100,000 people.

AT-F-7 Now, again, the document here outlines the fact that most -- the major impact from radiation would be from low level radioactive waste transport of the reactor itself, the vessel, to a low level radioactive waste site. People living all along the waste site, primarily people living in town around that reactor, and all along the transport route along the way to -- if it's South Carolina or Nevada or whatever ultimate destination this reactor vessel would have, amounts to many thousands of people, if not hundreds of thousands or millions of people. This level of human carnage cannot and should not be considered as quote, too small to be detectable.

Thank you.

AT-G Ms. Carroll: I'm so impressed with what I'm hearing here tonight. My name is Glen Carroll and I'm with Georgians Against Nuclear Energy. I met Chip Cameron eight years ago -- nine years ago over this issue. I want to say that I feel really honored to be participating. I feel like we're all here, we're pioneers. We don't know how to decommission and we're trying to figure it out.

So I would say with this kind of work, with maintaining good will towards each other and maybe a little prayer and divine assistance, I hope we're going to end up doing a good job.

Oh, Eva -- now I don't know, this is a pretty good thing to keep up there. Do you think you could get the definition up there because I'd kind of like a power point assist. However, I did keep looking and I did find it in the EIS. It's sort of like rubblization.

(Laughter.)

Ms. Carroll: Oh, hey, Warren. He transcribes all of our stuff when we intervene at the NRC. I've known him for a long time, too, through Georgia Tech, which is decommissioning and they didn't invite me to a meeting.

Okay, the process of safely removing a facility from service followed by reducing residual radioactivity to a level that permits termination of the NRC license.

So, you know, except for the fact that there's only one universe I know about and it's got all of this radiation in it and there's like no way to take it to -- I don't know, it's not a real perfect
AT-G-1 premise. I'm real happy to see entombment is coming up and getting more discussion because it is the area that we look to, the avenue that we think will yield the most protection for the public ultimately.

AT-G-2 One of the things that has to be acknowledged I think or anticipated is the failure of the United States nuclear waste program on all levels, so that low level dumps are not getting established, high level dumps are not getting established. Therefore, we may really have to keep a lot more of this radiation on site than we had anticipated.

AT-G-3 There's a financial assurance gap here, I feel, and this has been mentioned several times tonight. I'll say two syllables -- Enron. And we've got nuclear power plants, you know, they're fast becoming white elephants and getting snapped up at Salvation Army prices by multi-national corporations -- Enron. And we don't really know if we're saving up enough money -- and I could be wrong about this but I thought the money was somewhat linked to the rate base and all these plants are not operating for their design life.

And so I'm real concerned that the fund was never -- the goal was never set correctly to begin with and that we would fall short on raising the money, it may not be enough. There is inflation. So what I don't know is are these figures periodically revisited and adjusted -- they are. I would think the utilities would tend to howl about that.

Is there assurance or something for a corporation a couple of generations removed from the corporation that actually originally licensed and built the plant? They are paying, you know, sometimes a tenth or a quarter of the decommissioning fund that they acquire with the plant, and so, you know, I would like to know what the assurance is that that money won't be absconded with and just disappear -- Enron.

AT-G-4 Love Canal, kudzu, gypsy moths, zebra mussels. One idea that we've talked about for a long time, and we actually had a big meeting about it and I think the idea is probably still alive, the site-specific advisory board. Really this is outside of engineering and physics, this is thinking political science, archaeology. But thinking archaeology ahead of time, how can the people remember -- whatever we decide, how can the people remember, how can we regulate -- you know, what kind of systems can we set up?

And so I'm an artist by profession that wandered into this arena. I don't get this lax visual imagery, I'd like to see more pictures. So I'm going to describe an idea I have for you --

AT-G-5 entombment taken to an aesthetic level.

You've got like contaminated soil, maybe even mill tailings if we could figure out how to get them there -- fill everything in and just build out soil barriers, barriers, barriers, make it a pyramid, make it vast, make it huge -- sell tickets for the first few generations. And I even think possibly the geometric -- the geology of this might even be an earthquake that just keeps falling in on itself. You hit it with something, it just keeps falling in on itself.

Now there's a question of subterranean -- what's the subterranean issue here and, you know, forget practicality, forget cost, which I would like to do that, I mean I really would not like cost to be much of a factor here. We need to do what it takes. So probably you need some subterranean things, definitely a site-specific idea I've got here.

And then let's plant spider worts around it because everybody knows that spider worts are shown to -- they have these little blue hairs, maybe they're called stamens or something that's the pollinator part of it, and they are like these incredible plants that -- there's this perfect correlation for the amount of radiation exposure it gets.

These little things turn pink, these little hairs turn pink. And it's been like studied and it's a good correlator. So we need to plant the spider worts, which is basically a weed and then we need to teach the people how to analyze. You know, we can't forget the technology of microscope. That's pretty easy -- lenses. And the site-specific advisory board and actually, you know, this sounds kind of corny, but I'm your artist speaker tonight -- the nuclear priesthood has been talked about seriously. Religion is probably a good model for long memory.

I cannot thank my colleagues enough for being really prepared with really thoughtful, with technical comments. I think the fact that we've been working on this for nine years -- I remember you from previous meetings -- this is deliberate and it's what's required to do it.

Thank you.

Ms. Carroll: I'm not going to invoke Atlantis or Elvis -- I could -- and Diablo. I figure it's getting subducted over there on that leading edge and that might be a solution, you know, underneath the mantle.

AT-H Mr. Ferguson: Tom Ferguson, Physicians for Social Responsibility. Very few words.

AT-H-1 My executive director asked me to express our concern for we want this process to be transparent. Allow public accessibility to the process, knowledge of the standards. Do no harm. We represent physicians who take the Hippocratic Oath. Take no risks that can be avoided. It seems ridiculous to come in here and say to professionals "be careful." But Adele quoted the too cheap to be metered promise and there's some credibility problems, so be careful.

We'll be submitting written comments.

Mr. Cameron: Okay, thank you, Tom.

I think there's a number of things that we might be able to clarify. This is not the time for the NRC staff to try to comment on the comments that we've heard, but there were a number of questions within the comments that I think that it might be useful since we have a little bit of time, for the NRC to provide some clarification on.

I'm just going to list some of these that I took down and then I'm going to ask Barry Zalcman from the NRC staff to just give us a little bit of a review of what the NRC is doing. We heard this top to bottom or bottom to top, whatever, review.

But I think Sara Barczak indicated that there was some ambiguity about how was spent fuel treated under this decommissioning process and of course there's various ways to store spent fuel and maybe Eva can talk a little about that one when we get there.

Again, Sara talked about using the example of how do you explain to a fisherman small, medium, large; that that might not sit well. And I thought, Eva, perhaps you could just talk a little bit more about the small, medium and large. I know you already talked about where that was derived from, from the Council on Environmental Quality, but perhaps you can say a little bit more about that.

Lou Zeller read a statement from the executive summary about non-radiological after license termination being considered, but yet some radiological not being considered. And I think there's a fairly straight-forward answer to that, that I think Eva can also address.

And finally, I think it might be -- Glen brought up Enron and decommissioning and is the fund tied to operation. And Steve, it might be worthwhile for you to just say a little bit about that fund and what happens, the bankruptcy implications, all that sort of deal so that we can give some assurance on that.

And I think that other people in the audience may have some comment. I don't want us to be commenting on other people's comments, okay? Because I don't think that that's appropriate to do that. But if you do have a fact that might be useful information for people, I'm thinking, Paul, you said that you had a couple perhaps comments, maybe facts we can get out here to increase all of our understanding of this.

And before we get to those questions, Barry, do you want to come up and just say a little bit about what the Commission is doing in what we call Safeguards, protecting these facilities against possible terrorist attack? Barry -- it's Barry Zalcman.

Mr. Zalcman: Barry Zalcman again from staff.

Actually I was going to talk a little more --

Mr. Cameron: I hate to give this to you since you said I'm going to talk a little bit more --

Mr. Zalcman: I like this instrument a little better.

Before I go into security, I touched on it at the outset, I'll talk a little more about it, I want to bring us back because there's a lot of good points that you had raised, all of you, about issues perhaps that don't apply to this supplemental GEIS. I want you to understand what happens with information that comes to the agency. We take away your comments and we identify what is relevant to the action that we're trying to deal with now -- this is a supplemental GEIS, we identified what the scope of the GEIS is.

It's operating in environmental space under the guise of the National Environmental Policy Act and the agency's regulations in that arena. It is not operating in safety space -- that's an important distinction. There are matters in safety space that have environmental components. You talk about the design of the facility and the environmental factors that lead to adequate protection -- earthquakes, tornadoes and the like. Those are environmental factors but they are considered part of the design basis of the facility. That is different than what we look at in environmental space under NEPA -- that's an important distinction.

And a couple of the issues that you raised, while they may not be directly attributable to the scope of the environmental impact statement, we think are going to be sufficiently important to share with the other groups within the agency and particularly issues associated with the events of September 11. The Safeguards Group, we will share that information with them as they consider what the actions of the agency should be in response to the events of September 11.

Now we have already taken some actions. We've gone into high alert, we've issued advisories, licensees have enhanced their security activities at the plants. The agency has an operations facility, operations center, it's manned 24 hours a day. We beefed up our staffing of that. Management is engaged in that process as well as additional staff. Our regions have incident response centers, they have been manned as well.

I can share with you that we do have an ongoing intergovernmental dialogue at the federal level. We also have it at the state level, interactions with state organizations, governors and the like.

So there are a lot of activities that are already ongoing immediately in response to September 11 and then we have to look at where do we go from here. That's where I talked about the top down review. The Commission has already directed the staff, there is a task force underway looking at what needs to be done. That is likely to result in perhaps changes. That will be shared in a public arena.

Now I lament the same challenge that you have -- and I'm looking at Sara -- the same challenge that you have. When the events of September 11 occurred, the nation went into a lockdown. We were looking at not just the infrastructure that was challenged, meaning our economic base in the World Trade Center, but there is our entire infrastructure across the country that is vulnerable and we are looking at target assessments. I'm talking about the federal government, not just the Nuclear Regulatory Commission -- target assessments to decide what additional measures need to be taken.

We're in contact with Homeland Security, we're in contact with the NSC/NSA, National Security Council, National Security Agency, as to what we need to deal with. And we're not alone, it's going to affect a lot of other things as well.

So looking forward as the agency comes out and lays out its recommendations, I will share with you that some of it is not going to be publicly accessible. You don't want us talking about this in public. Some things will be publicly accessible and we will seek stakeholder engagement on those issues and when the opportunity presents itself, do stay aware of it.

Now what is the formal mechanism for the agency releasing information? It's through the Federal Register. The agency did make an attempt to release it. Since we went into lockdown as the government, we decided that there was information that could lead to vulnerabilities that could support unlawful acts that we had to guard against. And because of that, we brought down our website and we are rebuilding it as best we can. It is still www.nrc.gov.

If you go to that, you'll be able to see the best information that we have available. Our ADAMS system is back up, but there is information regarding sites that we are not going to share until we feel comfortable enough that we're sharing the right information.

When we did release the GEIS for public comment, it did go through the Federal Register, but it is a GEIS, it is not all things to all people. It's not going to satisfy every single issue. In some of the issues that you have raised, we've identified what is within scope and what is outside scope. There are different processes involved.

You know, license termination is at the back end of decommissioning. Some of these activities are at the front end of decommissioning. And it's not that we're parsing the issues, but we have a fundamental responsibility to provide the best information available. The GEIS is 13 years old, we have additional information that we can share with the public. We think it's fundamental to share that with the public. It is a living document. This is Supplement 1. There will be a Supplement 2, there will be a Supplement 3. There will be additional information that we gain through the experience that we have to continue to update this information.

Sara, you have the opportunity to participate with us on license renewal. We have a commitment, we have a GEIS for license renewal, we have a commitment every 10 years to revisit that, just to make sure we learn from the experience and we update the information. So we are moving in that direction, we are going to update the information.

Hopefully that brings you back to focusing your opportunity. We've taken your comments already, we look forward to written comments and hopefully this kind of dialogue is what can expand your understanding of the document, focus your issues and we look forward to receiving them certainly before the end of the year.

We hope that that provided sufficient opportunity, we distributed how many, over 300 copies of the GEIS nationwide through our earlier experience with scoping and through the interactions that we've had trying to reach out to those parties that did have an interest, expressed an interest already. We may not have covered everybody, but we're hoping that communication does exist within the public as well to focus issues, target the issues and get us the best information you can share with us.

So hopefully that is useful. I didn't want to take anybody else's thunder away, but this kind of interaction is essential and how we operate in safety space may not be the same as how we operate in environmental space. This is an open process, this is a transparent process.

I don't know if any of you realize but Sara has changed the way we do our environmental documents already. There was an issue that was raised on Hatch between scoping and the draft document, there wasn't a clear path and we have changed not just the document you worked on, which was the Hatch Environmental Impact Statement, but even in this one, Appendix A is the in scope activities that were raised during the scoping period, and from now and hopefully forever more, that's the way we're going to do business. But it's through the public interaction that helps us do our job better.

So with that, thank you.

Ms. Hickey: Okay. Spent fuel is one of those issues where there were parts of the spent fuel issue that we looked at in decommissioning activities and that was removing the fuel from the reactor and putting it into the spent fuel pool. The storage of spent fuel from there on out either in the spent fuel pool or in dry cask storage is one of those activities that's considered outside of scope. And in Appendix D, we talk about where those issues on spent fuel are further addressed.

From our perspective, it's not that they aren't addressed, it's just that we're not addressing them in this GEIS. They are addressed in other documents.

And I guess with that, likewise I will say once again that's also true for the radiological impacts after license termination. Those impacts are addressed in NUREG-1496, I think is the appropriate number. And that's the GEIS for license termination.

What we tried to do in the document is direct the reader where the other areas were addressed. And there are a number of them, but in Appendix D, there's a little more discussion about that. Okay?

Ms. Hickey: Okay. I think the thing to do is discuss that right now. Because the radiological impacts are discussed elsewhere, we've chosen to say they are out of scope. However, the non-radiological impacts after decommissioning are not addressed in other NRC documents, and therefore, that's why we've addressed those in our document. We say they are in scope.

I like to think that in fact what we've tried to do is look at this process holistically. I think somebody used that term. We couldn't put everything in the supplement, it would have been too large and too difficult to handle. But what we've tried to do is tell the reader where to go to find the other information.

And hopefully with your comments, if that's -- if we weren't totally successful in that from your comments, we can go back and take another stab at that.

But that's why we've addressed non-radiological impacts in this document, following license termination, but not the radiological impacts.

Okay, now let me talk a bit about the small, moderate and large. And since you were specifically interested in some of the aquatic impacts, I'm going to put Duane on the line here. I'd like you, Duane, if you could just explain the evaluation and the conclusions from the aquatic analysis and the fact that we've said that those impacts are small, and what that means.

Mr. Neitzel: I need that definition.

Mr. Cameron: And I would just note while Duane is coming up that in reference to where Sara was starting from in terms of the fishermen, for example, that the fact that an impact is said to be small doesn't mean that it's not an important issue, an important resource to be looked at. And I don't know if there's any confusion about that or not.

Ms. Hickey: Oh, okay.

Mr. Neitzel: When we were doing the impact stuff and going through those matrices, I was responsible for focusing on the aquatic stuff. As a team, we kept looking back to this level of significance that's listed here in the executive summary and then it occurs again, it's on page xiii in the executive summary.

And that's what we kept coming back to, small being not detectable or so minor that it won't destabilize or noticeably alter the attribute or the resource that we were dealing with. Moderate, sufficient to alter but not destabilize. And large, clearly noticeable and are sufficiently large and could alter the system -- so we looking at those. Again, whether it was aquatic, terrestrial, but in those terms -- detectable -- or not detectable, detectable but not going to destabilize the situation, or clearly detectable and could cause some alterations.

So that was our guidance and then when we looked at issues and subissues like in aquatic, we looked at fish, plants, the community -- you know, all these issues. And are the activities that are within the scope -- and then we went back to the definition of generic, which is also in here, that the impacts -- again, this starts on, in the executive summary on page 8 of the executive summary. Has the issue been determined to apply to all plants or some plants of specific -- we've got examples here -- specific size, specific location.

I remember on location, we were dealing with fresh water versus marine, riverine versus lake. So specific location. For specific type of cooling system or site characteristics and then looking now does this type of impact to fishery apply to all sites, or do we have to lump them in marine or freshwater.

Then we described, we looked at these criteria for small, moderate and large, and assigned that. And those are in these matrices that are in the appendix, on how we stepped through that matrix each time, each time going back and looking at these definitions. That's what we dealt with and we're hoping we communicated to all the readers. And then, you know, what does it take to mitigate that if there is some associated impact.

So it was stepping through the matrices that are in here by those definitions. And I think one of the things that we talked about a lot on Eva's team and we talked with NRC on this, on making these statements, is the generic, we were not asked to preclude an assessment of an impact at a later date.

Generic was at this point in time with this information to say here are the impacts that are going to require site-specific information, you know, as this process proceeds. And one of the important things that we keep hammering ourself with, NRC keeps saying is there's always new and significant information that can arise and working for NRC, it's our responsibility. NRC has it, I know they look for it, the licensees do. We get stuff from the public also. You know, new and significant information means a new assessment.

So don't take -- or at least this is the way I've been taught in working this -- don't take generic as it's off the table, take generic as, you know, we've lumped these together so you can focus on what we think at this time is important and then look for new and significant information so we can come back to these that are new and significant. But these definitions were really important to following that. And I think if you apply that -- no disruption, you can apply that to terrestrial plants, to a fish community, a mussel community -- all these other issues.

Ms. Hickey: So in fact when we say that to the aquatic ecology, the impact is small and generic, what we're saying is for all the decommissioning activities and the evaluation that we did, that we didn't see any disturbance in --

Mr. Neitzel: Detectable, nothing detectable.

Ms. Hickey: Detectable disturbance to the aquatic ecology.

Mr. Neitzel: And that's based on information we got from the public, it's based on the review of literature, it's based on our visiting power plants that were being -- were in the process of decommissioning. The -- what do you call it -- history or the experience -- you had a specific phrase, what we've learned so far, what we're learning as we go along. And then the open literature, technical reports and published documents.

And so what we're saying is based on all that information, we don't see where the activities inside the operating fence for aquatic communities will even be detectable, they're so small that you won't even see them, they're small, they're going to be the same everywhere and that's the statement we've -- that was the conclusion we came up with. That's how we did that.

Mr. Lewis: Steve Lewis, General Counsel's Office, NRC.

One thing I wanted to say is that a number of comments that I heard which were to the effect that we ought to include more on the costs of decommissioning in this GEIS, was something that struck me as a very, very thoughtful comment and I'm accordingly, thinking about them, which means I don't have a response to them right now, but I thought they were good points.

The -- as far as bankruptcy goes, this is obviously a point of considerable concern to the federal government and fortunately the Department of Justice agrees with us that there's a good deal of case law that we have on our side to the effect that these funds are not part of the assets of the estate that are available to be invaded, if you will, or used by other creditors. They're treated as outside the estate for that purpose. They are considered to be governmental in nature and they also partake of a protection that is related to their health and safety and environmental protection function.

Having said that, bankruptcies are very contentious proceedings and so we don't just rest on the fact that we have cases that say what we think will protect us. We go to the Department of Justice and we get the Department of Justice attorneys to represent us and vigorously make sure that those cases are accepted by the bankruptcy judge and that the monies in those trust funds are preserved for the purpose that was established.

That's really all I had to say unless there was some aspect of this that I missed.

Mr. Cameron: No. I think that what you're -- in case it isn't clear, but that the decommissioning fund is not going to be affected by bankruptcy because the fund is there and the creditors of that corporation can't get at that fund. It's preserved. So I think you've done it, Steve.

Mr. Lewis: That's correct.

Mr. Cameron: Thank you very much.

This is, is the fund tied to operation. Is that what you're going to talk about? Who knows what you're going to talk about.

(Laughter.)

Mr. Masnik: Rather than try to interpret your understanding of his question, I'll just respond directly to hers. She had a couple of comments. One had to do with periodically updating the fund, which periodically it is updated, and the staff does an assessment of burial costs which change over time, and licensees then adjust their amount of money that they put aside. That was the question.

AT-G-7 Ms. Carroll: And the other is, isn't this fund built through rates, so what happens if it goes off line or even if the company is no longer billing. There seems to be a couple of vulnerabilities.

Mr. Masnik: Yeah, the requirement of the regulations is to put the fund aside. It doesn't really specify how the licensee gets the money. Licensees of course hope that they can pass that cost on to the ratepayers but if the PUC, for example, doesn't approve it, the licensee has to put in the funds out of their own profits.

You mentioned also that you were concerned about premature shutdowns and we've actually had a number of plants -- the regulation to establish a decommissioning trust fund came into being in 1988. We had a number of plants shut down in the late '80s and early '90s and obviously the fund was not fully funded.

In those cases, the licensee has continued to collect funds and contribute to their decommissioning trust fund. And what they have done, of course, is model their decommissioning activities around the availability of funds. If they still have 60 years to do it, in some cases the licensee would either put the plant in long term storage for a couple of years or they would pace the decommissioning activities to match the funds.

In one case, in Trojan, there was a period of time where they actually exceeded the amount of funds that they -- or they speculated that they would exceed the amount of funds in their trust fund, in which case they went out and borrowed money to continue the decommissioning.

So the bottom line is that licensees have been very creative about obtaining the money and continuing the decommissioning process. We were very concerned about these plants, particularly the premature shutdowns, whether or not they would be able to accumulate the funds. It appears that so far everything has been going along reasonably well.

Mr. Genoa: Thank you, Chip. Paul Genoa, Nuclear Energy Institute.

AT-E-2 It was Ed Martin who asked the question about sort of the discrepancy or the debate between the EPA and the NRC standard for site cleanup or license termination and I think that has been an obstacle to public understanding and acceptance of decommissioning. While it's not unexpected, if you gave two different regulators authority over the same activity that they might develop different approaches towards regulating that activity -- and in fact that is the case.

They did develop different approaches, but when one looks into it and if one really goes in depth into looking at it -- and of course, these are technical issues and we all like to sort of come up with a quick sound bite like answer and unfortunately they don't always lend themselves to that, the reality is, as was noted in a GAO report on the EPA and NRC standard, that the results actually are very similar, of the two approaches, that they both protect public health and safety.

Now one would think that 15 millirem on average per year versus 25 millirem on average per year -- that one would look at that and say well obviously 15 is less than 25, therefore, it must be more protective. In fact, one has to look more closely at what the assumptions are. Twenty-five millirem by the NRC is an all pathway analysis that assumes the worst case in any year.

EPA assumes a 30-year average, what is the average exposure over an entire 30-year period. In fact, when you look at light water power reactors that we're talking about here, who typically have cobalt and cesium as the prime isotopes that drive the exposure, you find that the NRC model of 25 millirem for those isotopes which doesn't take into account decay because it's the worst case, generally the first year after license termination -- actually results in a more strict standard than a 15 millirem average over 30 years. In other words, you can leave more radioactivity behind under the EPA standard, by the way it's designed, for light water reactors than you can under the NRC standard.

So that was the point I wanted to make. And the most recent policy issue that you could look to is that recently at the West Valley Project, the EPA found that the NRC standard of 25 millirem was acceptable and was protective of public health and safety at that site. It met EPA's criteria.

Mr. Cameron: Thank you very much, thank you, Paul.

Janet, do you want to give us one comment before we adjourn for tonight?

AT-B-19 Ms. Zeller: I guess I'd like to just comment that to the public and to many non-profit organizations, generic means you may say this, you may not say that; this is on the table, that is not on the table. And what happens is that people do make comments that affect their communities and affect their safety and if they are indeed outside the scope of a particular process, I would truly love to believe that those comments are not lost. But at this point, my experience doesn't lead me to be sure that that's the case.

AT-B-20 So I'm challenging NRC staff, all of you I believe are genuine in your concern about our welfare, and I would challenge you not to lose any of the comments that have been made about security or any other issue that you consider outside the scope. And make certain that those do surface somewhere.

AT-B-21 I'd also like to point out that what happens in the real world is different from your idealistic presentations and your idealistic views of what ought to be happening. And we have such things as the nuclear waste train carrying Yankee Rowe waste coming into the town of Roanoke at 9:00 on a Friday evening with a street festival going on and you know where the railroad track goes in Roanoke, it comes right into downtown.

And all of the highways were blocked off for the festival, there were thousands of people there, having come into the county for this festival. And that train sat there for hours. And if they were really only emitting 10 millirem per hour at six feet -- and believe me, people were closer than six feet, a bunch of them ran up to it, although our people who were there tried to stop them and get the crowd to move away from the train. There was nobody there who was doing that function except us.

And so, you know, in the real world, what -- the decisions that you make come down to people's communities and so I don't need to preach at you -- well, yeah, I do. You've got to do better, you've got to make assumptions that are way more conservative than what you're doing. And you've got to assume human failings.

AT-B-22 And so much of what is in this document depends on the skills and the experience level, which are lacking, because decommissioning is new, just like plutonium fuel is new. NRC does not know what it's doing, the people who are on these reactor sites don't know what they're doing and so if safety depends on human capability, it does too much by the way in this document, then you know, that's not very reassuring and I'm glad I've got the last word.

(Laughter.)

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Manager of Nuclear
Oversight and Regulatory Affairs

December 27, 2001

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Subject: **"Notice of Availability of the Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities and Notice of Public Meetings," 66 Federal Register No. 218, page 56721 (November 9, 2001)**

Gentlemen·

In the subject Federal Register Notice, the U S. Nuclear Regulatory Commission (NRC) solicited comments on the draft supplement to the Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities as issued in October, 2001

For the past thirteen years, the original GEIS on Decommissioning of Nuclear Facilities, NUREG-0586, has provided a comprehensive and robust evaluation of the environmental impacts associated with decommissioning of nuclear facilities. Nevertheless, we support

CL-01/1 the NRC's current efforts to update the GEIS for nuclear power plants to reflect the industry's experience in decommissioning and to more fully consider issues like partial site release and re-use of concrete rubble as fill

The draft supplement provides a detailed discussion of the impacts of decommissioning on eighteen environmental issues. Overall, the conclusions provided in the draft supplement seem reasonable There are, however, some issues that would benefit from additional clarification by the NRC·

CL-01/2 1. **The time frame for assessing the magnitude of the environmental impacts is not clearly discussed.** In some instances (terrestrial ecology page 4-20, lines 39-41), the draft acknowledges that some impacts will be temporary but once decommissioning is completed, not significant The discussion of other issues is silent with regards to when the impact is assessed For example, dewatering for a relatively short period while sub-surface foundations are removed would be performed in accordance with a National Pollutant Discharge Elimination System (NPDES) permit (section 4 3 2).

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However, the impact on the water table during this period of decommissioning would probably be noticeable. Once dewatering has ceased, the water table would most likely return to its pre-decommissioning level. The licensee would reasonably conclude that dewatering during decommissioning is a SMALL (not noticeable, does not de-stabilize any important attribute of the resource) impact once decommissioning has been completed and is addressed in this GEIS Supplement. The NRC should revise the GEIS Supplement to clarify that the magnitude of the impact should be assessed once decommissioning activities have ceased and the license is terminated

CL-01/3 2. **Activities that require State or local permits or approval should be considered to have a SMALL impact under the GEIS.** Licensees will be required to obtain approval from State and/or local agencies for several activities performed as part of decommissioning and site restoration These activities may include routine discharge of non-radiological liquids, dewatering, removal or modification of circulating water conduits, and use of portable combustion engines. Typically, the regulations governing approval for these activities require that the regulatory agency perform an assessment of the environmental impact(s) and, as appropriate, establish mitigating measures as permit conditions In the case of water quality issues, the NRC relies on the licensee's compliance with the NPDES permit to conclude that the magnitude of the impact(s) is SMALL. The NRC should revise the GEIS Supplement to clarify that the NRC will consider the impact of an activity to be SMALL and rely on the licensee's compliance with a state or local permit, including any mitigating conditions

CL-01/4 3. **The water quality (section 4.3.3) discussion does not address the potential impact of dewatering on the quality of ground water.** If, for example, the ground water is a source of potable water and the facility is located near an ocean, dewatering could impact the quality (salinity) of the potable water. The NRC should revise the GEIS Supplement to clarify that the NRC will rely on the licensee's compliance with the NPDES permit for dewatering to conclude that the impact is SMALL

CL-01/5 4. **The potential impacts of removing circulating water conduits on water quality or aquatic ecology are not consistently discussed or are considered an exception from the staff's conclusions.** The Executive Summary states that the "removal of uncontaminated SSCs (such as the intake structure or cooling towers) that were required for the operation of the reactor" are included in the scope of the GEIS. However, chapter 4 does not discuss the potential impacts of removing circulating water conduits on water quality (section 4.3 3) and the staff considers removal of these structures to be an exception to the generic evaluation for aquatic ecology (section 4 3 5) Similarly, the tables in Appendix H do not address this issue. Realistically, the licensee will have to comply with state and/or local regulations to

remove the circulating water conduits or cooling towers The state and/or local agency would perform an environmental assessment and, as appropriate, establish conditions in the permit to mitigate any environmental impact(s). As in the case of water quality issues, the NRC relies on the licensee's compliance with the NPDES permit to conclude that the magnitude of the impact(s) is SMALL. The NRC should revise the GEIS Supplement to clarify that the NRC will rely on the environmental assessment performed for and any mitigating conditions included as part of the state or local permit for removal of circulating water conduits.

CL-01/6 5. **Facilities included in the NRC's review of information during preparation of the draft supplement should be able to use the NRC's conclusions on socioeconomic impacts instead of performing an additional assessment along with a license-amendment request.** In section 4.3.13, the results of the evaluation stated (page 4-56, lines 30-32) that "In the 21 decommissioning case studies observed, it is concluded that facility decommissioning should have a SMALL socioeconomic impact on low-income and minority populations". At the same time, given that populations differ near each reactor site, the staff concluded that environmental justice was a site-specific issue. The NRC should revise the GEIS Supplement to clarify that licensee of a plant that was one of the case studies can refer to the staff's assessment that this was a SMALL impact instead of having to perform a site-specific evaluation and submit a license amendment request.

CL-01/7 6. **Public opposition to a facility is not an objective criterion for determining the impact of decommissioning on aesthetics.** In section 4 3.15 2, the magnitude of potential impacts on aesthetics is described as proportional to how vigorously the plant is opposed by the host community. Opposition to a facility is frequently expressed by a few vocal individuals or groups who do not necessarily reside in the area but who are philosophically opposed to the peaceful use of nuclear power. These individuals will continue to speak in opposition against a facility as a matter of principle, even when the facility begins decommissioning and site restoration Since aesthetic issues are a function of each individual's perception, opposition to the facility should not be used as a criterion for assessing environmental impact A more objective and justifiable approach would be to apply the other criteria described in this section (the facility's impact on the skyline, noise, land disturbance, traffic) or to consider recreational use, if any, in determining the magnitude of decommissioning impacts

CL-01/8 In a related issue, there continues to be a gap in regulations concerning the release of slightly contaminated solid materials. In both partial site release without a license termination plan and license termination for the entire site, residual radioactivity may

remain as long as the exposure criterion of 10 CFR 20 Subpart E is satisfied. Conversely, this same residual radioactivity is treated as licensed material prior to license termination — regardless of how little the amount, concentration, or dose significance — and can only be disposed of at a licensed facility. This double standard poses an incentive to retain radioactive material on-site until the license has been terminated to avoid potentially excessive costs for radwaste disposal, while creating a longer term risk for additional site cleanup required by other regulatory authority or court of law. While we recognize that the US Nuclear Regulatory Commission (NRC) is seeking to resolve this discrepancy through study by the National Academy of Sciences and further agency deliberation, this process may take several years. Prolonged delay contributes to the erosion in public understanding and confidence in government policy as well as the lack of resolution mentioned above for licensees. Public policy is needed to define the quantitative dose and radionuclide characteristics that have no discernible public health consequences.

Southern California Edison appreciates the opportunity to comment on the draft supplement. If you have any questions concerning these comments, please contact me.

Sincerely,

for
A.E. Scherer

11/9/01
66 FR 56721
(2)

December 28, 2001

BEFORE THE

UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE of NUCLEAR REACTOR REGULATION
Washington, D.C. 20555-0111

THREE MILE ISLAND ALERT &
The EFMR MONITORING GROUP's
COMMENTS on the NUCLEAR REGULATORY COMMISSION's
GENERIC ENVIRONMENTAL IMPACT STATEMENT on
DECOMMISSIONING of NUCLEAR FACILITIES, NUREG-0586:
DRAFT SUPPLEMENT DEALING WITH
DECOMMISSIONING of NUCLEAR POWER REACTORS

Prepared by Eric Joseph Epstein,
Chairman, Three Mile Island Alert
Coordinator, EFMR Monitoring Group

Template = ADM-013 E-RIDS = ADM-03
Add = D. Scaletti (dgeis)

December 28 , 2001

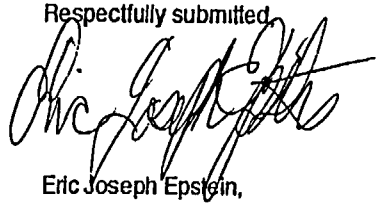
Mr. Michael T. Leaser, Chief,
Rules and Records Branch
Division of Administrative Services
Office of Administration
Rules of Directives Branch
Mail Stop T 6 D 59
United States Nuclear Regulatory Commission
Washington, D C. 20555-0001

Dear Mr. Leaser:

Enclosed please find Three Mile Island Alert's (TMIA) and the EFMR Monitoring Group's (EFMR) Comments on the **NUCLEAR REGULATORY COMMISSION's GENERIC ENVIRONMENTAL IMPACT STATEMENT on DECOMMISSIONING of NUCLEAR FACILITIES; NUREG-0586: DRAFT SUPPLEMENT DEALING WITH DECOMMISSIONING of NUCLEAR POWER REACTORS**

The comments were prepared by Eric Joseph Epstein, on behalf of behalf of Three Mile Island Alert and the EFMR Monitoring Group Mr. Epstein is Chairman of TMIA and the Coordinator EFMR. (*See Enclosure I*). Since 1985, Mr. Epstein has testified and intervened in hearings and proceedings before the Nuclear Regulatory Commission (NRC) and Pennsylvania Public Utility Commission (Pa PUC) on nuclear decommissioning and radioactive waste isolation issues (*See Enclosure II*). Mr. Epstein's research and testimony have focused on the following nuclear generating stations. Peach Bottom 1, 2 & 3, the Susquehanna Steam Electric Station (SSES) 1 & 2, and Three Mile Island (TMI) 1 & 2. Since 1993, EFMR, along with General Public Utilities Nuclear (GPU) and Exelon have sponsored and invested $1,590,000 in remote robotics research relating to nuclear decommissioning (*See Enclosure III*).

Respectfully submitted,



Eric Joseph Epstein,

Chairman, Three Mile Island Alert

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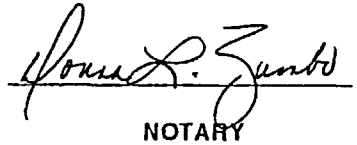
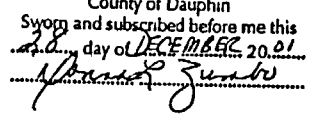
DATED: December 28, 2001



NOTARY

NOTARIAL SEAL
Donna L. Zumbo, Notary Public
City of Harrisburg, Dauphin County
My Commission Expires October 25, 2003

State of Pennsylvania
County of Dauphin
Sworn and subscribed before me this
28 day of DECEMBER 20 01



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I. INTRODUCTION

CL-02/1 Three Mile Island Alert (TMIA) and the EFMR Monitoring Group (EFMR) do not dispute the contention of "electric utilities" (1) and the Nuclear Regulatory Commission (NRC) that radiological decommissioning and radioactive waste isolation expenses are

CL-02/2 subject to change and likely to increase. However, the Nuclear Regulatory Commission has

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1 The NRC promulgated revised rule making for decommissioning nuclear power plants, including an amendment to its regulations.

"...on financial assurance requirements for the decommissioning of nuclear power plants. The proposed amendments are in response to the potential deregulation of the power generating industry and respond to questions on whether current NRC regulations concerning decommissioning funds and their financial mechanisms will need to be modified The proposed action would require power reactor licensees to report periodically on the status of their decommissioning funds and on the changes in their external trust agreements (Federal Register, Financial Assurance Requirements for Decommissioning Nuclear Power Reactors, 10 CFR Part 50, RIN 3150-AF 41, September 10, 1997, (Volume 62, Number 175, pp. 47588-47606.)

In fact, the Commission specifically addressed the particular condition of nuclear utilities under the jurisdiction of regulatory authority:

"...the NRC is proposing to revise its definition of "electric utility" to introduce additional flexibility to address potential impacts of electric industry deregulation. The Commission notes that the key component of the revised definition is a licensee's rates being established either through cost-of-service mechanism or through other non-bypassable charge mechanisms, such as wire charges, non-bypassable customer fees, including securitization or exit fees, by a rate-regulating authority.. Should a licensee be under the jurisdiction of a rate-regulating authority for only a portion of the licensee's cost of operation, covering only a corresponding portion of the decommissioning costs that are recoverable by rates set by a rate-regulating authority, the licensee will be considered an "electric utility" only for part of the Commission's regulations to which those portions of costs pertain. (Pages 47593- 47594.)

Clearly, the NRC has anticipated the nuclear industry's financial apprehension, and acted accordingly by promulgating regulations to resolve the industry's concerns Furthermore, the Commission extended the definition of an "electric utility" to include

"An entity whose rates are established by a regulatory authority by mechanisms that cover only a portion of the costs collected in manner Public utility districts, municipalities, rural electric cooperatives and Sate and Federal agencies, including associations of any of the foregoing, that establish their own rates are included within the meaning of "electric utility." (Section 50.2, Definitions, p. 47605)

steadfastly refused to address the fundamental problem that has created and perpetrated financial gaps between "target" (2) decommissioning funding and actual assets on hand to complete radiological decommissioning (3). In fact, the Commission has no statutory authority to compel "electric utilities" to physically raise, maintain, secure and account for radiological decommissioning funding The NRC can authorize and mandate a preferred "mode of decommissioning", but the Commission lacks the ability to ensure the existence of adequate funding levels, i e , accretible external sinking funds

The NRC's GENERIC ENVIRONMENTAL IMPACT STATEMENT (GEIS) on DECOMMISSIONING of NUCLEAR FACILITIES-NUREG-0586: DRAFT SUPPLEMENT DEALING WITH DECOMMISSIONING of NUCLEAR POWER REACTORS does not adequately factor the financial disconnect between NRC "funding targets" and actual and realized funding pools accrued by "electric utilities". Moreover, there

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2 By the NRC's own admission, a "funding target" is below the actual amount an "electric utility" will actually need to complete radiological decommissioning

Prior to deregulation, and in states not affected by deregulation, "Electric utilities" must petition state utility commissions to recover "targeted" funding levels "suggested" by the NRC. But the Companies are not mandated by the Commission submit detailed funding plans until two years prior to site closure. In addition, if a utility has been saving for DECON, but SAFSTOR is necessitated, the funding package becomes grossly inadequate.

3 The amount of monies necessary to complete non-radiological decommissioning fluctuates from plan to plant, and in many cases "electric utilities' are not saving the eventuality.

remains a chronic shortfall between "targeted" funding levels and actual costs for nuclear decommissioning. (4)

CL-02/3 In addition to the economic gash in the GEIS portal, this fatally flawed document does not adequately address, acknowledge, account for, or compute a number of significant barriers related to radiological decommissioning; including: Cost Estimates for Radiological

CL-02/4-10 Decommissioning; Planned Operating Life of a Nuclear Generating Stations; Spent Fuel Isolation; "Low Level" Radioactive Waste Isolation; Rate payer Equity; Plant Valuation, Joint Ownership; and, Regulatory Ambiguity.

TMIA and EFMR's comments also include: III. SUMMARY; IV. THE PROBLEM with NEPA & "PSYCH STRESS"; V: CRITICISMS & SUGGESTIONS of 4.0 ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; VI. APPENDIX J: INCORRECT or MISSING DATA; and, VIII. TRANSPORTATION.

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4 WASHINGTON, Dec 20, 2001 (Reuters) - The Nuclear Regulatory Commission falls short in its oversight of funds for U S. nuclear power plant decommissioning, according to a report released on Thursday by Congress' main investigative arm.

Decommissioning a retired nuclear plant typically costs between $300 million and $400 million, and involves dismantling it and removing its radioactive components for safe storage.

The General Accounting Office report said that in some instances, the NRC's reviews were "not always rigorous enough" to ensure adequate decommissioning funds, according to the report

"The commission will review the report carefully and take whatever action they feel is appropriate," an NRC spokesman said. The agency oversees all 103 U.S. nuclear plants.

CL-02/11 The Nuclear Regulatory Commission can no longer evade its responsibilities and duties without considering the practical consequences, financial limitations, and political

CL-02/12 realities. Does any one of sound mind or body residing within the Commission really think that a nuclear power plant can be radiologically decommissioned if the funding is inadequate

CL-02/13 and the plant is prematurely shut down? Can the Commission identify a pragmatist, physicist, chemist, policy analyst, or behavioral scientist who is willing to testify that radiological decommissioning can be achieved with the fate of Yucca Mountain in perpetual limbo and the three, current "low-level" radioactive waste facilities limited by finite capacity

CL-02/14 and geopolitical considerations? Did the Nuclear Regulatory Commission "encourage" its economists, accounts, and actuaries to ignore the impact of deregulation and plant devaluations on local communities? Is it unreasonable to ask the NRC to view decommissioning through a global lens that accounts for economic reality, objective science, and fiduciary accountability? Or is the Commission intent on viewing radiological decommissioning through surrealistic prescription monocles prescribed by the Nuclear Energy Institute, the Edison Electric Institute, Electric Power Research Institute, and the Institute for Nuclear Power Operations?

CL-02/15 **The NRC, once again, has missed an opportunity to constructively participate in solving the nuclear decommissioning riddle. Radiological decommissioning requires inter-agency cooperation among federal, state, and**

CL-02/16 **local shareholders. At some point, the NRC will have to create a decommissioning vessel the incorporates reality as its guide. Frankly, the GEIS resembles a script for "Abbott and Costello" prepared by Norman C. Rasmussen, Bernie Snyder and Ken Lay.**

II. BARRIERS TO NUCLEAR DECOMMISSIONING:

A. Current Problems Associated with Cost Estimates for Radiological Decommissioning

CL-02/17 Power reactor licensees continue to rely heavily on nuclear decommissioning projections provided by the industry consultant, Thomas LaGuardia and TLG , Inc. Furthermore, TLG continues to base decommissioning estimates on flawed and specious "field" studies extrapolated from small, minimally contaminated, and prematurely shutdown nuclear reactors

P-81 No reasonable, sound or prudent financial officer operating outside of the nuclear industry would accept funding formulas and that rely on so many fluid caveats and assumptions. Recently, David Hayward, president of Hayward Consulting stated:

> In my judgment, AmerGen Energy Co.'s strategy to purchase and operate nuclear power plants does not make a lot of sense for the following reasons First, from a historical perspective, many nuclear power plants have closed down prior to the expiration of their licenses Thus, their financial performance has been lower than that originally anticipated **Second, nuclear plant owners have historically underestimated the cost of decommissioning nuclear power plants (Bold face type added)** Third, the issue of disposing nuclear waste has not been fully settled. ("Plant Valuation: Book Value and Beyond", *Public Utilities Fortnightly*, September 1, 1999, p. 58.)

The wild fluctuation in the cost estimates for radiological decommissioning are attributable to the lack of actual decommissioning experience at large nuclear generating stations (over 1,000 MWe, or at plants that have operated for their full and planned lifespan. (See Discussion **B. Planned Operating Life of Nuclear Generating Stations)** The largest commercial nuclear power plant to be fully decommissioned, Shippingport, is a 72 megawatt (MWe) light-water breeder reactor and is substantially smaller than the Susquehanna Steam Electric Station-1 & 2 (1,050 Net MWe for each unit) (5) During Pennsylvania Power & Light's Base Rate Case ("PP&L" or "PPL") (*PA PUC v. PP&L*, 1995; Docket No R-00943271; R-00943271COO1, *et seq*). Company witness Thomas LaGuardia, President of TLG, admitted that Shippingport was "almost like a pilot plant." (1995 PP&L Base Rate Proceeding; Official Transcript, Page 2103, Lines 17-20) (6) Shippingport was owned and operated by Duquesne Light Company under special agreement with the Department of Energy. The entire core was removed and replaced three times prior to decommissioning, and as noted by Company witness LaGuardia during cross examination, "[T]here were several cores at Shippingport starting out as a

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5 PPL announced it would petition the NRC to increase the capacity of SESS by 100 megawatts, while decreasing the property value of the plant "The 120 million of improvements at the Susquehanna plant are expected to add to earnings as soon as they go into operation" (*Reuters*, April 23, 2001.

On July 17, 2001, he NRC approved PPL's capacity expansion request. Unit 1 will be increased this month while the upgrade at Unit 2 is planned for Spring, 20002, after the planned refueling outage.

6 This methodology was reconfirmed in 1997:

> The cost estimating methodology employed in developing the decommissioning estimates, have been field verified by the Company's decommissioning consultant [TLG] in work performed during the decontamination and dismantling of the Shippingport Atomic Power station, Shoreham Nuclear Station and Pathfinder Atomic Station as well as for activities ongoing at the Yankee Rowe, Trojan and Rancho Seco nuclear units (Question & Answer 155, PP&L's Response to Interrogatories of Environmentalists, Set 3, Dated May 19, 1997.)

pressurized water reactor and later being converted to a light water reactor." (1995 PP&L Base Rate Proceeding; Page 2105, Lines 19-21). Furthermore, the reactor vessel was shipped to the Hanford Reservation (through an exclusive and unique agreement with the Department of Energy) thus depriving the industry of critical hands-on decommissioning experience. In fact, Shippingport was dismantled and not decommissioned. The immense differences between Shippingport and the large, commercial nuclear generating stations make any financial comparison between inadequate and baseless.

Several other nuclear reactors are being prepared for decommissioning but provide little meaningful decommissioning experience that could be used reliably to predict decommissioning costs.

For instance, Yankee Rowe was cited during the 1995 PP&L Base Rate Case as a reliable predictor of the decommissioning cost estimates associated with a large commercial reactor. Yankee Rowe, however, is a small commercial plant (167 MWe) that had a unique advantage which make it an unlikely predictor of decommissioning costs at other nuclear plants: The most significant component removal, steam generators, was completed without Nuclear Regulatory Commission approval. PP&L's witness, Thomas LaGuardia, admitted, "[t]hat's correct, at the time. They [Maine Yankee Atomic Power Company] didn't have the decommissioning plan approved at that time." (PP&L Base Rate Case, Page 2095, Lines 17-18.) Moreover, this plant is only in the initial phase of decommissioning and costs have already mushroomed from $247 to $370 million from 1993 to 1995 primarily for spent fuel management costs. (PP&L witness, Thomas LaGuardia, confirmed the figures on Page 1029, Lines 16-22)

Shoreham, a large Boiling Water Reactor (809 MWe), was decommissioned after two full power days of operation or 1/7,300 of the "expected" operating life of the SSES. Therefore, Shoreham is also an unpredictable and unreliable indicator of future decommissioning costs at the Susquehanna Steam Electric Station

The Nuclear Regulatory Commission and "electric utilities" rely heavily on TLG, to construct decommissioning cost estimates based on work completed at Shippingport, Shoreham, Yankee Rowe and small, prototype reactors such as: BONUS (17 MWe) placed in ENTOMBMENT; Elk River (20 MWe) a reactor approximately 2% of Susquehanna's size which operated for five years; and, Pathfinder (60 MWe), which operated for 283 full power days (PP&L Base Rate Case, LaGuardia, Page 1044, Line 1) before being placed in SAFSTOR in 1989.)

TLG's are specious and depend on: 1) The development of nonexistent technologies; 2) Anticipated projected cost of radioactive disposal, and, 3) The assumption that costs for decommissioning small and short lived reactors can be accurately extrapolated to apply to large commercial reactors operating for forty years.

In Response to Interrogatories of the Environmentalists, Set 3, Dated May 19, 1997, PP&L stated: "However, at this time, the Company cannot predict future changes in decommissioning technology, decommissioning costs or nuclear regulatory requirements Accordingly, the Company cannot anticipate future decommissioning cost requirements or the associated rate recovery levels." (Q. & A., 157.)

At the Susquehanna Steam Electric Station, projected costs for decommissioning have increased by at least 553% in the last 19 years. In 1981, PP&L engineer Alvin Weinstein predicted that PP&L's share to decommission SSES would fall between $135 and $191 million By 1985, the cost estimate had escalated to $285 million, and by 1991 the cost in 1988 dollars for the "radioactive portion" of decommissioning was $350 million.

The Company then contracted out for a site-specific study which projected that the cost of immediate decommissioning [DECON] would be $725 million in 1993 dollars. The 1994 cost estimate remained steady at $724 million, but the market value of securities held and accrued in income in the trust funds declined, and thus the estimate reflected another increase in decommissioning costs. (7) (PP&L Base Rate Case, Page, 1016, Lines 7-27 and Page 1017, Lines 1-24.)

7 "PP&L has not performed an analysis which compares the PP&L estimate of $4.6 billion to $5 6 billion in stranded costs to the $3.1 billion estimate prepared by Resource Data International/POWERdata reported on page 12 of the May 1997 edition of Public Utilities Fortnightly." (PP&L's Response to Interrogatories of the Office of Small Business Advocate, Set I, Dated May 22, 1997, Q. & A. 38.)

However, three days earlier, the Environmentalists asked PP&L (Q. & A. 156 b.): "Is the Company aware of any such [decommissioning] studies conducted by others? Please identify and provide each such study conducted by others and in the Company's possession or control."

"PP&L is unaware of any such studies." (PP&L's Response to Interrogatories of the Environmentalists, Set 3, dated May 19, 1997.)

Furthermore, PP&L has never analyzed or evaluated decommissioning cost discrepancies and predictions offered by separate entities

Q.4 a. "Are you aware that PP&L's decommissioning estimates from 1981 (Alvin Weinstein, $135 to $191 million) through 1995 have increased by 553% when TLG projected nuclear decommissioning costs at $724 million?"

A. 4. a. The S.M. Stoller Company study and the TLG studies were prepared using different assumptions. PP&L has not done any study that would compare or equate the two estimates. (PP&L's Response to Interrogatories of Eric Joseph Epstein, Dated June 3, 1997.)

The Industry "leader", Exelon, has filed comments attesting to the imprecise and speculative nature of radiological decommissioning estimates (*See diagram below*). Unfortunately, these figurers (8) are already anachronistic, inaccurate, and grossly underestimate decommissioning since they represent data from studies conducted by TLG (9) from 1995-1996, but *not* filed until January 1, 1998. Therefore, Exelon is not preparing to revise decommissioning estimates until 2003.

Generating Station(s)	*1995 Study/1995 Study*	*$ Increase/% Increase*
Limerick 1& 2	$272m/$986m	$714m/610%
Peach Bottom 2& 3	$273m/$947m	$674m/724%
Salem 1 & 2	$271m/$701m	$430m/600%
Three Mile Island 1 (a)	$60m(b)/$368m or $431m(b)	$308-$371/-(c)

(a) GPU reported that the cost to decommission TMI-2 more than doubled in 48 months By 1997, the decommissioning estimate had nsen 110% in four years to $433 million. (1997, GPU Annual Report.)

(b) TMI-1 total, projected decommissioning expense based on ENTOMB, (1986, GPU Annual Report, p. 39).

(c) TLG's estimate as referenced in the 1998, Annual Report, p 59.

8 **PECO Energy's Response to Eric Epstein's: I-4,** *BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION,* Eric Joseph Epstein's Testimony APPLICATION OF PECO ENERGY COMPANY, PURSUANT TO CHAPTERS 11, 19, 21, 22 AND 28 OF THE PUBLIC UTILITY CODE, FOR APPROVAL OF (1) A PLAN OF CORPORATE RESTRUCTURING, INCLUDING THE CREATION OF A HOLDING COMPANY AND (2) THE MERGER OF THE NEWLY FORMED HOLDING COMPANY AND UNICOM CORPORATION, DATE. Docket No A-110550 F0147, FILED APRIL 17, 2000)

9 All of the above referenced studies were conducted by TLG Industries (TLG) ComEd's net nuclear decommissioning costs have almost doubled from 3,089 million in 1990 to 5,426 million in 1999. (PECO Energy's Response to EE-I-4)

In 1995, ComEd estimated that its decommissioning costs had risen from $2 9 billion to $4 2 billion

However, should Limerick, Oyster Creek, Peach Bottom 2-3, or TMI-1, shut down prematurely, the entire residue of decommissioning funding must necessarily be derived from shareholder and/or Company resources due to the advent of deregulation.

The Company added that, "The original [1985] and current [1995] mode of decommissioning funding is geared toward a DECON method of decommissioning." (PECO's Response to EE-I-4, d) However, since there is no permanent nuclear waste isolation site for spent fuel, SAFSTOR is the most likely decommissioning mode available when PECO's nuclear plants come off-line. (10)

CL-02/18 The GEIS stated, "Based on the number of reactors shut down and the date that they permanently ceased operations, over 200 facility-years' worth of decommissioning experience have accumulated since the 1988 GEIS." (**Executive Summary**, xi). However, based on this statement, and NRC's inability to grasp the "exponential nature" of radiological decommissioning estimates, it appears that the Commission has had the same experience 200 times. Moreover, the GEIS's sophomoric tone in declaring vast decommissioning experience is similar to the NRC's rhetoric at the time of the 1988 GEIS. On May 26, 1988, in Harrisburg, Pennsylvania, the Commission confidently stated they have "considerable experience [decommissioning] with reactors that have not had a significant accident before the end of their useful lives". (NRC, TMI Advisory Panel, May 26, 1988).

10 "A search of ComEd's records reveals that ComEd does not have records of the initial estimates of the indicated decommissioning costs." (PECO's Response to EE-Informal-I-4.)

B. Planned Operating Life of Nuclear Generating Stations

CL-02/19 Experience at large commercial nuclear power plants over 200 MWe has clearly demonstrated that TLG's assumption that nuclear units will operate for 40 years, i.e., "PP&L expects that Susquehanna will operate for its full license life" (11) contradicts existing nuclear reactor experience. The Company's witness, Thomas LaGuardia, was asked by Mr. Epstein: "[H]ow many commercial nuclear power plants in this country have completed their full operating lives?" Mr. LaGuardia replied, "[N]one, essentially." (PP&L Base Rate Case, Page 1023, Lines 20-22.) Additionally, George T. Jones, Vice-President of Nuclear Engineering, was asked by Mr. Epstein:

Q: "In your experience, which is rather extensive at TVA, Entergy and CE, can you at least let me know what is the longest life of a plant you've been associated with?"

A: Mr. Jones, I've never been associated with one that -- none of them have ever reached the end of their licensed life

There has been a lot of work done and continues to be done on life extension, not by us but by the industry. I don't know." (Page 2272, Lines 8-16.)

11 Pennsylvania Power & Light Company, Response to Interrogatories of the Environmentalists, Set 3, Dated May 19 1997, Question and Answer: 167 (Also see, Pennsylvania Power & Light Company, Response to Interrogatories of the Office of Consumer Advocate, Set III, Dated April 17, 1997 and PP&L's Response to Interrogatories of Eric Joseph Epstein, Set I, dated June 3, 1997.)

Additionally, PPL admitted (in the same set of Interrogatory Response of the Environmentalists) that TLG "has not performed, nor is he aware of, any generic studies or studies that address the premature closure of a nuclear unit and the cost of decommissioning under such a scenario." (Q. & A. p. 190)

Moreover, PP&L believes that while the SSES may operate for 40 years, they are not confident that this critical assumption applies to other commercial nuclear power plants

Q 9. "Is the Company aware that if the Susquehanna Steam Electric Station operated for 40 years, it will be retired at the same time as the majority of nuclear reactors in America?"

A. 9. "This question is premised upon an assumption that the majority of other nuclear reactors in America will operate for their full license lives **There is no evidence that this premise is correct.**" **(Boldface type added.)** (PP&L's Response to Interrogatories of Eric Joseph Epstein, Set I, Dated June 3, 1997.)

Even Mr. MacGregor, counsel for PP&L, wavered on Susquehanna's ability to operate for its full-life. Mr. Epstein asked him: "But his [LaGuardia] methodology is based on the fact the plant will operate for 40 years; is that not correct." Mr. MacGregor answered, "I'm not sure that's true." (Page 456, Lines 15-18.)

The Company reconfirmed the 40 year assumption in the 1997 Rate Case. "PP&L expects that Susquehanna will operate for its full license life. Moreover, the Company believes that it can meet 'higher than expected decommissioning costs,' if they arise, and can avoid 'financial difficulties at the responsible entity' by operating its system in a efficient and cost effective manner. The Company has not contemplated additional measures at this time." (Pennsylvania Power & Light Company Response to Interrogatories of the Environmentalists, Set 3, Dated May 19, 1997. Q. & A. 167.) This assertion **contradicts PP&L's direct testimony** about their apprehension and financial vulnerability if the Company is no longer defined as an "electric utility." **(Bold face type added.)**

Mr. LaGuardia's and Mr. Jones's acknowledgments are confirmed by empirical data contained in the GEIS. **(Appendix F & J.)** For example, the following reactors have been shut down prematurely: Shoreham, 809 MWe, operated for two full-power days (which is .000136986% of the estimated life of the Susquehanna Steam Electric Station) and closed before it could begin commercial operation in May 1989; Trojan, 1095 MWe which operated for 40% of its operating life, and completed a unique disposal arrangement with the Hanford Nuclear Reservation (May 1976 to November 1992); Three Mile Island-2, 792 MWe which operated for 1/120 of its operating life (December 1978 to March 1979), Dresden, 200 MWe which operated for 45% of its operating life (July 1960 to October 1978); Indian Point-1, 257 MWe which operated for 30% of its planned operating life (January 1963 to October 1974); San Onofre-1, 436 MWe which operated for 35% of its expected life (from January 1968 to November 1992); and, Fort Saint Vrain, 330 MWe which operated for 27.5% of its expected life (January 1979 to to August 1989) and Big Rock Point a 67 MWe General

Electric BWR which began commercial operation in March 1963 prematurely shut down on August 29, 1997. (World List of Nuclear Power Plants: Operable, Under Construction, or on Order (30 MWe and Over) as of December 31, 1994. "Nuclear News," March, 1995, pp. 38-42.)

On December 4, 1996, Haddam Neck, a 582 MWe Pressurized Water Reactor operated by Connecticut Yankee Atomic Power Company, closed prematurely in the hope of saving rate payers $100 million ("Nuclear Monitor", p. 4, December 1996.) The plant came on-line in January 1968 and operated for 72.5% of its predicted life. Six months later, on May 27, 1997, Main Yankee was shut down and became the first Combustion Engineering reactor to be prematurely retired. The plant, an 860 MWe Pressurized Water Reactor, opened in December 1972 and was scheduled to operate through 2008.

The Connecticut Department of Public Utility Control removed Millstone-1 from the rate base on December 31, 1997. Millstone-1, a 660 MWe General Electric Boiling Water Reactor operated by Northeast Utilities, began operation in March, 1971 before being prematurely retired. More importantly, the decision prevents Northeast Utilities from charging rate payers for costs associated with the shutdown.

And, on January 15, 1998, Commonwealth Edison(ComEd) announced it was permanently shutting down Zion-1 and Zion-2, 1040 MWe Westinghouse PWRs. Zion-1 began commercial operation in December 1973 followed by Zion-2 in September 1974. ComEd also reported this decision will cost shareholders $515 million or $2 38 per share. With the shutdown of Zion, premature closure has occurred for every nuclear reactor type and supplier in the United States of America.

A sense of fair play, intergenerational equity, and risk sharing between rate payers and taxpayers on one hand, and shareholders and Board Members of on the other, necessitate that the Nuclear Regulatory Commission and licensees plan for decommissioning based on the assumption that their nuclear units will be prematurely shut down. As previously noted, operating capacity and historical evidence from commercial nuclear power plants give no valid indication that nuclear generating stations will operate for 40 years. (12) On the contrary, reactor history has resoundingly demonstrated that nuclear power plants have not operated for the term of their license.

CL-02/20 Obviously, there are chronic shortfalls between "targeted" funding levels and actual costs for nuclear decommissioning. The burden of proof rests squarely on the shoulders of power reactor licensees, their partners and the NRC to demonstrate that a 40 year operating life, which they predicate their financial planning upon, is realistic. Furthermore, the nuclear industry has exacerbated this problem by resolutely refusing to put aside adequate funds for non-radiological decontamination and decommissioning

12 In *Re Wolf Creek Nuclear Generating Facility*, 70 PUR 4th 475 (1985), the Kansas State Corporation Commission was confronted with the pudency of the construction of a nuclear generating plant. On the issue of decommissioning, the Commission stated that "Decommissioning cost estimates are inherently uncertain and speculative" and that "[t]o date, there has been no actual experience decommissioning a large, commercial nuclear plant and cost estimates have been traditionally low."

In addition, the Commission held that "The current shortage (indeed nonexistence) of the site for the disposal of large quantities of radioactive waste makes detailed estimates of shipping distance and cost virtually impossible." Id. at 540-41. In the *Wolf Creek* rate case, Mr. LaGuardia (also a Company witness in the 1995 PP&L Base Rate Case) failed to include inflation in his cost estimates and assumed a forty year operating life for the nuclear plant. Id. On the basis of this omission and the speculative predictions of operating life, the Commission chose a "midpoint" of LaGuardia's testimony.

The Commission also declared, **"We believe that the NRC and general industry estimates of 30 years is a valid and realistic life to utilize for purposes of decommissioning estimates"** Id. at 541. **(Bold faced typing added.)** The NRC must adopt and promulgate consist decommissioning mandates, which includes planning for nuclear decommissioning around a thirty (30) planned operating life

C. Spent Fuel Isolation

CL-02/21 Spent fuel "disposal" is an unresolved and hugely problematic area. Each reactor produces approximately 20 to 30 tons of I high-level radioactive waste per year. There is presently, and at least until 2010, nowhere to put this waste. The technology to safely manage spent fuel for an indefinite period of time does not exist. While the manner of spent fuel management may differ, i.e. re-racking and possibly dry cask storage all operating nuclear power plants are forced to store high-level, radioactive waste in the form of spent fuel on-site.

There is no location to permanently store spent fuel and high level radioactive waste (HLW) generated by nuclear power plants. This is significant problem for Exelon Nuclear which operates the largest nuclear fleet in America (13) In fact, many of Exelon's reactors are close to losing Full Core Off load Capability.

Reactor	*Core Size*	*Lose Full Core Off load Capability*
Limerick 1	764	2006
Limerick 2	764	2006
Oyster Creek	560	LOST
Peach Bottom 2	764	2000
Peach Bottom 3	764	2001
Salem 1	183	2012
Salem 2	193	2018
Three Mile Island	177	NA

(Source: PECO Energy's Response to Eric Epstein's, I-12, Unicom Merger Proceedings, PA PUC, 2000)

13 "...PECO Energy Company, each decommissioning cost evaluation presumes a date for a permanent high level radioactive waste (HLRW) facility This allows for a cost comparison with other estimates. The following dates are included as 'presumed' in the cost estimates...Oyster Creek: DOE commences pickup in 2010...TMI: DOE commences pickup in 2010...PBAPS [Peach Bottom Atomic Power station] 2 & 3: DOE commences pickup in 2010, LGS [Limerick Generating Station]: DOE commences pickup in 2010, Salem 1 & 2: DOE commences pick up in 2010." (PECO Energy's Response to EE-I-10)

Exelon's response to the critical shortage in spent fuel capacity has been to gamble, CL-02/23 and increase storage capacity through an untested, commercial dry cask technology

Station	*Dry Cask Technology*	*Deployment Date*	*Contractor*
Limerick	BD	Summer 2010	TBD
Oyster Creek	NUHOMS 52B (c)	July, 2010	None
Peach Bottom	Trans-Nuclear TN-68	June, 2000	Raytheon
Salem (a)	None	TBD	None
TMI (b)	None	TBD	None

(Source: PECO Energy's Responses to EE-I-11 & EE-I-12.)

(a) Salem has no plans to extend spent fuel capacity though dry cask storage or re-racking

(b) TMI-1 plans to increase spent fuel storage capacity by re-racking in 2002.

(c) Holtec is the new vendor chosen to provide dry cask services at Oyster Creek (PECO's Response to Eric Epstein's Informal I-8)

CL-02/22 When, and if, spent fuel storage is increased (14) at the above mentioned facilities, the additional upward 'adjustments" will have a significant impact on decommissioning funding This cost, which was omitted from TLG's estimate, "None of the estimates we have prepared include the cost of disposal of spent nuclear fuel" (1995 PP&L Base Rate Proceeding, Page 1032, Lines 20-12) is the main contributing factor to the escalation of decommissioning CL-02/24 costs at Yankee Rowe. Thomas LaGuardia, the Company's witness, admitted the increase during cross examination·

Mr. Epstein: "Are you aware that the cost has increased for the decommissioning of Yankee Rowe from $247 million to $370 million over the last two years?"
Witness: "Yes. I'm aware of what the estimate concludes."

Mr. Epstein. "And half of the cost was attributable to spent fuel storage?"
Witness: "That's correct." (Page 1029, Lines 16-22.)

14 "PECO Energy Company is participating in research projects on spent nuclear fuel (SNF), and Transportation methods for SNF, through EPRI and NEI. The total spending on these projects is in excess of $250,000 per year." (PECO's Response to EE-Informal-I-11).

Aggravating the critical shortage of HLW storage space is the bleak estimate for the completion of Yucca Mountain, the designated repository for high level nuclear waste. The earliest date this repository could be available is 2010. Lynn M. Shishido-Topel served as the Overseeing Commissioner of the Illinois Commerce Commission testified on behalf of the National Association of Regulatory Commissioners before the House Subcommittee on Energy and Mining Resources and the House Committee on Oversight and Investigations (March 17, 1995.) Shishido-Topel recognized **eight years ago** that she was "fairly certain that DOE would not meet its revised 2010 deadline to begin accepting spent fuel from commercial reactors " [Bureau of National Affairs (BNA), "Federal Facilities: Industry, DOE Struggle to Find Acceptable Solution to Interim Storage of Spent Fuel, Daily Environment Report News, March 18, 1994 [1994 DEN 52 d10]. She also predicted that the amount of spent fuel generated by 2000 will be 40,000 metric tons (MTU). This amount of waste would exceed Yucca Mountain's capacity, and the State of Nevada has demonstrated that Yucca Mountain will probably hold about 20% of the total 85,000 MTU of spent fuel earmarked for the facility. (State of Nevada, Nuclear Waste Project Office, Scientific and Technical Concerns, pp 8-11.)

As early as 1995, concerns about Yucca Mountain's integrity surfaced from scientists at Los Alamos National Laboratories. Dr. Charles Bowman warned that plutonium would remain after the steel casks holding the nuclide dissolved Plutonium could then migrate and concentrate. (*The New York Times*, p 1, March 13, 1995.) And in February 1999, the scientific peer review panel for Yucca Mountain commissioned by the Unites sates Department of Energy (DOE) produced a "highly critical" report. "The review panel said the model [DOE's computer model] has so many uncertainties - like the corrosion rates of waste containers, the area's vulnerability to earthquakes and how climate changes would affect rainfall - that its reliability was limited " (*The New York Times Science*, "New Questions Plague Nuclear Waste Storage Plan," Jon Christensen, August 10, 1999)

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CL-02/25 Furthermore, on October 4, 1999, LeBoeuf, Lamb, Green & MacRae, filed a complaint alleging a conflict of interest by the Department of Energy in their selection and awarding of $16 million legal contract to Winston & Strawn Former general counsel to the Energy Department, R Tenney Johnson, in a sworn affidavit, stated: "[A] situation has been created which an entity [Winston & Strawn] will pass judgment on its own work." (Matthew Wald, *New York Times*, October 5, 1999.)

Exelon's "political strategy" relative to finding a solution for a permanent spent fuel storage facility has been disappointing, and reflects the philosophy of the Nuclear Energy Institute

> The planned fall-back scenario in the event of unavailability of low-level radioactive waste disposal facility would be to continue political pressure on the Sates and US Government to support the development of permanent low-level waste facilities. In the event that a high-level radioactive waste facility is unavailable, the station would continue spent fuel management under "dry storage". Any station without dry storage capability would establish dry spent fuel storage management if its likely that the DOE would not receive spent fuel in a prudent time frame and wet fuel storage is no longer feasible.
> (PECO Energy's Response to EE-I-14)

CL-02/26 Isolation of high-level radioactive waster, which is primarily composed of spent fuel, can not be separated from radiological decommissioning The earliest Yucca Mountain will be available is in the year 2010. Nuclear generating stations can not be decommissioned or decontaminated with the presence of HLW on-site or inside the reactor vessel. Aggressive decontamination process will be precluded, necessitating utilities to place retired reactors into extended-DECON or SAFSTOR. If a long term solution to spent fuel isolation is not found in the immediate future, some of the nation's nuclear generating stations will be shut down prematurely due to an absence of spent fuel storage capacity. **Cost projections**

CL-02/27 **by "electric utilities" must be revised to necessarily include funding scenarios that anticipate premature closure.**

D. Low Level Radioactive Waste Isolation (15)

CL-02/28 TLG provided nuclear waste storage and nuclear decommissioning costs estimates for all Pennsylvania utilities regulated by the Public Utility Commission. However, TLG's testimony during the 1995 PP&L Base Rate Proceeding discredits their projections. Mr. La Guardia based his cost estimates for low-level radioactive waste (LLW) disposal on the assumption that the Appalachian Compact would be available when the SSES closes (PP&L Base Rate Case, Page 1034, 17-20). He concluded that the disposal of LLW is the most expensive component in the decommissioning formula (Page 2091, Lines 21-25.) Furthermore, Mr. LaGuardia conceded that it may be necessary to recompute cost estimates for disposal because it now appears imminent that Barnwell will open for seven

15 This term is imprecise and "low-level" is not analogous to low-risk

The GEIS definition of LLW on M-11 is **misleading** and is symptomatic of problems embedded in **Appendix M: Glossary.**

The overwhelming majority of "low-level" nuclear waste comes from nuclear power plants and includes· irradiated components and piping; control rods, poison curtains, resins, sludge, filters and evaporator bottoms; even the remains of entire nuclear power plants if and when they are decommissioned.

Radioactive medical waste comprises less than .1% of the radioactivity to shipped all "low-level" radioactive waste sites. If you factor academic waste into the formula, 2% of all "low-level" radioactive waste is derived for biomedical sources

The above mentioned figures are national averages derived from the Department of Energy between 1987-1990. What does the"low-level" radioactive waste stream look like in the Appalachian Compact? Of the compact states of West Virginia, Delaware, Maryland and Pennsylvania, the Commonwealth generates approximately 85 % of the radioactive waste or 170,000 cubic per year. The source of radiation is as follows: nuclear power plants· 80%; industry: 12%; medical. 5%, and academic institutions less than 1% However, the amount of radioactivity present in the volume is even more unbalanced: nuclear power plants: 92%; industry 7%; medical .1%; and academic institutions:.07%. The nuclear waste site planned for Pennsylvania is primarily for the use of the nuclear industry

to ten years for all states except North Carolina (Page 2108, Lines 4-9.) However, the Company has not yet taken the step of reconfiguring costs of LLW disposal now that Barnwell has been open since **July 5, 1995. (Bold face type added.)**

Q. 7. "Has TLG or the Company recomputed decommissioning estimates since Barnwell has reopened?"

A. 7. "No." (Pennsylvania Power & Light Company Response to Interrogatories of Eric Joseph Epstein, dated June 3, 1997.)

Barnwell is currently operating and has the capacity to function through 2006 In a response to a formal inquiry posed by Mr. Eric Epstein, Chairman of Three Mile Island Alert, Inc., on May 18, 1996, concerning Barnwell's operating and capacity status, Chem-Nuclear Systems, Incorporated, the owners and operators of the Barnwell, declared:

> Our analysis is based on the insights and understanding that come from having a major operation in South Carolina. The realities are that Chem-Nuclear LLRW disposal facility in Barnwell, S C. has sufficient disposal capacity to remain open to the nation for approximately 10 years based on volume received (Walter E. Newcomb, Ph D., Vice President and Project Manger, CNSI Pennsylvania Office, May 18, 1996.)

CL-02/29 In addition to recomputing the cost of LLW disposal, the reopening of Barnwell has indefinitely postponed the siting of a waste facility in Pennsylvania Marc Tenan, Appalachian Sates LLW Commission executive director observed: "If Barnwell's going to open to the entire country for at least the next 10 years, is there really a pressing need to continue work on regional disposal facilities?" ("ACURIE Newsletter, About Low-Level Radioactive Waste Management," May 1995, Page 1.)

On June 18, 1998, the Appalachian States LLW Commission voted to support the Pennsylvania Department of Environmental Protection's suspension of the siting process for a Low-Level Radioactive Waste Disposal Facility.

CL-02/30 Limerick, Oyster Creek, Peach Bottom, Salem, and Three Mile Island are among the nation's nuclear generating stations currently serving as "temporary" repositories for low-level radioactive waste. Limerick, Peach Bottom, and Three Mile Island do not meet the standards set by the Appalachian Compact in regards to a permanent LLW facility.

> Neither PECO nor ComEd consider its nuclear generating sites to be appropriate for permanent isolation of either low-level or high-level radioactive wastes generated as a result of operations. ComEd will continue to store only radioactive waste generated at each site on a temporary, as-needed basis.
> (PECO Energy's Response to EE-I-13)

E. Rate Payer Equity

CL-02/31 Objective empirical data clearly demonstrate that the majority of commercial nuclear power plants will not operate through their planned operating life of forty years (40) While the power reactor licensees are entitled to recover a portion of decommissioning funding through the rate, they are not entitled to a full and complete rebate on "stranded investments", and shortfalls that will certainly arise do to the underfunding of nuclear decommissioning "funding targets". Shareholders and Board Members of electric utilities and Rural Electric Cooperatives (REC) must assume responsibility for their business decisions. These aforementioned entities aggressively sought to license, construct, and operate nuclear power plants To allow artificial definitions concerning ownership of nuclear generating stations to insulate those who cogently made capital investments is immoral, unethical, and an endorsement of corporate socialism That is, shareholders profit from imprudent investment decisions and are accorded relief when error of mismanagement becomes manifest.

The issue of rate payer equity and the mandated feasibility of shared costs was highlighted in PP&L's Base Rate request before the PUC. The Company went on record during the hearings as being disgruntled with the manner in which decommissioning costs are unfairly distributed among rate payers. Mr. Douglas A. Krall, Manager-Integrated Resource Planning for PP&L is on record decrying the current decommissioning formula during the PP&L Base Rate Case:

Mr. Epstein: "That if the rate increase for decommissioning fossil fuel plants are delayed future customers would unnecessarily be at risk "

Mr. Krall: "Yes. There would be an exposure that a customer who came on the last day of operation of the plant would get very little service from the plant and end up paying the whole cost of decommissioning." (Page 1925, Lines 16-24.)

Mr. Epstein: "But you would not be adverse to assessing future customers who got no electrical benefit from a plant decommissioning costs?"

Mr. Krall. "It doesn't seem to me to be an equitable situation." (Page 1927, Lines 9-13.)

Yet, PP&L sidestepped the issue of intergenerational rate equity and focused on intraclass and interclass cost shifting prior to the *Joint Petition For Full Negotiated Settlement of PP& L Inc 's.'s Restructuring Plan and Related Court Proceedings*, August 12, 1998:

> For any customer, a change in the recovery of CTC costs from a usage rate to a customer charge does not constitute an intraclass or interclass shift in cost recovery, as long as those charges are developed consistent with the rate cap and so that the customer's total bill is held constant during rate restructuring, absent any changes in usage. The Company's approach meets these tests. No customer is picking up costs for another customer within his or her class or from other rate classes. (S.F. Tierny, Pennsylvania Power & Light Company response to Interrogatories of the Pennsylvania Petroleum Association, Set A, Dated June 10, 1997. Q. & A. 20.)

This formula only serves active and hostage PP&L rate payers. The Company has made no provisions to insulate near future customers (seven to ten years) from financing stranded debt on a nuclear generating station.

The Pennsylvania Public Utility Commission cited Nuclear Regulatory Commission guidelines that suggested five criteria for evaluating alternative financing mechanisms for nuclear decommissioning. One of the components of was titled "Intergenerational equity - that the cost of decommissioning be spread equitably to all rate payers throughout the life of the facility" Unless a more equitable funding formula for nuclear decommissioning is established, rate payers and tax payers who received little or no direct electrical benefit from nuclear generating, will be financially exposed.

The nuclear industry must assume responsibility for their investment strategies. Creating and perpetuating intergenerational debt is reckless and fundamentally inequitable and undemocratic

Future generations may be exposed to gross rate payer inequity if adequate decommissioning funding based on realistic estimates (and not "funding targets") are not assured. The solution should not be a financial safety net provided by hostage rate payers and tax payers excluded from internal corporate decision making "Electric utilities" must assume financial responsibility for their decisions to invest in nuclear power which necessarily means the shareholder should bear a substantial portion of post-deregulation decommissioning expenses. Clearly, a formula must be established that recognizes rate payer and tax payer equity for the realized service that power reactor licensees provide. It is timer for the Nuclear Regulatory Commission to recognize, through its Environmental Impact Statements, that consumers and tax payers are human beings and not abstract, hypothetical billing invoices

F. Nuclear Plant Valuation

CL-02/32 Since deregulation, numerous nuclear plants have changed hands To "cushion" the transition from regulated monopoly to competitive marketplace, many states allowed "electric utilities" to recover "stranded costs". Rate payers are saddled with paying for the industry's uneconomical investments, i.e., "stranded costs. " Two of the most "bullish" nuclear corporations, Exelon and PPL, recovered over $8 3 billion in "uneconomical investments". This figure does not include the millions in savings Exelon and PPL have accrued by unilaterally devaluing the combined PURTA and Real Estate tax assessments for their nuclear generating stations.

The Susquehanna Steam Electric Station is the most glaring example of a company "devaluing" their property at the expense of taxpayers, while billing the same hostage rate payer for uneconomical investments, and exposing this rate payer/taxpayer to further financial exposure related to the underfunding of nuclear decommissioning.

In the of Winter 1999-2000, PPL unilaterally devaluated the combined PURTA and Real Estate tax assessments for the SSES. Prior to the 1998 Joint Petition for Negotiated Settlement, the nuclear power generating units were assessed by PP&L at approximately $1 billion. PPL now claims that the SSES is only worth $74 million or the same amount as the valuation of the Columbia Hospital. Not only did the Berwick School District and Luzerne County experience revenue shock, but PPL refused to pay or escrow any monies they owed to Luzerne County and the Berwick School district while the case was being appealed.

PPL's behavior is all the more egregious in an era where nuclear plant's value on the open-marker are equal to, or in excess, of fossil generating stations. For example. Entergy and Dominion resources engaged in a bidding war to purchase the Fitzpatrick and Indian Point 3 nuclear generating stations from the New York Power Authority (NYPA). The sale established a record high.

> According to press reports, Entergy's winning bid for the total 1,805 megawatts of capacity offered $967 million, or 535 per kilowatt...The price per kilowatt not only exceeds the previous average unadjusted price for nuclear assets - $75 per kilowatt-but also exceeds the average price paid for fossil capacity-$360 per kilowatt." "NYPA's Nuke Auction: More at Sake Than Price?", *Public Utilities Fortnightly*, July 15, 2000, p. 90.

CL-02/33 The GEIS failed to address the issue of nuclear plant "devaluation" and revenue

CL-02/34 shock. This "revised" document also failed to adequately address and factor the socioeconomic impact of "Greenfield" on the revenue base of local municipalities. (*Please refer to Enclosure IV for a report on the impact devaluation has had on communities in Pennsylvania*).

G. JOINT OWNERSHIP

CL-02/35 The most disturbing and financially bizarre component of radiological decommissioning is the relationship between a "power reactor license" and the "minority power reactor licensee ". Unlike "power reactor licensees", " fractional licensees" are not subjected or mandated by the Nuclear Regulatory Commission to empirically verify, report or monitor record keeping relating to nuclear decommissioning funding mechanisms In some instances, even Public Utility Commissions lack the ability to mandate or regulate savings levels from "fractional licensees", e g., Rural Electric Cooperatives.

At PPL's Susquehanna Steam Electric Station, the "minority licensee", the Allegheny Electric Cooperative, is scheduled to contribute 10 (ten) to the total cost of decommissioning funding. The "power reactor licensee's" estimated PPL's share decommissioning share to $724 or 90% of the total cost of decommissioning. Based on this calculation, AEC 's 10% share of $804 million should be $79 million. However, Allegheny is setting aside a figure based on 5% of the final decommissioning costs even though Laurence V. Bladen, Director of Finance and Administrative Services told Mr. Epstein that AEC is basing its decommissioning costs on data supplied by PP&L. (Telephone conversation, March 30, 1995) "Allegheny's portion of the estimated cost of decommissioning SSES is approximately $37.8 million (same figure enumerated in the AEC 1993 Annual Report, p 27) and is being accrued over the estimated useful life of the plant." (Decommissioning Trust Fund Allegheny Electric Cooperative, 1994 Annual Report, **Cost of Decommissioning Nuclear Plant**, p 49) The AEC's cost projections have not changed since 1993.

Unfortunately, Exelon has a similar financial relationship at Peach Bottom with its proportional partner, Public Service Electric and Gas (PSE&G). At Salem, where, PSE&G is the "power reactor licensee," PECO has a similar financial stake but asserted:

> The 42.6 % ownership share in Salem requires that the percentage of the decommissioning be PECO Energy's responsibility. A decommissioning trust fund has been established by PECO Energy and coordinated with PSE&G for that portion of the ownership share
>
> (PECO Energy's Response to EE-I-5a)

PECO and PSE&G have a history of protracted and acrimonious litigation, and decommissioning coordination can not be guaranteed or mandated After the NRC ordered the shut down of Peach Bottom 2 & 3 in 1987, PSE&G, Delmarva Power & Light Company and Atlantic City Electric sued PECO in 1988, and alleged the Company had "breached" its contract under the Owners Agreement. Several tort claims were also filed "As part of the settlement, Philadelphia Electric will pay $130,985,000 on October 1, 1992 to resolve all pending litigation." (Joseph Paquette, President & CEO, PECO, April 8, 1982.)

After Salem's chronic mechanical and technical kept the plant shut down for a prolonged outage, beginning in 1995, Exelon sued PSE&G, and,

> On December 31, 1997, the Company received $70 million pursuant to the May 1997 settlement agreement with PSE&G resolving a suit filed by the Company concerning the shutdown of Salem. The agreement also provides that if the outage exceeds 64 reactor unit months, PSE&G will pay the Company $1 million per reactor unit month.
> (PECO Energy, 1997 Annual Report, **Note 21. Other Income**, p 44)

Clearly, this history of protracted litigation does not foster an ideal environment of comity nor does it facilitate a rational coordination of decommissioning funding

ComEd also has a dysfunctional relationship with its proportional shareholder at Quad Cities. "ComEd ["power reactor licensee"] does not know the mode that MidAmerica Energy [proportional owner] uses for nuclear decommissioning nor the amount of money being set aside by MidAmerica Energy." (PECO Energy's Response to EE-I-6.)

The impact of this uncertainty between decommissioning partners is clear. PECO has no enforcement mechanism to compel PSE&G to fund 42.49% of the decommissioning costs at Peach Bottom. While PSE&G may be obligated to come with their share of decommissioning costs, the "minority licensee" is under no obligation to accept the "power reactor licensee's" estimates or mode of decommissioning. PSE&G tenuous financial position in regard to inadequate decommissioning savings will place a greater fiscal burden on PECO and, thereby; 1) Create further uncertainties about the Company's ability to meet its financial commitments to decommission Peach Bottom 2 & 3; 2) Undermine TLG's net decommissioning estimates; and, 3) Dilute TLG's contingency factor.

CL-02/36 The cost estimates for non-radiological decommissioning (an imprecise term) are not mandated by the NRC. "For PECO Energy Company and ComEd, the costs for 'Greenfield' are included in the cost estimates and in the funding streams established for decommissioning." (PECO Energy's Response to EE-I-8b.) However, Greenfield, i e., the original environmental status of nuclear generating station prior to construction of the nuclear power plant, has never been achieved by an operating nuclear generating station. Moreover, this site status is unattainable if a station is placed in delayed-SAFSTOR, DECO, or ENTOMB.

One only need look at Three Mile Island to see why this is a potential financial boondoggle. Three Mile Island is owned by three different companies, and controlled by one holding company: General Public Utilities. Jersey Central Power & Light (JCP&L), which owns 25% of the plant, was granted permission to raise decommissioning funds anticipating DECON as the method of decommissioning. Metropolitan Edison (Met Ed), which owns 50% of the plant, was denied decommissioning funding based. Met Ed is anticipating SAFSTOR as the preferred method of decommissioning. As it stands, 25% of the decontamination and decommissioning of TMI-2, a plant that operated for 1/120 of its projected life is being picked by JCP&L customers while the other 75% (Pennsylvania Electric owns 25% of TMI) remains in limbo and will most probably be assessed against the shareholders In turn, the shareholders are likely to opt for the cheapest method of decontamination and decommissioning. I.e, ENTOMB.

Exacerbating an already bizarre situation is the fact that AmerGen (PECO Energy and British Energy) owns TMI-1 AmerGen has sole financial and technical responsibility for decommissioning this facility. GPU owns the Possession Only License at TMI-2 which has yet to be decommissioned or decontaminated. Further complicating the situation is First Energy's merger (November 7, 2001) with GPU which includes ownership of Three Mile Island Unit-2

H. REGULATORY AMBIGUITY

CL-02/37 Former Senator John Glenn and the General Accounting Office announced in November 1994, that it is time for the Environmental Protection Agency (EPA) and the NRC to coordinate radiation protection standards which are based on risk-assessment. **Eight years later,** the agencies have been unable and unwilling to settle their conflicting regulatory standards As it stands, how would the nuclear industry determine what levels constitute "Greenfield?" (16) Worker exposures remain decidedly liberal. The NRC allows a 1-in-286 lifetime fatal cancer due to "acceptable" routine releases from NRC licensed facilities and NRC occupational standards for workers is 1-in-8 lifetime fatal cancer Translating this into human terms, Dr. Peter Gartside, Professor of Bio-Statistics at the University of Cincinnati, found workers at Fernald died at significantly younger ages and suffered a higher incidence of intentional and blood cancers than the US population (April, 1994). The Commission has already approved a 1-in-285 lifetime cancer, or 100 MR/year and rejected the Staff's recommendation of 3 MR/year of residual radiation

CL-02/38 The most formidable governmental regulations facing nuclear related industries is conflicting regulatory authority. Uncertainty is the enemy of the electric industry. This is most clearly evident in the decontamination and decommissioning of nuclear power plants

CL-02/39 Funding targets to bring a site back to "Greenfield" are set by the Nuclear Regulatory

CL-02/40 16 The GEIS's glossary superficially glosses over "Greenfield" and equates it with an " an end state of decommissioning..." (M-7 & 2-5).

According to NRC Regulations, Greenfield is achieved when a nuclear generating station is returned to "original status" prior to licensing, construction, and generation of nuclear power. The NRC would then clear the site for "free release" and allow a "school or playground" to be constructed at the former nuclear power plant.

Commission and do not include spent fuel disposal or non-radiological decommissioning. However, the NRC has no rate making authority and electric utilities must go before state utility commissions to recover funding levels "suggested" by the NRC. But the Companies are not mandated by the federal government to submit detailed funding plans until two years prior to site closure. In addition, if a utility has been saving for DECON, but SAFSTOR is necessitated, the funding package becomes grossly inadequate.

Moreover, as Mr. LaGuardia attested (1995 PP&L Base Rate Case, Page 2100, Line 24), there are conflicting radiation clean-up standards for soil, water and surface as defined by the Environmental Protection Agency and the Nuclear Regulatory Commission and each agency has conflicting cleanup standards for site restoration (16). (Witness, LaGuardia, Page 2099, Lines 20-25 and page 2100, Lines 1-18)

17 For further discussion see FR 52061, October 23, 1981; 42 FR 60956, November 30, 1977; 40 CFR 192, 12, July, 1989 and US NRC, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Nuclear Material " Policy and Guidance Directive FC 83-23, Division of Industrial and Medical Nuclear Safety, Washington, DC, August, 1987.]

III. SUMMARY

I find it highly unlikely, in today's uncertain utility industry, that anyone would invest in the new plant designs for nuclear power, which are still highly capital intensive. "The Bush Plan and Beyond: Toward a More Rational U.S. Energy Policy," *Public Utilities Fortnightly*, July 1, 2001, p. 37.

CL-02/41 **As of this filing, no commercial nuclear power plant has been decommissioned, decontaminated, and returned to free-release. Nuclear decontamination and decommissioning technologies are in their infancy and several identifiable industrial trends are apparent when reviewing the Nuclear Regulatory Commission's treatment of prematurely shutdown reactors: 1) There is a reluctance to undertake, initiate or finance decommissioning research;**

P-96 CL-02/42 **(18); 2) Prematurely shutdown reactors place an additional financial strain on the licensee; and, 3) These reactors have been retired for mechanical or economic reasons. [United States Nuclear Regulatory Commission, *Advisory Panel for the Decontamination of Three Mile Island Unit-2*, September 23, 1993.]**

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18 Q. 12. "What technological initiatives are PP&L pursuing to ensure decommissioning technology is available when the SSES is no longer operational?"

A. 12. "PP&L expects that appropriate decommissioning technology will be available at the time Susquehanna is decommissioned, and accordingly, is not pursuing additional 'technological initiatives' at this time." (Company's Response to Interrogatories of Eric Joseph Epstein, Set I, Dated June 3, 1997.)

IV. NEPA & "PSYCHOLOGICAL STRESS"

Before discussion the **ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER**

CL-02/43 **REACTORS; Conclusions**, it is important to address NEPA and "psychological stress." **(Scope - D)** The GEIS correctly paraphrases PANE vs. Metropolitan Edison, and excludes "psychological strews" from the "scope of this supplement". (1-8).T However, the reality is that "psychological stress" exists, and will continue to exist In fact, if the NRC had revisited the issue of "psychological stress" and the TMI community, it would have found the following:

On June 22, 1979, Governor Richard Thornburgh (R) wrote to the NRC, expressing his "deeply felt responsibility for both the physical and psychological well being of the citizens of Pennsylvania." Thornburgh affirmed his "strong opposition to any plans to reactivate Unit -1 until a number of very serious issues are resolved."

Three years later, on January 7, 1982 , the D.C. Circuit Court decided psychological (psych) stress does not need to be covered during the restart hearings. However, the Court ruled, that under the **National Environmental Policy Act (NEPA), psych stress must be addressed. The Court ordered an injunction on restart until a study on psych stress was conducted.** However, on April 19, 1983, The United States Supreme Court reversed the D.C. Circuit Court's opinion on psych stress and ruled an environmental study is not necessary.

Two months later, on May 5, 1983, GPU revealed for the first time to the NRC that management audits, including psychological evaluations, concluded by BETA and RHR, completed in February and March, 1983, were critical of plant operations and management.

In August 1985, Marc Sheaffer, a psychologist at the Uniformed Services University of the Health Sciences in Bethesda, released a study linking TMI-related stress with immunity impairments.

Subsequently in August, 1987, James Rooney and Sandy Prince of Embury of Penn State University reported that chronically elevated levels of psychological stress have existed among Middletown residents since the accident.

Additionally, in April, 1988, Andrew Baum, professor of medical psychology at the Uniformed Services University of the Health Sciences in Bethesda discussed the results of his research on TMI residents in *Psychology Today*. "When we compared groups of people living near Three Mile Island with a similar group elsewhere, we found that the Three Mile Island group reported more physical complaints, such as headaches and back pain, as well as more anxiety and depression. We also uncovered long-term changes in levels of hormones These hormones affect various bodily functions, including muscle tension, cardiovascular activity, overall metabolic rate and immune-system function .."

The NRC can hide behind NEPA or any other convenient acronym, but "psychological stress" is a verifiable fact of life for people who live and work, in and around, nuclear power plants

V: CRITICISMS & SUGGESTIONS of
4.0 ENVIRONMENTAL IMPACTS of DECOMMISSIONING
PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS

CL-02/44 **(4.1.1) Terms of Significance of Impacts**

The Nuclear Regulatory Commission employed a "standard of significance" developed by the Council of Environmental Quality (CEQ).

> **Context** means that the significance of an action must be analyzed in several contexts, such as a society as a whole (human, national) the affected region, the affected interests, and the the locality (4-1.)

However, no "electric utility" constructs, operates, or decommissions a nuclear station without economics being the paramount consideration Yet, the NRC and CEQ have created a nuclear Potamkin Village where economic imperatives are subordinated to the behavioral science flavor-of-the-day. In the NRC's world, an "electric utility" can apply for a loan using NEPA as collateral. I hope that at the end of the GEIS process the Commission can provide me with an address so that I can relocate my family to a neighborhood-without-economic considerations

CL-02/45 **(4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; On site/*Off* site Land Use - Conclusions:**

The GEIS stated, "it is rare for decommissioning activities to affect off-site land use ." (4-7) This statement fails to recognize that most nuclear generating stations are located in close proximity to substantial water resources. The Susquehanna Steam Electric Station, Three Mile Island and Peach Bottom are located on, or adjacent to the Susquehanna River which feeds the most productive estuary in America, i e., the Chesapeake Bay.

CL-02/46 Decommissioning and decontamination tasks affect people's perception, especially when these visibly intrusive and audibly offensive activities are in close proximity to their homes and recreational areas Peach Bottom and Three Mile Island are located next to prime water skiing and boating areas on the Susquehanna River. Dozens of summer cabins are located less than 100 yards from TMI on Shoilley. Fishing takes place on a daily basis, and Boy Scout badges are available by completing outdoor activities on Three Mile Island.

CL-02/47 The Staff should visit TMI and then travel to Clinton Lake to examine how perceptions and reality affect "off site land use".

> After the terrorist attacks, the U.S. Nuclear Regulatory Commission advised all nuclear power plants to move to the highest level of security. Exelon Nuclear, which operates the Clinton nuclear power plant and owns the sprawling, 5,000-acre Clinton Lake, promptly ordered all boats off the lake and closed it.
>
> It remains closed to this day nearly two months later. The power plant uses water from the lake to cool the reactor core.
>
> The closure is causing economic hardship for a number of businesses that cater to boaters, who value Clinton Lake because of its size and its lack of restrictions on boat horsepower. Some business owners say they'll have to shutdown if the lake isn't reopened by next spring.
>
> (*The News Gazette*, Champaign , Illinois, November 4, 2001)

The GEIS must acknowledge the potential for adverse economic impacts on a community during decommissioning

CL-02/48 **(4.3.2.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Water Use - Conclusions:** (The discussion **4.3.1.4 is also relevant)**

The GEIS stated, "The overall water use of a nuclear facility will dramatically decrease one the once the reactor has stopped operating and the demand fro cooling and makeup water ceases." (4 9-4.10) On the surface, this statement appears to be correct. However, at Three Mile Island, a considerable amount of "cleanup water" was created ***after*** the plant was shut down:

In 1980, the Susquehanna Valley Alliance, based in Lancaster, successfully prevented Met Ed (GPU) from dumping **700,000 gallons of radioactive water** into the Susquehanna River. Ten years later (December, 1990), despite legal objections, GPU began evaporating **2.3 million gallons of accident-generated radioactive water** (AGW). From December, 1990 to January 1991, the evaporator was shut down five times due to electrical and mechanical "difficulties." And from April-May1991, the evaporator was shut down for most of this period so GPU could "rewrite the main operating procedure." The Nuclear Regulatory Commission (NRC) issued a Notice of Violation related to evaporator operations. Two months later (June, 1991) the NRC noted repeated mispositioning of AGW valve. The valve in question was also involved in the NRC's Notice of Violation issued in Apnl.

By February 1992, the "portable" evaporator was shut down again due to the failure of the blender-dryer. Replacement of the blender was delayed until August. By May 1992, GPU decided to use a "temporary" blender-dryer until a permanent replacement was installed in August. However, from August-September 1992, some of the water in the evaporator's borated water storage tank was "processed" twice due to "slightly higher activity levels." And in November 1992, approximately **600,000 gallons** of AGW was processed twice due to "slightly higher activity levels." Two months later, (January, 1993) GPU "discovered" they failed to take periodic samples of approximately **221,000 gallons** of AGW in the borated water storage tank

Finally, in August 1993, over six months behind schedule, evaporation of 2.3 million gallons of accident, generated clean-up water was completed...Can anyone at the NRC point to an official document that classifies 700,000 gallons of radioactive water (which later grew to 2.3 million gallons) as "SMALL"?

The people who live and work around TMI have found that the risks associated with additional cleanup water are not "SMALL".

CL-02/49 **(4.3.3.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Water Quality - Conclusions:** (The discussion in **4.3.2.4** is also relevant.)

"The staff concludes that the issue of surface or ground water quality for all decommissioning activities is generic and that the environmental impacts for these activities will be SMALL " (4-12).

Persistent "water quality" problems continue to plague TMI, a prematurely shut down reactor

On November 2, 1993, in a letter to the NRC, GPU Nuclear acknowledged: "During the TMI-2 accident, the cork seam located in the Auxiliary Building Seal Injection Valve Room (SIVR) was contaminated with radioactive water. Attempts to contain the contamination within the room have been unsuccessful During the past 14 years, radioactive material has spread along the joint in one direction into the Annuls, and in the other direction into the Auxiliary Building, Service Building and Control Building West (R L. Long, GPU Nuclear, Director, Services Division/TMI-2)"

On June 4, 1998, "GPUN found several pipes penetrating the wall between the turbine building basement and the control building in Unit-2 to be open on both sides of the wall. This condition was contrary to the Unit-2 post-defueling monitored storage safety analysis report (PDMS-SAR) which requires entrances to the control building area to be watertight or provided with flood panels and openings that are potential leak baths to be sealed." (NRC Inspection Report, 50-289/98-08.) Less than a month later, on July 2, 1998, an LER was necessary due to the breaching of flood barriers "between the turbine building and the control building area due to inadequate fieldwork documents" (NRC Inspection Report, R 50-289/98-08.)

As recently as January 9 and 19, 1999, elevated tritium levels and potential leaks from the waste evaporator condensate storage tank for the months of January, February and March, 1999 were reported. (NRC Inspection Report, 50-289/99-01).

Based on the above documented water quality problems the staff should revisit the rating of "water quality "

CL-02/50 **(4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Air Quality - Conclusions:**

"Fugitive dust from those activities performed outside of the building is temporary (19), can be controlled mitigative measures, and will generally not be noticeable off site." (4-16). Once again the experience of TMI-2 is instructive:

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19 Please note that the term "temporary" has been applied unevenly in the GEIS. "Temporary" storage of LLW and HLW is essentially analogous with "indefinite."

In June-July, 1980, for 11 days, Met Ed vented 43,000 curies of radioactive Krypton-85 (10-year half-life; beta and gamma) and other radioactive gasses into the environment without having scrubbers in place. Yet in November, 1980, the United States Court of Appeals for the District of Columbia ruled that the krypton venting was *illegal*.

From July 24-27, 1984, during the reactor head lift, which was delayed to brake failure on the polar crane, GPU vented radioactive gasses into the environment The venting occurred despite pledges by GPU and the NRC that no radioactive releases would take place during the head lift operation. GPU was fined $40,000 for the violation by the NRC.

On July 12, 1985, two workers who participated in the initial phase of the cleanup and contracted **cancer**, joined 2,500 area residents suing GPU.

On September 25, 1989, two cleanup workers received radiation exposures while handling a "small piece of reactor core debris " in the decontamination area "Officials said preliminary calculations show one worker may have a radiation exposure on the hands above 75 rem. The second worker may have an exposure greater than 18.75 rem. The federal occupational limit for exposure to extremities is 18.75 per calendar quarter." By November 1, 1989 , one of two workers involved in a radiation exposure "incident" may have received 220 rems to the hands, I e., "extremities." The other worker harmed the incident is projected to have received 35 rems of exposure. The incident began when the workers picked up an object they thought was a "nut" or "bolt", but was in fact a piece of highly radioactive fuel. The workers were then advised to throw the "object into the reactor vessel." Since the fuel was "discarded", GPU had to use models to predict dose calculations and exposure rates

GPU was also in violation for failing to report this incident in a timely fashion Additionally, the workers have reported contradictory statements about the event. On January 13, 1990, GPU was **fined $50,000** for a violation of "requirements protecting workers "

After ten years of defueling activities, 5,000 TMI workers had received "measurable doses" of radiation exposure. The NRC staff should reconsider the placement and value of the terms "temporary" and "fugitive", and rethink the adverse affects of "air quality" on workers

CL-02/51 **(4.3.5.2) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Aquatic Ecological Resources- Conclusions:**

(Discussions in 4.3.2.4 & 4.3.3.4 are also relevant.)

The staff found that ". the impact to aquatic ecology for all decommissioning activities is generic and that the environmental impact for these activities is SMALL". (4-19) Unfortunately, the staff biologists are unfamiliar with the unique water chemistry of the Susquehanna River and historic infestations that have afflicted Three Mile Island

In February 1986, one celled organisms believed to be fungus, bacteria and algae-like creatures were discovered. These creatures obscured the view of the reactor core, and **impeded the cleanup** of Three Mile Island -2.

On June 23, 1999, "Three Mile Island, trying to rid itself of clams, recently released too much of a potentially hazardous chemical into the Susquehanna River State regulations allow TMI to release 0 3 parts per million of Clamtrol back into the Susquehanna River. For about an hour, the plant was releasing 10,500 gallons per minute containing twice the amount " (*York Daily Record*, July 7, 1999.)

CL-02/52 The NRC staff correctly concluded, "...the magnitude, (I e , SMALL, MODERATE, LARGE) of potential impacts will be determined through a site specific study...: (4-19). This flexible barometer should be applied to all of the above mentioned **Conclusions.**

CL-02/53 **(4.3.6.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS: Conclusion - Terrestrial Ecological Resources:**

The NRC staff aptly stated, "...the magnitude, (i.e., SMALL, MODERATE, LARGE) of potential impacts will be determined through a site specific study..." (4-23). These flexible barometer should be applied to all the above mentioned **Conclusions**

CL-02/54 **(4.3.10.1) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Occupational Issues - Conclusions:**

(The discussion in **4.3.1.4 is also relevant)**

Labor relations is an essential component, and potential impediment to prompt decommissioning activities. For example:

On August 12, 1982, William Pennsyl, a cleanup worker, was fired for insisting he be allowed to wear a respirator while undressing men who entered highly radioactive areas Pennsyl filed a complaint with the U.S. Department of Labor. William Pennsyl settled out-of-court two days before an administrative law judge was scheduled to hear his case. (April 11, 1984).

On March 22, 1983, TMI-2 senior-safety engineer Richard Parks publicly charged GPU and Bechtel Corporation with deliberately circumventing safety procedures, and harassing him and other workers for reporting safety violations Parks filed a complaint with the U.S. Department of Labor. On August 12, 1985, GPU and Bechtel were fined $64,000 for the incident by the Nuclear Regulatory Commission (NRC). Between March 22, March 27, and April 2, 1983, three senior level plant employees, Richard Parks, Larry King, and Edwin Gischel, charge GPU and Bechtel with harassment, intimidation and circumvention of cleanup safety procedures.

On July 31, 1990, the NRC announced "that an allegation that a shift supervisor on duty at Three Mile Unit 2 control room, during defueling operations in 1987, had sometimes slept on shift or had been otherwise inattentive to his duties, was true..."

> Although some key members of the site management staff were aware of the sleeping problems and some actions were taken to correct it, it [sic] was not effectively corrected until utility corporate management became involved. The NRC staff proposes to fine GPU Nuclear, Inc. (GPUN) the company that operates the TMI site, $50,000. The staff also proposes a Notice of Violation to the former shift supervisor.

Also, in February 1991 an operator "inadvertently flooded the vaporizer" and several days later an operator was discovered "apparently sleeping "

CL-02/55 In 1986, the TMI-2 defueling work force peaked at 2,000 Today less than a dozen AmerGen employees police Unit-2...

Based on the experience at Three Mile Island, the SMALL and MODERATE evaluations need to be upgraded to "LARGE".

CL-02/56 **(4.3.10.3) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Costs - Conclusions:**

TMIA and EFMR object to the absence of a **Conclusion** in this section, and reassert the merits of its argument articulated in: **A. Current Problems Associated with Cost Estimates for Radiological Decommissioning**, pp. 5- 10.

CL-02/57 The most troubling aspect of this section is the assertion that, "The cost of decommissioning results in impacts on the price of electricity paid by rate payers." (4-45) Due to deregulation, additional decommissioning recovery is either limited or "under-funding" is the sole responsibility of the "electric utility," e g., Three Mile Island Unit-1. The "hostage rate payer" is being replaced by the shareholder who is not likely to advocate paying for the "under-collected" portion of the fund after the plant is permanently shut down.

This section needs to be redrafted and include the following variables:

Cost Estimates for Radiological Decommissioning (20); Planned Operating Life of Nuclear Generating Stations; Spent Fuel Isolation; Low Level Radioactive Waste Isolation; Rate Payer Equity; Plant Valuation, Joint Ownership, and, Regulatory Ambiguity.

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20 On January 25, 2000, the Citizens Utility Board (CUB) petitioned the Illinois Commerce Commission, and requested that ComEd's $480 million decommissioning charge for Zion be denied. "CUB cited a state court ruling that decommissioning costs may be collected while a plant is in service. Zion was taken out of service in 1997 and shut down permanently in 1998." (*Public Utilities Fortnightly*, March 15, 2000, pp. 18-19.)

CL-02/58 **(4.3.1.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Socioeconomics - Conclusions:** (Also Refer to discussion on **F. PLANT VALUATION**, pp. 26-27.)

> The staff concludes that shutdown and decommissioning of nuclear facilities produces socioeconomic impacts that are generic. The impacts occur either through the direct effects of changing employment levels on the local demands for housing and infrastructure or through the effects of the decline of the local tax base on the ability of local government entities to provide public services.(4-53)

There can be no generic measure of the socioeconomic impact of any community without an in-depth study of a number of driving variables. Nuclear plants are subject to various regulations and tax codes based on location, plant history, levels of corporate investment, composition of work force, state and municipal legislation, economic diversity, and municipal relationships.

The number of employees working at TMI has decreased from 900 in 1999 to 650 in 2001. Unlike GPU, AmerGen is a non-union entity, and out of the 650 employees at TMI, it is not clear how many reside in Central Pennsylvania since the Company rotates workers on a regional basis TMI was once a large corporate donor, and one of the region's top 50 employers. Within the last five years, community giving has decreased, and GPU, along with former community scions, AMP, Armstrong Industries, and Rite Aid, have slashed thousands of jobs. Any further cuts in tax revenues, community giving or employment levels, i e , "SMALL 10%" or "MODERATE 10-20%", create undue economic hardships

The amount of taxes paid by TMI-owners prior to the plant's acquisition are listed below, and contrasted with current corporate assessments The plant's assessment value at market rate was $92 million after the purchase in July, 2000. AmerGen has disputed the $49 million valuation (October, 2000).

	AmerGen	GPU
School District	$394,500 (Net)	$210,000-220,000
County:	$146,940 (19)	$635,000 (PURTA)
Township:	$30,000	$8,000
	$571,440	$853,000-$863,000

Amount of Revenue Decrease: $281,560 - $ 291,560 (21)

(Follow-up data from Exelon will be provided by mid-January, 2001. Similar decreases have occurred at Peach Bottom 2 & 3.)

CL-02/59 Before TMI reaches decommissioning, the community has already lost 250 jobs, and over $220,000 in tax revenues. Pennsylvania is not similar to Connecticut (22) whereby the difference in pre- and post-deregulation revenues are made up by the state. These are jobs and revenues are lost forever. Most local and state taxing authorities classify "Greenfield" as non-commercial, tax-paying status.

Moreover, TMI and Peach Bottom are located in rural areas that are sensitive to seasonal fluctuations Farm revenues in the 1980s were sharply down due to drought, avian flu epidemics, and an informal boycott by consumers who did not want to purchase TMI-tainted produce, dairy products, or beef and poultry.

21 Refer to discussion in *Enclosure IV*

CL-02/60 **(4.3.13.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS Environmental Justice - Conclusion:**

The NRC made the appropriate demarcation and concluded, "..the issue of environmental justice requires a site-specific analysis " (4-57) (For further discussion please refer to **VI. APPENDIX J: INCORRECT or MISSING DATA; 6)**

CL/02/61 **(4.3.14.2) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS Cultural Resources; Conclusions:**

The NRC properly concluded, "...the magnitude, (I e., SMALL, MODERATE, LARGE) of potential impacts will be determined through a site specific analysis." (4-61)

CL-02/62 One issue that needs to be factored into the equation is what happens when the object of decommissioning has been declared a historical marker, I e., Three Mile Island-2?

CL-02/63 **(4.3.15.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS On site/Off site Aesthetics - Conclusion:**

The staff posited that, "any visual intrusion (such as the dismantlement of buildings or structures) would be temporary (22) and would serve to reduce the aesthetic impact of the site " (4-63) By nature, aesthetics is subjective Therefore the staff's conclusion is arbitrary "Because there will be no readily noticeable visual intrusion beyond what is already present from the an operating facility, consideration of mitigation is not warranted " (4-63-64)

22 Please see footnote for a brief discussion on the concept of "temporary "

CL-02/64 The GEIS could have looked more closely at TMI-2, and considered the following "visual scenarios"

On August 5, 1992, GPU "declared an event of potential public interest when the Unit-2 west cooling tower caught fire." The fire lasted for ten minutes. This was the third fire at TMI-2 during the cleanup. The Department of Environmental Resources subsequently instructed GPU to dismantle the wooden paneling and waffling at the base of the cooling towers. The cooling towers now serve as a nesting ground for "fugitive" swallows.

(4.3.16.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Noise - Conclusions:

Please refer to the discussion in **4.3.1.4.**

CL-02/65 **(4.3.17.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Transportation - Conclusions:**

Please refer to *Enclosure V* which features articles highlighting problems with transporting damaged fuel from TMI to Idaho.

VI. APPENDIX J: INCORRECT or MISSING DATA

CL-02/66 **1)** All references to Three Mile Island-2 as a "decommissioned reactor are in error. The plant has not been decommissioned or decontaminated. TMI-2 was placed in Post-Defueling Monitored Storage in December, 1993.

The plant has been substantially defueled, and debate remains around the K-effective:

> Dr. Michio Kaku, Professor of Theoretical Nuclear Physics at City University of New York, evaluated studies conducted or commissioned by the NRC on the amount of fuel left in TMI-2. Kaku concluded: "It appears that every few months, since 1990, a new estimate is made of core debris, often with little relationship to the previous estimate...estimates range from 608.8 kg to 1,322 kg...This is rather unsettling...The still unanswered questions are therefore precisely how much uranium is left in the core, and how much uranium can collect in the bottom of the reactor to initiate re-criticality. (August, 1993)

Three Mile Island Unit-2 was built at a cost to rate payers of $700 million, and had been on-line for only 90 days, or 1/120 of its expected operating life, when the March 1979 accident occurred. One billion dollars was spent to defuel the facility. Three months of nuclear power production at TMI-2 has cost close to $2 billion dollars in construction and cleanup bills; the equivalent of over $10.6 million for every day TMI-2 produced electricity. The above mentioned costs **do not** include nuclear decontamination and decommissioning or restoring the site to "Greenfield."

At the time of the accident, TMI's owners had no monies put aside for decommissioning. General Public Utilities' (GPU) customers contributed three times as much for the defueling effort than the corporation that caused the disaster, i e , $246 versus $82 million (GPU Nuclear Press Release, January 10, 1985) In January 1993 the Public Utility Commission (PUC) refused GPU's request to hand their customers the TMI-2 decommissioning bill estimated to be at least $200 million. However, several months later the PUC reversed itself and gave GPU permission to pass the cost of the decontamination and decommissioning of TMI-2 onto the rate payer. This decision to financially assess GPU rate payers for the accident was upheld by the Pennsylvania Supreme Court. In 1995, GPU hired a consultant to conduct a site-specific decommissioning study for TMI-2. The "retirement costs" for TMI-2 was estimated to be $399 million for radiological decommissioning and $34 million for non-radiological removal (**GPU, 1997 Annual Report, Nuclear Plant Retirement Costs, p. 52.**)

Although TMI-2 is scheduled to be decontaminated and decommissioned in 2014, if AmerGen requests a license extension at TMI-1, decommissioning will not begin until 2034 or **55 years after the accident.**

CL-02/67 **2)** In Table J-2, the location of Peach Bottom is incorrect. Peach Bottom resides in Delta, and is located less than a mile from Lancaster County and the State of Maryland.

3) In Table J-2, the location of Three Mile Island by county is incorrect. Three Mile Island resides in Londonderry Township, Dauphin County. "Northampton" County is located in Northeastern Pennsylvania

In addition, there are four counties located within five miles from Three Mile Island, i.e., Cumberland, Lancaster, Lebanon, and York.

CL-02/68 **4)** J.1 2. and Table J-3. All relevant information is provided on pages 45-46.

CL-02/69 **5)** Table J-4 should incorporate data provided in **F. Nuclear Plant Valuation** pp. 26-27 and pages 44-45.

CL-02/70 **6)** In Table J-5 fails to acknowledge that the "white" population is not monolithic In the case of Three Mile Island a "special white population", i e., the Amish does not utilize electricity, telecommunications, or mechanical transportation, and lives in close proximity to the plant.

VIII. TRANSPORTATION

CL-02/71 Please refer to **(4.3.17.4) ENVIRONMENTAL IMPACTS of DECOMMISSIONING PERMANENTLY SHUTDOWN NUCLEAR POWER REACTORS; Transportation - Conclusions:**

Please refer to the *Enclosure V*, which features articles highlighting problems with transporting spent fuel from TMI to Idaho.

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December 31, 2001

VIA COURIER AND ELECTRONIC MAIL

Chief
Rules and Directives Branch
Division of Administrative Services
United States Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, Maryland

Re: **Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, 66 Fed. Reg. 56,721 (Nov. 9, 2001)**

Dear Sir or Madam:

The Metals Industries Recycling Coalition ("MIRC") submits the following comments on draft Supplement 1 to the United States Nuclear Regulatory Commission's ("NRC's") "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" ("the GEIS"), dealing with decommissioning of power reactors 66 Fed. Reg 56,721 (Nov. 9, 2001) The National Environmental Policy Act requires federal government agencies to complete a detailed environmental impact statement for every "major" action that "significantly affects" the environment. 42 U S C. § 4332(C) NRC will rely on this GEIS and the draft Supplement to meet its statutory obligation to prepare an environmental impact statement in future decommissioning activities

MIRC is concerned because the draft Supplement does not contain any meaningful discussion regarding the serious environmental, economic, and socioeconomic impacts of the radioactively contaminated scrap metal that would be released into the economy from facilities preparing for and undergoing decommissioning Such releases would affect the metals industries' ability to recycle scrap metal and threaten the economic viability of metals companies MIRC urges NRC to consider these impacts when preparing the final Supplement to the GEIS.

I. THE METALS INDUSTRIES RECYCLING COALITION

MIRC is an ad hoc coalition of metals industry trade associations comprised of the American Iron and Steel Institute ("AISI"), the Copper and Brass Fabricators Council ("CBFC"), the Nickel Development Institute ("NiDI"), the Specialty Steel Industry of North America ("SSINA"), and the Steel Manufacturers Association ("SMA") The metals industries comprise a major sector of the nation's economy. A significant and growing portion of this production is

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based on recycled scrap metal In a recent study commissioned by the National Recycling Coalition, R W. Beck, Inc reports that combined ferrous and nonferrous metals recycling industry employment totals approximately 350,000 jobs, with a payroll in excess of $12 billion annually and receipts of approximately $90 billion [1]

All of the members of MIRC consume metal scrap to make new metal products The recycling of enormous tonnages of scrap by MIRC members provides substantial environmental benefits, including reusing material that otherwise would be discarded and conserving energy. The energy savings from the steel minimill industry alone in one year are enough to supply the energy needs of the city of Los Angeles for eight years. The recycling of scrap is a sophisticated, technology-based industry, involving highly controlled scrap selection and blending processes to meet detailed customer specifications A growing number of customers are setting specifications that include certification of minimum radioactivity levels in metal components and products.

The metals industries that MIRC represents strive to boost public confidence in the safety, strength and recyclability of metal products, and they invest significant time and resources in product promotion, sponsoring advertising, grass-roots initiatives, and educational activities. Moreover, all of the metals industries expend considerable resources on research regarding the effects of metals on human health and the environment, with an emphasis on creating safer products.

In the metals business, scrap metal is a valuable feedstock that is bought and sold as a commodity. Scrap accounts for a significant, if not the largest, portion of metals companies' production costs Given that scrap metal has such a high value, the metals industries generally support public policies that serve to increase the quantity of scrap metal available in the economy and actively promote recycling Scrap metal with residual radioactive contamination, however, including scrap metal that would be released from nuclear power reactor facilities in preparation for and during decommissioning, would undercut efforts to protect the scrap supply from radioactivity, and is not acceptable to the metals industries.

II. METALS INDUSTRIES' RESPONSE TO RADIOACTIVITY

Since the 1980s, metals companies have been installing and using sensitive, highly sophisticated radiation detection systems Metals producers also have developed sophisticated monitoring protocols and procedures to ensure that they do not inadvertently allow contaminated scrap metal, including sealed sources that have escaped NRC regulation, to enter their mills. The metals industries' objectives in doing this are to protect workers and consumers and to prevent radioactive contamination in their mills. Inadvertent meltings of sealed sources can contaminate products, waste streams, mill equipment and the surrounding property. Radioactive contamination has caused individual metals companies to incur tens of millions of dollars in

[1] R.W. Beck, Inc., *US Recycling Economic Information Study* (July, 2001) at ES-6, Figs. ES-3 & ES-4

clean-up and decontamination costs, per incident. These incidents can bankrupt individual metals companies. Metals companies have a financial interest in keeping radioactivity out of their mills, and have set their detectors to detect at or slightly above background radiation levels, to protect against the possibility of sealed sources ending up in the melt. Accordingly, scrap metal that sets off metal company radiation detectors is rejected

III. NRC'S RELEASE GUIDANCE

CL-03/1

Since at least as early as 1974, NRC has espoused a policy of "unrestricted release" of solid materials, including scrap metal, from nuclear fuel cycle facilities, without any specific, health-based release criteria. Unlike NRC requirements applicable to gaseous and liquid releases from nuclear facilities, there are no specific criteria governing releases of solid materials by licensees. Requests to release solid material are approved on a case-by-case basis using existing regulatory guidance and license conditions.

The regulatory guidance is a generic, five-page document entitled "Regulatory Guide 1 86, Termination of Operating Licenses for Nuclear Reactors" ("Reg Guide 1.86"). Reg. Guide 1 86 was published in 1974, without public notice and comment, by NRC's predecessor agency, the Atomic Energy Agency. Under Reg. Guide 1.86, nuclear fuel cycle facilities are allowed to release for unrestricted use solid materials that meet "acceptable surface contamination levels." *See* Table I, Reg. Guide 1.86 These "acceptable" contamination levels are based on surface activity as measured in disintegrations per minute. They are based on the detection technology readily available in 1974 and not on public health or environmental considerations The measurements in disintegrations per minute have no bearing on doses to the public or exposure, nor do they account for the impact of the radioactive contamination on metals industry operations

Under Reg Guide 1.86, nuclear fuel cycle facilities do not have to employ the same level of screening for small amounts of residual surface activity that metals companies must use to keep radioactivity out of their mills. Scrap released pursuant to surface activity levels in Reg Guide 1 86 has caused radiation detectors at metals company facilities to alarm when no sealed sources were present. In short, a load of scrap metal that is acceptable for a power reactor facility to release is not an acceptable feedstock for metals company manufacturing operations

IV. THE DRAFT SUPPLEMENT

A. Environmental Impacts

CL-03/2

NRC's intent in producing this Supplement was "to consider in a comprehensive manner all aspects related to the radiological decommissioning of reactors." NUREG-0586 Draft Supp. 1 at xi (Oct. 2001). Yet, the Supplement does not discuss the potential environmental impacts of releasing scrap metal or other solid materials pursuant to NRC's unrestricted release guidance, except to state that licensed facilities must comply with standards in 10 C F R. part 20, limiting

the sum of allowable internal and external doses to individual members of the general public to 0 1 rem per year. NUREG-0586 at 4-26 (Allowable doses to individual members of the public following license termination are limited to 25 millirem per year during the control period and 100 millirem per year after the end of institutional controls. *See* 10 C.F.R. § 20 1402) As discussed in the previous section, 10 C.F.R. part 20 does not contain any release standards for solid materials. Although it is not certain, a strong possibility exists that power reactors could release scrap metal that has a serious impact on the environment, such as by contaminating the soils or groundwater underneath a scrap yard or by escaping detection and becoming melted inadvertently in a metal company furnace. Furthermore, certain isotopes in scrap metal that escape detection before melting may accumulate and concentrate in emission control systems at metals company facilities, to the extent that metals producers could generate low-level wastes ("LLW") or mixed wastes.

CL-03/3

CL-03/4

Even if NRC eventually does establish dose-based clearance standards for solid materials, thousands of tons of scrap metal with residual radioactive contamination still would be released into the economy or sent to LLW or industrial waste landfills. If the scrap is released for reuse in the economy, it could have a devastating effect on metals recycling. The introduction of added radioactivity in the scrap supply would make it difficult or impossible for metals producers to meet certain product specifications. Customers who require their metals components to be free of radioactivity are driven by consumer demand for safe products and by the necessity in sensitive applications, such as in computers, for the metal to be radiation-free

The mere possibility that products made with recycled metals may contain materials that were released from nuclear facilities could cause a significant number of consumers to purchase consumer goods made of substitute materials. A survey commissioned by the Steel Alliance found that 61 percent of Americans believed it would be a bad decision (42 percent said "very bad") to allow steel from closed down nuclear facilities to be recycled into the mainstream production of new steel products.[2] When those who opposed the idea of recycling radioactive scrap metal were asked if they would change their mind if they were assured that the material met government safety standards, they remained skeptical, with 74 percent continuing to oppose such recycling (and 51 percent saying it would be a "very bad" decision). If radioactive scrap were recycled into the manufacturing of new steel, three out of four Americans (73 percent) said they would be less likely to purchase food products packaged in steel cans; 62 percent would be less likely to purchase a steel-framed house; and half (53 percent) would be less likely to purchase an automobile made of steel. Finally, survey respondents' favorable impression of steel before and after discussing the potential introduction of steel from nuclear facilities being recycled into everyday products plunged 24 points on a 100-point rating scale,[3] from

[2] The survey was conducted by Wirthlin Worldwide, an independent research firm, and involved polling of four focus groups followed by a phone survey of 1,007 individuals.

[3] On the 100-point scale, a score of 50 indicates a neutral opinion, above 50 a positive opinion. and below 50 a negative opinion.

approximately 68 to 43.6. Hence, the impression of steel went from solidly positive to negative as a result of the radioactive scrap recycling issue.

Therefore, it is not implausible to expect that retail consumers would demand certification that their products are made with mined virgin ores or would eschew metal consumer products altogether. This consumer reaction, coupled with the fact that many sensitive applications, like computer components, require radiation-free metal, would lead manufacturers to demand that the metal they purchase be free of residual radioactivity. This result would be a marked reduction in metals recycling rates and an increase in consumption of virgin mined ores. Thus, the introduction of added radioactivity into the scrap stream would undermine the environmental contributions made each year by recycling scrap metal

B. **Economic and Socioeconomic Impacts**

CL-03/5 The draft Supplement discusses the economic impacts of decommissioning, including the fact that the Barnwell Low-Level Radioactive Waste Management Disposal Facility in South Carolina, the last remaining facility to dispose almost all classifications of LLW, is scheduled to stop accepting LLW from all NRC licensees except those in the Atlantic Compact, by 2009. *Id* at 4-43 Yet, decommissioning of most nuclear power reactors is not expected to occur until after 2009. The existence of the EnviroCare disposal facility in Utah, which can accept Class A wastes for disposal, mitigates the economic impact of losing Barnwell, but nuclear power plant operators still are expected to incur significant waste disposal costs. The Supplement discusses how these costs are passed on to electricity customers. The Supplement also analyzes the socioeconomic impacts of decommissioning with respect to the communities surrounding power reactors. These impacts include direct and indirect job losses, losses in tax revenues and reductions in local governments' ability to pay for public services *Id.* at 4-47 - 4-53. Yet, the draft Supplement does not discuss the economic and socioeconomic impacts on the metals industries related to the release of radioactively contaminated scrap metal into the economy.

1. **Impact on Metals Company Operations**

To prevent sealed sources from contaminating their operations, metals companies have installed sophisticated radiation detection systems and monitor all incoming shipments of scrap metal for radioactivity. When a radiation detector alarms, the metals company responds, typically by rejecting the load of scrap or hand sorting it to determine where the radioactive contamination is located This causes metals companies to incur significant costs. Often metals producers stop the production process whenever the radioactivity is detected, to take appropriate measures, including rejecting the load of scrap outright. These measures are necessary but impose unreasonable costs on the metals industries.

CL-03/6 The release of scrap metal from power reactors undergoing decommissioning will present a far more insidious problem than orphan sources, by greatly increasing the volume of radioactive scrap arriving at, and the frequency of alarms at, metals companies This poses a

serious problem for the suppliers and transporters, who must manage and arrange for the ultimate disposition of the rejected scrap It would have a similarly enormous adverse impact on the smaller producers, foundries, scrap dealers and processors, fabricators, and end product manufacturers Metals companies experiencing several alarms daily would continue to incur enormous costs, either unfairly increasing their manufacturing costs or compelling them to raise detection levels to above background, thereby exposing themselves to increased risk of inadvertently melting sealed sources Receipt of even slightly elevated levels of radioactively contaminated scrap imposes enormous costs on metals companies.

2. **Impact on Consumer Perception of Metal Products**

The unrestricted release of radioactively contaminated metal for recycling would tarnish the perception of recycling as a social good that should be encouraged Aversion to perceived radioactive risk could lead consumers to avoid products made of metal, especially those with a recycled metal content. Metals recycling industries have worked hard to build public confidence in the safety and utility of products made from recycled metal. This confidence would be lost if the public, rightly or wrongly, perceives such products to be unsafe. For this reason, metal companies have not, and will not, accept scrap that is known or perceived to be radioactively contaminated

The public's perception is that any level or type of radioactivity is unsafe, official assurances to the contrary notwithstanding. The public, including workers at metals companies, will neither understand nor accept the release of radioactively contaminated scrap from nuclear facilities and its use as a feedstock in the manufacture of consumer products

CL-03/7 Accordingly, MIRC urges NRC to look at all of the economic consequences (*i e*, lost sales, employment reductions, and losses in sales by suppliers of equipment, materials, and services to metals industries) to be incurred by the metals industries and allied sectors, as well as the losses in tax revenues to be incurred by governmental entities

3. **Incentives for Unrestricted Release**

CL-03/8 The economic and socioeconomic impacts of decommissioning, coupled with the lack of health-based release criteria using dose-based standards, create a disturbing incentive for the nuclear power industry to release as much surplus metal as it can into the economy and market it as useful material, rather than incurring additional disposal costs when the scrap metal meets general regulatory release guidelines but may contain levels of residual radioactivity unacceptable to metals producers. NRC's recognition of these economic and socioeconomic impacts and its concurrent failure to consider the impacts of contaminated scrap metal on the metals industries create the mistaken impression that the agency has covered all of the significant impacts of decommissioning

V. **CONCLUSION**

CL-03/9 MIRC appreciates the opportunity to comment on the draft Supplement and urges NRC to consider in the final Supplement to the GEIS the environmental impacts of releasing radioactively contaminated scrap metal into the economy for unrestricted use, as well as the economic impacts on the metals industries and related socioeconomic impacts.

If you have any questions, please contact us

Sincerely,

John L Wittenborn/kbp

John L. Wittenborn
Christina B. Parascandola

11/9/01
66FR56721
(4)

December 27, 2001
MN-01-049 RA-01-190

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TO NRC "dgeis@nrc.gov"

UNITED STATES NUCLEAR REGULATORY COMMISSION
Attention. Chief, Rules and Directives Branch
Division of Administrative Services
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Washington, DC 20555-0001

Reference: (a) License No DPR-36 (Docket No 50-309)
(b) NRC Notice of Availability of the Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities and Notice of Public Meetings, 66FR56721, dated November 9, 2001

Subject: Maine Yankee Comments on NUREG-0586 Draft Supplement 1 "Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities"

CL-04/1 Overall, Maine Yankee (MY) believes that the Supplement provides a fair update of the sections of the 1988 NUREG versions relating to pressurized water reactor, boiling water reactors, and
CL-04/2 multiple reactor stations. However, while the stated intent of the Supplement is to consider in a comprehensive manner all aspects related to the radiological decommissioning of nuclear reactor facilities, the Supplement sometimes deviates from this intent by delving into activities and impacts related to the removal of uncontaminated structures, systems, and components such as intake structures or cooling towers While the consideration of these impacts may be useful and helpful, their inclusion without proper caveat may tend to blur the line of NRC jurisdiction.

Attached are some specific comments on the draft NUREG Supplement. We appreciate the opportunity to provide comments. If you have any questions with regard to our comments, please contact me.

Sincerely,

Original Signed by Michael A. Whitney for TLW

Thomas L. Williamson, Director
Nuclear Safety and Regulatory Affairs

c: Mr. M. K. Webb, NRR Project Manager
Mr. C. L. Pittiglio, NRC NMSS Project Manager, Decommissioning
Mr. R. Ragland, NRC Region I

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Add = M. Masnik (MTM2)

Maine Yankee Comments on NUREG-0586 Draft Supplement 1 "Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities"

Mr. H. J. Miller, NRC Regional Administrator, Region I

I. General Comments

A. Supplement 1 represents a good effort by the NRC to update the environmental impacts of decommissioning based upon the actual experience encountered by nuclear facilities.

B. The Supplement sometimes deviates from this intent of considering impacts related to the radiological decommissioning, by delving into activities and impacts related to the removal of uncontaminated structures, systems, and components such as intake structures or cooling towers. While the consideration of these impacts may be useful and helpful, these considerations should be properly annotated with a caveat that these activities are beyond NRC's decommissioning jurisdiction.

II. Comments Related to Section 4 Environmental Impacts

CL-04/3 A. **4.3.4 Air Quality,** (4.2.4.2) pg. 4-14, last para., last full sentence: This statement indicates that in most cases the number of shipments of other materials (non-radioactive materials) will be small compared to those for LLW. This is not necessarily the case for a plant which is removing all above grade facilities. However, this fact should not affect the conclusion that the air quality related environmental impacts for these activities will be small.

CL-04/4 B. **4.3.5 Aquatic Ecology** (4.3.5.4) pg. 4-19, 1st para., last sentence. This conclusion would result in site-specific analyses for the use of areas beyond the previously disturbed areas if there is a potential to impact the aquatic environment. The vagueness of the condition "potential to impact" could be result in a site-specific analysis for any potential no matter how remotely possible. The NRC should consider rewording the condition to say "there is expected to be or likely to be an impact" Also on the previous page (pg. 4-18 last para in section 4.3 5.2,) it appears that a site-specific assessment would be required merely if the aquatic environment has not been characterized. NRC should clarify that a site specific EIS is not necessary just because the lack aquatic environment characterization, but rather, if an area beyond the previously disturbed area is to be used and no associated characterization of the aquatic environment, if applicable, exists, then such a characterization should be conducted. Then as stated above, if there is expected to be or likely to be an impact to the aquatic environment, then a site-specific analysis should be conducted.

CL-04/5 C. **4.3.6 Terrestrial Ecology** (4.3 6.4), pg. 4-23, last para in section 4.3.6 4, last sentence. This should be reworded to be the same as section 4.3.5 4 as modified in the comment above.

Maine Yankee Comments on NUREG-0586 Draft Supplement 1 "Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities"

CL-04/6 **D. 4.3.7 Threatened and Endangered Species** (4.3.7.4), pg. 4-25, last para., last sentence. This conclusion indicates that the NRC will meet its responsibilities on a site specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees.

CL-04/7 **E. 4.3.8 Radiological** (4.3.8.3), pg. 4-29, 4th full para., last sentence. Maine Yankee agrees that it is not necessary to update the estimates for exposure found in the 1988 GEIS.

CL-04/8 **F. 4.3.13 Environmental Justice** (4.3.13.4), pg. 4-57, last para., last sentence. This conclusion indicates that licensees will need to provide appropriate information related to environmental justice as part of the environmental portion of the PSDAR, but it does not specify what kind of information is needed or what evaluation criterion should apply.

CL-04/9 **G. 4.3.14 Cultural, Historical and Archeological Resources** (4.3.14.4), pg. 4-61, last paragraph in section 4.3.14.4, last sentence. This conclusion indicates that the NRC will meet its responsibilities on a site specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees.

CL-04/10 **H. 4.3.17 Transportation** This section does not seem to give sufficient attention to licensees that are removing all above grade structures from the site and transporting all of the above grade concrete offsite. The volume of concrete for PWR DECON is much to low for this situation by a factor of three or four. Provided below is Maine Yankee's update of its LLW Volume information. This information is consistent with Maine Yankee's License Termination Plan Revision 2. This waste volume is greater than that assumed in the GEIS. However, even with the increased LLW Volume associated with the removal of all above grade concrete, Maine Yankee's estimates of public dose is still less than that assumed in the draft supplement or the 1988 GEIS because of the extensive use of rail transportation.

III. Comments Related to Maine Yankee Data

Maine Yankee will be reviewing and updating all uses of Maine Yankee data including:

CL-04/11 **A. Appendix F Summary Table of Permanently Shutdown and Currently Operating Commercial Nuclear Reactors**, pg. F-1, Table F-1 Permanently Shutdown Commercial Nuclear Plants {Total Site Area (ac.) For Maine Yankee: 741 (should be 820)}

B. Appendix G Radiation Protection Considerations for Nuclear Power Facility

Maine Yankee Comments on NUREG-0586 Draft Supplement 1 "Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities"

Decommissioning

1. G.2.2 Dose to Members of the Public

CL-04/12 **a.** Pg. G-21, Table G-15 Summary of Effluent Releases Comparison of Operating Facilities and Decommissioning Facilities
The values associated with the maximum, minimum and average gaseous effluents for the Decommissioning Reactors do not add up. The Fission and Activation Gasses for gaseous effluents are incorrectly all the same for the maximum, minimum and average in each category (PWR & BWR). It appears that the minimum category for Decommissioning PWR's is Maine Yankee. If so, the minimum value for Fission and Activation Gasses for gaseous effluents should be "none detected". Making this correction appears to make the table added up assuming a PWR population of two.

CL-04/13 **b.** Pg. G-22, Table G-16 Summary of Public Doses from Operating and Decommissioning Facilities
This table is not well formatted and difficult to interpret. The table mixes the collective dose in person-rem with the individual dose in mrem. The years of concern are assorted. We suggest that the table be simplified and either further discussed in the Section G.2.2 text or eliminated. The following is Maine Yankee's data on individual public doses from Maine Yankee's effluents for 1998, 1999 & 2000:

Maine Yankee Effluent Data	1998	1999	2000
Liquid Effluents			
Total Body (mrem)	1.2E-2	1.5E-3	9.6E-3
Critical Organ (mrem)	4.3E-2	2.9E-3	1.8E-2
Gaseous Effluents			
Critical Organ (mrem)	5.0E-3	5.3E-3	4 3E-3
Beta Air (mrad)	ND*	ND*	ND*
Gamma Air (mrad)	ND*	ND*	ND*

* None Detected

Maine Yankee Comments on NUREG-0586 Draft Supplement 1 "Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities"

C. Appendix J Additional Supporting Data Related to Socioeconomics and Environmental Justice ***Guerrette/Howes/Arnold***

CL-04/14 1. Pg. J-2, Table J-1 Impact of Plant Closure and Decommissioning at Nuclear Power Plants Currently Being Decommissioning
Maine Yankee's Post Termination Workforce should be 360 rather than 246 resulting in a Maximum Workforce Change of 121 rather than 235.

CL-04/15 **D. Appendix K Transportation Impacts,** pg. K-2, Table K-1 Low-Level Waste Shipment Data for Decommissioning Nuclear Power Facilities {LLW Volume for Maine Yankee is indicated as 5920 cubic meters. The Maine Yankee LTP Rev. 2 states: 31,924 cubic meters for transport and 26,920 for disposal after processing}

IV. Typographical/Editorial and Other Comments

CL-04/16 **A. 3.1.4 Formation and Location of Radioactive Contamination and Activation in an Operating Plant,** pg. 3-15 This description should include the activation of corrosion products as a contributor to radioactive contamination.

CL-04/17 **B. 3.3.3 Decommissioning Process** pg. 3-29, 2nd full para. This paragraph is redundance to the preceding and the seceding paragraphs and can be deleted in its entirety.

CL-04/18 **C. 4.3.5 Aquatic Ecology** (4.3.5.2), pg. 4-17, 1st para in section 4.3.5.2, 4th sentence, "Aquatic environment s" should be corrected.

CL-04/19 **D. Appendix A Draft Generic Environmental Impact Statement Scoping Summary Report: Comments in Scope** pg. A-2, Written Comment Letters: George A. Zinke is listed as the "Director, Nuclear Safety & Regulatory Affairs, U.S. Environmental Protection Agency." This reference should be revised to indicate; "Director, Nuclear Safety & Regulatory Affairs, Maine Yankee Atomic Power Co."

Letter 5, page 1

11/9/01
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From: "GENOA, Paul" <phg@nei.org>
To: "dgeis@nrc.gov" <dgeis@nrc.gov>
Date: 12/28/01 11 09AM
Subject: NEI Comments on Draft Supplement 1

Attached are NEI's comments. They are also being sent by mail---phg

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Letter 5, page 2

Chief, Rules and Directives Branch
December 28, 2001
Page 2

NEI
NUCLEAR ENERGY INSTITUTE

James W. Davis
DIRECTOR, OPERATIONS
NUCLEAR GENERATION

December 28, 2001

Chief, Rules and Directives Branch
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U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

SUBJECT: Industry Comments on Draft Supplement 1 to the Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear facilities

The Nuclear Energy Institute (NEI) appreciates the opportunity to provide the following comments on behalf of the nuclear industry. The industry attended all four public meetings held by the NRC on the draft GEIS to offer comments in support of the document. While the industry identified technical corrections or additions to improve the accuracy of the document, they do not alter the conclusions reached in the evaluation.

CL-05/1 Draft supplement 1 represents a useful update of the environmental impacts of decommissioning based upon over 200 facility-years' worth of actual decommissioning experience accumulated by nuclear facilities since the NRC published the initial GEIS in 1988. NEI concurs with the GEIS conclusions, which found that for the *"...environmental issues assessed, most of the impacts are generic and SMALL for all plants regardless of the activities and identified variables..."*

NEI commented in the scoping process that potential environmental impacts associated with the rubblization concept be analyzed in the GEIS Supplement. The non-radiological impacts are assessed, however *"...the staff has determined that Rubblization, or on-site disposal of slightly contaminated material, would require a site-specific analysis and the radiological aspects of the activity would be addressed at the time the license termination plan is*

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Cc2 = H. Nassik (MTM2)

submitted."

CL-05/2 In order to ensure that the radiological aspects of this activity are assessed consistently, NEI recommends that standard dose modeling assumptions be documented directly through the Q&A process associated with the NRC guidance consolidation project.
Specific comments on the draft are provided in the attachment. They are provided to improve the accuracy of the data included in the draft, however they do not alter the conclusions documented in the supplement.

Once again, NEI appreciates the opportunity to provide these comments. If you have questions concerning the enclosed comments, please contact me at (202) 739-8105 or Paul Genoa at (202) 739-8034.

Sincerely,

James W. Davis

PHG/maa
Enclosure

Draft NUREG-0586, Supplement 1
Specific Industry Comments

Comments on the Executive Summary:

CL-05/3 Executive Summary, page xiv, line 20 - references 10 CFR 50.82(a)(6)(ii) which states that the licensee must not perform any decommissioning activity that causes any significant environmental impact not previously reviewed. The supplement at page 1-8 beginning on line 23 defines three levels of significance SMALL, MODERATE, and LARGE. At which of these significance levels does the requirement of 10 CFR 50.82(a)(6)(ii) come into affect? This needs to be defined as several Environmental Issues, e g. threatened and endangered species are listed as site-specific.

Comments on GEIS Section 3:

CL-05/4 Section 3.1.3, p 3-8 – add "The systems described are typical and may differ at specific facilities." to end of the 1st paragraph.

CL-05/5 Section 3.1.3, p 3-10, 1st paragraph – add "or similar document" following "(ODCM)", since limits may be in Technical Specifications rather than an ODCM. Also, the description of effluent systems should include mention of an evaporator, since some facilities use evaporation to convert liquid waste to gaseous and monitor their discharge.

CL-05/6 Section 3.1 3, p 3-13, last paragraph – shipment of contaminated apparatus or hardware may also occur to support specific activities.

CL-05/7 Section 3.1.3, p 3-14, 1st paragraph – shipment may also occur on barges or other ships.

CL-05/8 Section 3.1 4, p 3-15, last paragraph – clarify whether the last sentence is referring to radiation exposure during decommissioning or operation. In context, the inference is that the activation products provide the main source of radiation exposure to plant personnel in an operating plant, but typically contaminated materials provide more exposure to plant personnel during operation.

CL-05/9 Section 3.2, p 3-16 – the definition of SAFSTOR should more clearly define that it includes the final decontamination of the facility. This would be more consistent with definitions used elsewhere.

CL-05/10 Section 3.2 p 3-20 - defines two ENTOMB options developed specifically to envelope a wide range of potential options by describing two possible extreme cases of entombment. These extremes are useful in bounding an analysis, however they may be inappropriate for analysis to support a potential rulemaking for this option.

Comments on GEIS Section 4:

CL-05/11 Section 4.3.4.2, p 4-14, 2nd paragraph – not all decommissioning sites have or will have building ventilation systems, especially those that are in SAFSTOR for many years. Temporary systems will be established, as needed, for gaseous effluents during decommissioning if installed systems are no longer functional.

Monitoring of air quality is not necessarily performed during the storage period, depending on activities, storage period and source term.

CL-05/12 Section 4.3.4.4, p 4-16, 1st paragraph – add the following sentence to the end of the paragraph: "Particulates produced by decommissioning activities within buildings will be filtered as needed so that air quality impacts will be small."

CL-05/13 Section 4 3 4 pg. 4-14, last paragraph - This statement indicates that in most cases the number of shipments of other materials (non-radioactive materials) will be small compared to those for LLW. This is not necessarily the case for a plant that is removing all above grade facilities. However, this fact should not affect the conclusion that the air quality related environmental impacts for these activities will be small.

CL-05/14 Section 4.3.5 pg. 4-19, 1st paragraph - This conclusion would result in site-specific analyses for the use of areas beyond the previously disturbed areas if there a potential to impact the aquatic environment exists. The vagueness of the condition "potential to impact" could be result in a site-specific analysis for any potential no matter how remotely possible. The NRC should consider rewording the condition to say "there is expected to be or likely to be an impact" Also on the previous page (pg. 4-18 last paragraph in section 4.3.5.2,) it appears that a site-specific assessment would be required merely if the aquatic environment has not been characterized. NRC should clarify that a site specific EIS is not necessary just because the lack aquatic environment characterization, but rather, if an area beyond the previously disturbed area is to be used and no associated characterization of the aquatic environment, if applicable, exists, then such a characterization should be conducted. Then as stated above, if there is expected to be or likely to be an impact to the aquatic environment, then a site-specific analysis should be conducted.

CL-05/15 Section 4 3 6, pg. 4-23, last paragraph - This section should be reworded as in section 4.3.5.4, as modified by the comment above.

CL-05/16 Section 4 3 7, pg. 4-25, last paragraph - This conclusion indicates that the NRC will meet its responsibilities on a site specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees.

CL-05/17 Section 4 3 13, pg. 4-57, last paragraph - This conclusion indicates that licensees will need to provide appropriate information related to environmental justice as part of the environmental portion of the PSDAR, but it does not specify what kind of information is needed or what evaluation criterion should apply.

CL-05/18 Section 4.3.14, pg. 4-61, last paragraph - This conclusion indicates that the NRC will meet its responsibilities on a site specific basis during any decommissioning process, but it does not specify how the NRC will meet its responsibilities or what information it will need from licensees.

CL-05/19 Section 4.3.17 pg. 4-68 - This section does not seem to give sufficient attention to licensees that are removing all above grade structures from the site and transporting all of the above grade concrete offsite. The volume of concrete for PWR DECON is much to low for this situation by a factor of three or four based recent experience.

Letter 6, page 1

Letter 6, page 2

November 2002

P-117

NUREG-0586, Supplement 1

From: "Routh, Stephen" <sdrouth@bechtel com>
To: "dgeis@nrc gov" <dgeis@nrc gov>
Date: 12/21/01 9 48AM
Subject: Bechtel Comments on NUREG-0586, Draft Supplement 1

11/9/01
66FR56572,
(6)

December 21, 2001

VIA E-MAIL TO DGEIS@NRC GOV

Chief, Rules and Directives Branch
Division of Administrative Services
Mail Stop T6 D59
U S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Public Comment on Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, 66 Fed Reg 56721

Dear Sir or Madam:

The purpose of this letter is to provide Bechtel Power Corporation's comments on draft Supplement 1 to NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities."

Comment #1

CL-06/1 Table 4-1 provides estimates of cumulative occupational dose for decommissioning reactors (comparison of the 1988 GEIS to new estimates compiled for draft Supplement 1) In order to reflect the conclusions of Section 4 3 8, it is recommended that a note be added to Table 4-1 to clarify that these estimates of cumulative occupational dose are generic and are not intended to be site-specific limits

Comment #2

CL-06/2 Out-of-scope activities are identified and discussed in Section 1 and Appendix D. It is recommended that "Interim Storage of Greater Than Class C Waste" also be identified as an out-of-scope activity, consistent with the final rule published in Federal Register Vol. 66, Number 197, dated October 11, 2001.

Comment #3

CL-06/3 Section 4 3 9 and Appendix I discuss the potential for, and consequences of, postulated radiological accidents. On page I-2 of Appendix I, the text states, "As a result of improvements in the technology used for decommissioning, several of the accidents listed in Table I-2 may now be considered to be of a much lower probability or, at the least, to result in much-reduced consequences " It is recommended that the text be revised to identify typical technology

Template = ADM-013

E-RIDS = ADM-03
Add = M Mosnik (MTM2)

BECHTEL POWER CORPORATION
5325 Spectrum Drive
Frederick, MD 21703-8388 USA
tel (301) 228 6000

improvements. For example, some of the plants currently undergoing decommissioning intend to use single failure proof cranes to preclude the potential for certain postulated spent fuel cask drop or heavy load drop accidents.

Thank you for the opportunity to review and provide comments on draft Supplement 1 to NUREG-0586. Should you have any questions on the comments, please contact me at (301) 228-6245.

Sincerely,

S.D. Routh

Stephen D. Routh
Manager of Regulatory Affairs

December 27, 2001
Sent via certified mail
Emailed to dgeis@nrc gov

Chief of Rules and Directives Branch
Div. of Administrative Services
Mail Stop T 6 D 59
U S Nuclear Regulatory Commission
Washington, D C. 20555-0001

RE: Draft Supplement 1 to NUREG-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities

COMMENTS OF GEORGIANS FOR CLEAN ENERGY

Georgians for Clean Energy is a non-profit, statewide membership organization that has been working in Georgia for 18 years to protect air and water resources by changing how energy is produced and consumed. We are based in Atlanta, Georgia and have a field office in Savannah.

These comments and questions serve as a supplement to our oral statement made at the public scoping meeting held in Atlanta, GA on December 12, 2001 (see attached).

Public Participation Concerns

CL-08/1 Georgians for Clean Energy remains concerned about the ability for the public to effectively participate in this and other nuclear related issues that impact Georgia's communities. Due to the tragic events of September 11th the Nuclear Regulatory Agency's (NRC) website was not available for a time and is currently severely scaled back, making public access to important background information very difficult or impossible. NRC staff mentioned at the public meeting on 12/12/01 that a full, top-to-bottom review of security concerns would be conducted. Georgians for Clean Energy urges that this review be done prior to the issuance of the final generic impact statement for decommissioning (GEIS).

CL-08/2 Given the difficulty in accessing thorough and accurate information, including potentially relevant material such as the relicensing documents on Plant Hatch in South Georgia, we feel it is important to both extend the public comment period until these documents can be made readily available and to provide more meeting locations to adequately gather public comments. Since

nuclear reactors will eventually be decommissioned in many states the public should be given more than just four locations nationwide to voice their concerns. Public meetings should also be held in communities neighboring currently existing nuclear power plants.

Georgians for Clean Energy promotes the shutdown of our unsafe nuclear power plants here in Georgia and the phase out of nuclear power nationwide. We also advocate for sound, systematic policymaking regarding decommissioning. We continue to oppose the NRC's method of handling nuclear industry issues "generically" and urge that site-specific environmental impact statements be conducted as each nuclear reactor approaches final shutdown.

Security

CL-08/3 In light of September 11th it is now abundantly clear that nuclear materials are desired by terrorist organizations. Our nation's operating nuclear power plants represent terrorist targets, but so too does the nuclear waste they generate. Since a decommissioned nuclear power plant would have a greatly reduced security force, the closed plant could provide an easier opportunity for terrorists to obtain nuclear materials. In the case of plants like Hatch that have outdoor storage of nuclear waste, the notion of a reduced security force is even more troubling. Georgians for Clean Energy again stresses the need for a full evaluation of security measures to be assessed prior to issuing a final GEIS.

Site-Specific Concerns

CL-08/4 Georgians for Clean Energy does not believe that a generic environmental impact statement (EIS) regarding decommissioning of nuclear facilities is a sufficient tool for evaluating impacts borne
CL-08/5 to specific environments from decommissioning a nuclear power plant. After the explanation by the NRC staff at the public meeting in Atlanta, we further disagree with the process of using the significance levels of SMALL, MODERATE, and LARGE for a variety of issues at a variety of locations to come up with a generic, one-word answer. The classifications are generic in form, hard to understand, and it is difficult to figure out how the NRC came to those characterizations even after NRC staff attempted to explain it at the public meeting in Atlanta. If the NRC unwisely chooses to continue using this classification system, Georgians for Clean Energy urges that, at a minimum, layman's terms be used to define the levels and the methods used to categorize the issues.

CL-08/6 Georgians for Clean Energy requests that the NRC require licensees undergoing or planning decommissioning to submit a new environmental assessment. We do not find it acceptable to give licensees the option of using "recent environmental assessments"

CL-08/7 Some nuclear plants, like Hatch, have overflowing volumes of nuclear waste that are now being
CL-08/8 stored outdoors which impacts the environment and could affect decommissioning. The NRC

has no experience in decommissioning nuclear reactors that have operated beyond the original
CL-08/9 40-year license period. Nor does the NRC have any experience decommissioning nuclear power plants that used plutonium bomb fuel, also known as mixed-oxide fuel (MOX). Again, these factors, among others, must be incorporated in addressing the decommissioning of individual facilities.

Economic Concerns

CL-08/10 Georgians for Clean Energy does not believe that the GEIS adequately addresses decommissioning costs. Though assurances were made at the public meeting in Atlanta that decommissioning funds are adequate, real-world examples have proved otherwise. For instance, in the current world of mega-mergers of electric utilities and sudden dissolution of energy giants such as Enron, there is little guarantee in place that companies will be able to pay for the full costs of decommissioning. Additionally, we are concerned that the method of decommissioning a nuclear power plant is determined more by the cost implications to the licensee than the overall ramifications of leaving a contaminated site for the local communities.

CL-08/11 An Associated Press news article from December 5, 2001, "Japanese power company begins dismantling country's oldest nuclear reactor," highlighted the enormous financial and technical concerns that Japan is facing regarding decommissioning, "Japan Atomic Power Co., which took the Tokaimura plant off line in 1998, won't begin taking apart the reactor for another 10 years because extremely high levels of radiation remain inside, said spokesman Eichi Miyatani. It will completely dismantle the plant by 2017 and spend an estimated 92.7 billion yen (US$748 million), Miyatani said." These monetary figures exceed those that were mentioned as average decommissioning cost estimates at the NRC's public meeting in Atlanta.

CL-08/12 Furthermore, a report issued this December by the United States Government Accounting Office, "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could Be Improved--GAO-02-48," brings to light many concerns about the lack of adequate funding available for decommissioning activities. The following statement by the GAO makes it apparent that the NRC needs to improve, "However, when new owners proposed to continue relying on periodic deposits to external sinking funds, NRC's reviews were not always rigorous enough to ensure that decommissioning funds would be adequate. Moreover, NRC did not always adequately verify the new owners' financial qualifications to safely own and operate the plants. Accordingly, GAO is making a recommendation to ensure a more consistent review process for license transfer requests." (P.4)

CL-08/13 Georgians for Clean Energy requests that this extensive report be thoroughly reviewed by the NRC staff, be printed in it's entirety as an appendix in the final GEIS as the report did not come out before the draft GEIS was issued, and that the recommendations by the GAO be studied and incorporated into the final GEIS. Additionally, the public participation process should be

extended to allow for proper review of this important report.

CL-08/14 The GAO report also highlights several uncertainties relating to the costs of decommissioning:

> "Varying cleanup standards and proposed new decommissioning methods introduce additional uncertainty about the costs of decommissioning nuclear power plants in the future. Plants decommissioned in compliance with NRC's requirements may, under certain conditions, also have to meet, at higher cost, more stringent EPA or state standards. New decommissioning methods being considered by NRC, which involve leaving more radioactive waste on-site, could reduce short-term decommissioning costs yet increase costs over the longer term. Moreover, they would raise significant technical and policy issues concerning the disposal of low-level radioactive waste at plant sites instead of in regulated disposal facilities. Adding to cost uncertainty, NRC allows plant owners to wait until 2 years before their license is terminated—relatively late in the decommissioning process—to perform overall radiological assessments to determine whether any residual radiation anywhere at the site will need further clean-up in order to meet NRC's site release standards. Accordingly, GAO is recommending that NRC reconcile its proposed decommissioning methods with existing waste disposal regulations and policies and require licensees to assess their plant sites for contamination earlier in the decommissioning process. (P.4-5)

CL-08/15 Georgians for Clean Energy is also concerned about economic impacts to the local communities.
CL-08/16 The NRC needs to pay attention to decommissioning costs proposed by Georgia nuclear utilities during rate cases and other proceedings so there is not a situation created where much needed monitoring and maintenance is ignored simply because there was no regulatory attention to the real cost of decommissioning.

Environmental Comments

CL-08/17 Georgians for Clean Energy firmly believes that a site-specific analysis must be done for each individual nuclear plant. This includes the area of the site itself along with downstream and downwind regions and all areas within the ingestion radius of the facility. As we mentioned at the public meeting in Atlanta, there are already elevated levels of some radioactive contaminants nearly 100 miles downstream of Georgia's Plant Hatch and Plant Vogtle.

CL-08/18 We are still concerned that the NRC mistakenly poses that decommissioning activities will have a small impact on water quality or air quality. Construction and demolition sites across Georgia, most of which do not have nuclear contaminants, contribute to the degradation of our rivers and air. Georgians for Clean Energy would like to know how the NRC determined that an enormous project such as decommissioning an entire nuclear plant, which will involve the handling of

nuclear contaminated materials, would have a SMALL impact or air and water quality. We have already requested a copy of the analysis that was done to make this determination, and since we have not received that analysis yet we continue to urge that the NRC make this available to the general public and us.

CL-08/19 Additionally, a thorough analysis of groundwater impacts seems lacking. Given Georgia's current concern over the Floridan aquifer, we request that a site-specific assessment of groundwater quality be conducted prior to decommissioning. Also, we request that a more thorough analysis of groundwater issues be researched prior to issuing the final EIS. As an example, the NRC should request the most recent data from state agencies, such as the Georgia Environmental Protection Division, that are involved in negotiations regarding "water wars" between states—as in the ongoing dispute facing Georgia, Florida, and Alabama.

CL-08/20 Georgians for Clean Energy requests that the "rubblization" method of decommissioning be removed from the final EIS. Chopping up a plant and storing it on site not only sounds ridiculous but also is grossly negligent of the fact that there are facilities designed, built and licensed to handle radioactive materials. A point supported by the GAO report cited earlier in these comments. Georgians for Clean Energy does not promote the idea of shipping nuclear waste all over the country and recognizes that nuclear plant owners and the NRC never told communities near nuclear plants that they were also accepting a permanent nuclear waste dump. Rubblization is an egregious assault on the public participation process and a devious example of corporations casting aside those communities that supported them over the years.

CL-08/21
CL-08/22

CL-08/23 Georgians for Clean Energy also opposes any efforts by the nuclear industry or licensee of a decommissioning nuclear plant to "recycle" radioactive materials for release into the marketplace. No facilities should be able to sell their demolition debris. Instead, it should be dealt with as regulated nuclear waste since the bulk of the materials will be radioactively contaminated

Health & Safety Comments

CL-08/24 The nuclear facility's land, even after decommissioning, must not be allowed to revert to public or private use even if the NRC believes that the radioactivity on the land is less than 25 millirems per year. Additionally, under no circumstances should future buildings, structures, etc. be built atop the former nuclear site.

CL-08/25 After the meeting in Atlanta, we are increasingly concerned about the safety of the workers that will be involved in decommissioning. Will a more specific analysis of worker effects be dealt with in the final EIS or is there a separate report that will research health impacts? Georgians for Clean Energy requests that all worker exposures that have occurred at nuclear power plants that are currently being decommissioned be made available to the public and listed in the final GEIS.

Low-Income Population Impacts

CL-08/26 Reactor sites are often contaminated to the extent that the location is made undesirable and unsafe for future economic development. As we stated at the public meeting in Atlanta, Georgians for Clean Energy urges that site-specific studies be conducted. For example, the economy of rural Georgia is much different from that of urban New York. How can these impacts be treated generically? Some nuclear power plants are in urban settings where economic impacts could be much different that in rural areas that have little or no other major employer in the region.

Questions:

CL-08/27 1. How will on-site, outdoor nuclear waste storage dumps, [also known as Independent Spent Fuel Storage Installations—ISFSI] like at Plant Hatch, be affected by decommissioning? How will the licensee of an ISFSI be impacted by events that may happen during decommissioning, i e. what if there is an accident nearby and the casks are damaged or the site is rendered inaccessible?

CL-08/28 2. How will the facility licensee, in our case, Southern Nuclear, benefit from later sale of the nuclear plant's land to a new owner? Also, how will the land be tracked after it's deemed "safe" and the licensee sells it...especially in cases where there may be a leak or a release of radiation into the environment after the initial sale occurred? For instance, isn't it in the best financial interest of the licensee, in our case Southern Nuclear, to use the fastest and least expensive decommissioning option so that the license can be terminated and they can sell the land before deficiencies can be found in the manner in which a plant was decommissioned?

CL-08/29 3. How is the funding of decommissioning costs guaranteed to be met by a company in a day and age where gigantic utility companies can collapse at any moment, as has recently happened with Enron?

CL-08/30 4. What legislation or regulations are in place to compensate communities, such as fisheries, farmers, etc. in cases of releases or accidents during or after decommissioning?

CL-08/31 5. What agency or governing body is responsible for monitoring the site after the decommissioning is deemed "complete"? How do the licensee and a government agency, such as the NRC, which is mandated to protect the public health, allowed to walk away from a site that will essentially remain radioactive forever?

Conclusion

CL-08/32 As we have stated earlier, the methods used to decommission a nuclear plant will affect not only the communities of today but also the livelihood of future generations. The nuclear industry is leaving humankind a legacy of devastation—epitomized by its long-lived and highly dangerous nuclear waste. They are unable to solve their waste problem and now, when faced with the eventual shutdown of their plants, are unwilling to take measures to ensure that the public is protected.

CL-08/33
CL-08/34 The NRC is charged to protect the quality of the human environment and we ask that they all can uphold that charge. The current draft GEIS is not protective and needs major improvement. We again stress the need for site-specific Environmental Impact Statements on decommissioning for nuclear power reactors. Our communities—from the people to the waterways—are unique and are entitled to nothing less.

Sincerely,

Sara Barczak
Safe Energy Director
Georgians for Clean Energy

Attachment

11/9/01
66 FR 56721
(9)

From: Lori Davis <davislj@dteenergy com>
To: <dgeis@nrc gov>, <swb@nrc gov>, <elk1@nrc gov>
Date: 12/28/01 6 59AM
Subject: Comments on Draft Supplement to GEIS on Decommissioning

Good morning.

Please find attached a letter on "Comments on Draft Supplement to GEIS on Decommissioning" (Fermi letter NRC-01-0087, dated December 28, 2001).

Should you have any questions or comments, please advise Ms. Lynne S. Goodman, Manager, Fermi 1 (Detroit Edison), at 1-734-586-1205 (Should you have any problems with the document transmittal, please advise the sender)

Thank you

CC: Lynne S Goodman <goodmanl@dteenergy com>

NRC-01-0087
December 28, 2001
Page 1

December 28, 2001
NRC-01-0087

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Reference: 1.) Draft NUREG-0586, Sup 1, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Draft Supplement Dealing with Decommissioning of Nuclear Power Reactors", dated October 2001

Subject: Comments on Draft Supplement to GEIS on Decommissioning

Detroit Edison appreciates the opportunity to comment on Reference 1.

CL-09/1 Overall, Detroit Edison agrees with the conclusions in the draft NUREG-0586, Sup 1. The supplement will be helpful and updates the previous Generic Environmental Impact Statement (GEIS) on Decommissioning to accommodate changes in regulations and experience gained in recent decommissioning activities. Detroit Edison does have specific comments on details in the document. The attachment to this letter details the comments. None of the comments should affect the overall conclusions in the supplement to GEIS.

If there are any questions on these comments, please contact Ms. Lynne Goodman at 734-586-1205.

Sincerely,

/s/

W. T. O'Connor, Jr.
Vice President, Nuclear Generation

WTO/LSG/ljd
Attachment
cc: S. W. Brown
E. Kulzer (NRC Region III)

Template = ADM-013
E-RIDS = ADM-03
Add = M. Masnik (MTM2)

D. Minaar (State of Michigan)
Regional Administrator, Region III
NRC Resident Office

Specific Comments on NUREG-0586, Sup 1:

CL-09/2 Abstract, p iii, lines 16-17 – add "explicitly" before "consider" in the 5th sentence. The original GEIS did not explicitly cover reactors except BWRs and PWRs. However, other reactors were not explicitly listed in what was not covered by the GEIS. Also, other reactors were listed in the table of decommissioning reactors in the original GEIS. They have been considered covered for activities described in the GEIS.

CL-09/3 Executive Summary, p xi, 3rd paragraph, 4th sentence, lines 31-32 – change to "It does not include research and test reactors or the decommissioning of reactors that were permanently shutdown as a result of an accident." This change provides consistency with the report and does not imply exclusion of all reactors that have been involved in an accident at some time during their operating history.

CL-09/4 Section 3.1, p 3-2, line 21 – the LaCrosse Boiling Water Reactor site is smaller than San Onofre. McGuire Nuclear Station has two operating reactors rather than three.

CL-09/5 Section 3.1.1, p 3-2, line 39 and 3-3, line 1 – Fermi 1 is in the final phase (decontamination and dismantling) of SAFSTOR.

CL-09/6 Section 3 1 1 3, p 3-4, lines 10-14 – delete 2nd sentence and modify 3rd sentence. The Fermi 1 FBR used uranium as its fuel. The information on uranium capturing neutrons to produce plutonium is correct. Breeding rates are dependent on the FBR's specific design.

CL-09/7 Section 3.1 1.3, p 3-5, line 1– add "commercial" before "FBR". The final decision on whether to permanently shutdown the FFTF, a DOE FBR, has not yet been announced.

CL-09/8 Section 3.1.2, p 3-6, lines 18-19 – The Fermi 1 Reactor Building is a steel domed structure. Below ground, there is considerable concrete shielding, but the building is not reinforced concrete.

CL-09/9 Section 3.1.3, p 3-8, line 32 – add "The systems described are typical and may differ at specific facilities." to end of the 1st paragraph.

CL-09/10 Section 3.1.3, p 3-10, line 7 – add "or similar document" following "(ODCM)", since limits may be in Technical Specifications rather than an ODCM. Also, the description of effluent systems should include mention of an evaporator, since some facilities use evaporation to convert liquid waste to gaseous and monitor their discharge.

CL-09/11 Section 3.1.3, p 3-13, last paragraph – shipment of contaminated apparatus or hardware may also occur to support specific activities.

CL-09/12 Section 3 1.3, p 3-14, lines 5-6 – shipment may also occur on barges or other ships.

CL-09/13 Section 3.2, p 3-16, lines 18-24 – the definition of SAFSTOR should more clearly define that it includes the final decontamination of the facility. This would be more consistent with definitions used elsewhere, such as in the original GEIS.

CL-09/14 Table 3-2, p 3-27 – add footnote "c" to Fermi 1. Detroit Edison informed the NRC in late 2001 per the requirements of 10 CFR 50.82, that the final decontamination and dismantling phase of SAFSTOR would be started for Fermi 1.

CL-09/15 Section 3.3.3, p 3-29 – sentences are duplicated between the three full paragraphs on p 3-29.

CL-09/16 Section 4.3.3.3, p 4-12, line 16 – there appears to be a discontinuity between the previous paragraph and the paragraph starting on line 16. Is something missing?

CL-09/17 Section 4.3 3.3, p 4-12, line 23 – pH would not necessarily (normally) be measured per the LTP. Also, while considerable attention is placed on minimizing spills during decommissioning, hazardous spills have occurred at decommissioning sites. The same types of activities as performed at operating units, which have resulted in spills at operating units, can lead to spills at decommissioning units. The likelihood is less since less water treatment and so less bulk chemical handling is typically performed at decommissioning sites.

CL-09/18 Section 4.3.3.3, p 4-12, lines 28-30 – add "The processing of residual sodium products from an FBR is no more likely to result in water quality impact than decommissioning activities at a LWR."

CL-09/19 Section 4.3.4.2, p 4-14, lines 11-24 – not all decommissioning sites have or will have building ventilation systems, especially those that are in SAFSTOR for many years. Temporary systems will be established, as needed, for gaseous and particulate effluents during decommissioning if installed systems are no longer functional.

CL-09/20 Monitoring of air quality is not necessarily performed during the storage period, depending on activities, storage period and source term.

CL-09/21 Section 4.3 4 3, p 4-15 – other activities during decommissioning could result in release of particulate matter. This includes temporary suspension of particles during cutting activities and production of particulates from processing of sodium and NaK at an FBR. Such particulate matter is filtered, as necessary, prior to release, to avoid or minimize adverse air quality impacts. While this is recognized on p 4-14, it should also be included in the section on "Results of Evaluation".

CL-09/22 Section 4 3.4 4, p 4-16, line 11 – add the following sentence to the end of the paragraph: "Particulates produced by decommissioning activities within buildings will be filtered as needed so that air quality impacts will be minimal."

CL-09/23 Section 4.3.9.2, p 4-34 – it is not clear whether the physical injuries discussed in this section are only those due to radiological impacts or due to non-radiological aspects of an accident. The section is on radiological accidents so the former is implied, but the wording is not clear.

CL-09/24 Section 4.3.9.3, p 4-35, lines 19-21 – the category of hazardous (non-radiological) chemical related accidents is listed here, which is appropriate since such accidents are possible during decommissioning. The description only mentions potential for injury to the public. However, in Section 4.3.9.2, which describes the classification of accidents as small, moderate and large, effects on workers are also discussed. This should be clarified since it appears to be inconsistent.

CL-09/25 Section 4.3.10.1, p 4-37 – the hazard of flames and fires should be addressed in the section on physical hazards.

CL-09/26 Section 4.3.10.1, p 4-39 – the following items should be added to the list of activities that expose workers to chemical hazards:

- Removal of chemical containing systems, such as demineralizers, and acid and caustic containing tanks
- Removal of sodium and NaK residues

CL-09/27 Section 4.3.10.2, p 4-40, lines 12-14 – in the paragraph on FBR decommissioning activities, add that decommissioning a FBR involves removal of sodium and NaK, but that these decommissioning activities can be performed safely with the proper engineering controls.

CL-09/28 Section 4.3.11.1, p 4-41, line 7 – add "LWR" before "licensee" in the third sentence. The formula for the specified minimum amount of decommissioning funds applies to LWR's. The other regulations on decommissioning funds and evaluation of adequacy do apply to all reactors, so there is no adverse impact of the formula applying only to LWR's

CL-09/29 Section 4.3.11.3, p 4-45, lines 4-5 – delete or reword "and is either undergoing decommissioning or is in safe storage awaiting decommissioning" from the second sentence. SAFSTOR or safe storage is a form of decommissioning.

CL-09/30 Tables 4-6 and 4-7, p 4-71 – footnote "d" is not used in the tables, but probably belongs next to the 960 value for the number of shipments from a PWR using SAFSTOR.

CL-09/31 Section 4 3 18 2, p 4-72, lines 38-41 – other irretrievable resources include gases and tools, but these resources are also minor.

CL-09/32 Section 6 1, p 6-1 – for plants shutdown before existing decommissioning rules were adopted, the environmental reviews may not be in the PSDAR as discussed in this section. In such cases environmental aspects not previously addressed that need to be addressed will be covered in the LTP.

CL-09/33 Tables E-3 and E-5
The issue of occupational hazards applies to activities in addition to those indicated in Table E-3. Since Table E-5 is based on Table E-3, it also needs to be revised to reflect the following.

Such additional activities that can affect or involve occupational issues are as follows. A brief explanation of why follows each item.

Adjust site training (Industrial safety type training needs to be continued and revised based on job hazards to ensure workers are trained for activities or areas [e g. confined spaces] involved in decommissioning)

Establish a reactor coolant system vent pathway (Depending on specific method, this could involve cutting, welding and working at heights)

Establish containment vent pathway (Depending on specific method, this could involve cutting, welding and working at heights)

Do preventive and corrective maintenance on SSCs (Maintenance activities at an operating plant or decommissioning plant can involve industrial hazards, some more so than others. There can be energized systems, pressurized fluids, rotating equipment, etc.)

Chemical decontamination (Occupational hazards include chemicals and pressurized fluids)

High pressure water sprays of surface (High pressure sprays are themselves a hazard due to energy involved. Precautions need to be taken to use them safely)

Cut out radioactive piping (Cutting typically involves torches or cutting wheels, creation of fumes or particles, and rigging)

Remove large and small tanks or other radioactive components from the facility (Careful rigging is needed to maintain control and prevent injury. If this activity also involves cutting the equipment free, the hazards of cutting are also involved)

LLW packaging and storage (Handling the LLW and packages needs to be performed

ergonomically safe to prevent injuries)

Large component transportation (The transportation issues all involve lifting of materials to remove them or bring them onto the site. Care also is needed if vehicle is backing up during the evolution.)

LLW transportation

Equipment into site transportation

Backfill tracked into site

Non-radioactive waste transportation

Complete final radiation survey (The survey will involve working at heights if buildings remain, and possibly accessing hard to reach locations.)

CL-09/34 Table F-1
The site area for Fermi 1 is listed as 1,120 acres. That is the size of the Fermi 2 site; Fermi 1 is on a portion of that site. The original Fermi 1 site was 900 acres. Currently, the portion of the site considered to be the Fermi 1 nuclear facility on the Fermi 2 site is less than 4 acres.

CL-09/35 Fermi 1's cooling water source was Lake Erie. Saxton's area is listed as 1.1 acres, however, the text reported San Onofre as having the smallest site. Also, footnote "b" should be applied to the "Cooling System" header, rather than "Cooling Water Source."

CL-09/36 Table F-2, p F-4 – Fermi is in Michigan, not Ohio.

CL-09/37 Section G.1.1.4 1, p G-5 – delete or revise fourth bullet. Conditions typically encountered in exposures from normal facility operations result in external dose, rather than internal dose. Internal deposition of particles can occur, but this is less common than external dose. Also, clarify last bullet.

CL-09/38 Section G 1.1 4 3, p G-8, lines 13-22 – this somewhat explains selection of the occupational nominal probability coefficient in Table G-4 for fatal cancers, but does not explain selection of hereditary coefficient.

CL-09/39 Table G-6, p G-11 – the table per its title covers dose limits for an individual member of the public under 10 CFR 20. The ALARA air emission dose constraint listed in the table is not a 10 CFR 20 limit.

CL-09/40 Section G 2 1, p G-13, lines 26-45 – the conclusion in the first sentence of the third paragraph

is misleading. The main reason that the occupational doses at reactors undergoing decommissioning are a small fraction of dose accumulated at operating facilities, as shown in Table G-9, is that there are many more operating plants than decommissioning plants. The average for decommissioning plants shown in the table is less than the operating plant, but not only a small fraction.

CL-09/41 It also is not clear how, why, and how many plants were selected for Tables G-11 and G-12. Additionally, the first sentence of the fourth paragraph should indicate that the data is estimated worker dose for major types of decommissioning activities. Actual data appeared to be listed for only one plant in the tables.

CL-09/42 Table G-12, p G-17 – the two numbers listed for San Onofre should be explained.

CL-09/43 Section G 2.1, p G-13 & G-19 – the conclusion reached that the doses for SAFSTOR and DECON are not substantially different is partly due to which decommissioning plants were selected to be evaluated.

CL-09/44 Table G-14 it appears strange that only 26-34 operating plants were listed as reporting dose from gaseous effluents each year, since all plants are required to report. Also, the selection of the years 1985-1987 appears strange for an update report.

CL-09/45 Section G.2.2, p G-21 – while the conclusion appears correct, it is strange that information was only available for a small sample of facilities. This data is reported to the NRC annually by licensees.

CL-09/46 Table G-15 – the basis of this table should be better explained. How were the plants selected? What years are covered?

CL-09/47 Table G-16 – how were the plants listed in this table selected? It appears to be a strange non-representative sample.

CL-09/48 Tables H-1 and H-2 – as addressed under comments on Tables E-3 and E-5, other activities involve occupational hazards.

Occupational issues do not seem to belong as an environment issue category. Safety of workers is considered as a separate category when planning work. From a regulatory perspective, OSHA and state agencies typically promulgate regulation on worker safety, not the EPA or state environmental agencies. The environmental issues typically are impacts to the air, water, or land both on and off site, while other environmental issues that impact people are evaluated for the public. The type of review is also different for occupational issues than other environmental issues. As each work package is planned, the hazards of the job need to be addressed in the planning and appropriate methods, engineering controls and

protective equipment planned and workers briefed for each activity. This is an immediate, short-term (for the duration of the activity) type of review, while most environmental issues have longer term implications.

However, if occupational issues are to be included in this environmental review, the additional activities discussed earlier also need to be included.

CL-09/49 Tables E-3, E-5, H-1 and H-2 – some additional activities, for example, system dismantlement and large component removal, could potentially impact air quality. Provisions are needed for portions of these activities to prevent adverse impacts.

CL-09/50 Table H-2, p H-17 – in the "Impact and Summary of Findings" section, "water use" should be changed to "air quality".

CL-09/51 Table I-5, p I-20 – add fire and hazardous materials to associated accidents for removal of contaminated pipe and tubing.

CL-09/52 Table I-5, p I-21 – add fire and hazardous materials to associated accidents for metal component dismantlement, intact removal or partial segmentation of large components and the first three subcategories of removal of reactor pressure vessel and internals.

CL-09/53 Table I-5, p I-22 – add fire to associated accidents for cut piping attachments. Add fire and hazardous materials to associated accidents for decontamination, segmentation and disposal of RCS and other larger bore piping.

CL-09/54 Table I-5, p I-23 – add fire to associated accidents for deactivate systems, disposal of nonessential structures and systems; establish a permanent reactor coolant system vent path; establish a permanent containment vent path; remove dedicated safe-shutdown diesel and generator; and remove unused equipment during SAFSTOR. Add hazardous materials to deactivate systems; disposal of nonessential structures and systems; drain and flush plant systems; process, package, and ship liquid and solid radioactive wastes; remove dedicated safe-shutdown diesel and generator; dispose of non-radioactive hazardous waste; and limited decontamination of selected structures and systems.

CL-09/55 In general, any activities that involve cutting or welding could lead to a fire. Precautions are implemented to minimize the possibility and respond quickly if a fire starts. Depending on the materials in the systems during operation or during earlier decommissioning activities, a hazardous materials accident is possible when removing systems, handling waste or using decontamination materials. Again, precautions are planned to minimize the possibility.

CL-09/56 Section J.1.1, p J-1 – add, "selected" before "facilities" in the first sentence of the first paragraph. Identify the time period used for the comparison in the second paragraph.

Letter 9, page 11

NRC-01-0087
December 28, 2001
Attachment 1
Page 10

CL-09/57 Table J-1 – add footnote "c" to Fermi 1.

Letter 9, page 12

NRC-01-0087
December 28, 2001
Attachment 1
Page 11

CL-09/58 In conclusion, Detroit Edison thinks the draft supplement to the GEIS on decommissioning of nuclear facilities is a good effort and agrees with the overall conclusions. Some details should be revised to improve accuracy and to ensure planned decommissioning activities, intended to be covered by this supplement, are fully addressed. This will avoid future questions on whether activities are covered and/or bounded by this GEIS supplement.

11/9/01
66 FR 65721
(10)

From: adele kushner <adelek@alltel.net>
To: <dgels@nrc gov>
Date: 12/29/01 6.48PM
Subject: NUREG-0586

Comments on Draft Supplement 1 to NUREG-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities.

CL-10/1 Although the alternatives proposed for decommissioning nuclear facilities all sound reasonable, the proposal in general has one major problem, which is the NRC's lack of credibility due to past errors and cover-ups.

CL-10/2 The present openness is most welcome, and a nice change, but past history hangs over NRC like a dark cloud.

CL-10/3 My direct experience is limited to having heard an eyewitness account of the decommissioning of Yankee Rowe This person reported a whole list of unfortunate incidents that released contamination into the air and groundwater, contaminating workers on site who were not wearing protective clothing, and possibly contaminating people along the rail and truck routes where parts of the plant were being transported.

CL-10/4 In addition, many reports of lost shipments of nuclear waste and materials, including fuel rods, in various parts of the country come to light, another hazard of transporting radioactive materials.

CL-10/5 Wherever human beings are involved, there are bound to be errors and accidents. The human element cannot be removed, as we found out at Three Mile Island and Chernobyl.

CL-10/6 Therefore, the safest alternative would be, first, to consider each reactor site individually rather than making a blanket policy to cover every site. Second, the lowest possibility of releasing contamination

CL-10/7 into the environment requires entombing radioactive structures, systems and components in a long-lived substance, maintaining and monitoring it, until the radioactive level is reduced to a safe level, which would take many years.

CL-10/8 This method would be the most likely to reduce exposure to workers and the public, and would not require workers familiar with the original construction

CL-10/9 Any of the methods proposed would require long time maintenance and monitoring, but keeping it in its original location would mean that the community would be familiar with it, it would be visible, and the community would be likely to care about its monitoring. In fact, involving the community in the whole process could utilize their experience and encourage their help.

CL-10/10 Allowing the licensee to choose the decommissioning method is not recommended, due to the usual pressures to cut costs despite the obvious dangers.

CL-09/11 ALARA is not a sufficient basis for judging proper methods.

CL-10/12 Thank you for holding these meetings in four locations around the country, and for encouraging public participation.

Adele Kushner, Executive Director
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adelek@alltel.net

Template = ADM-013

E-RIDS = ADM-03
Add - M. Masnik (MTM2)

Letter 11, page 1

11/9/01
66 FR 65721
(11)

From: Debbie Musiker <dmusiker@lakemichigan.org>
To: "'dgeis@nrc.gov'" <dgeis@nrc gov>
Date: 12/31/01 11:10AM
Subject: Comments on DGEIS on Decommissioning of Nuclear Facilities

On behalf of the Lake Michigan Federation and the Environmental Law & Policy Center of the Midwest, please accept the attached comments regarding the Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586.

Please contact Debbie Musiker if you have any difficulty opening the attached document or have any other questions. Thank you for your consideration.

Best regards,

Debbie Musiker
Lake Michigan Federation
dmusiker@lakemichigan.org
312-939-0838

Paul Gaynor
Environmental Law & Policy Center of the Midwest
pgaynor@elpc.org
312-795-3713

CC: "'pgaynor@elpc org'" <pgaynor@elpc.org>

Letter 11, page 2

December 31, 2001

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
U S. Nuclear Regulatory Commission
Washington, D C. 20555-0001

Re: Comments on Draft Supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG–0586.

Dear Rules and Directives Branch Chief:

Please accept the following comments on behalf of the Lake Michigan Federation and the Environmental Law & Policy Center of the Midwest. The Lake Michigan Federation is a not-for-profit environmental organization that works to restore fish and wildlife habitat, conserve land and water, and eliminate pollution in the watershed of America's largest lake.

The Environmental Law & Policy Center is a Midwest public interest environmental advocacy organization, working, among other things to achieve cleaner energy resources and implement sustainable energy strategies.

CL-11/1 As a preliminary matter, we support the prompt decommissioning of nuclear power plants and urge the United States Nuclear Regulatory Commission ("NRC") to ensure that decommissioning goes forward in the safest, most environmentally sound manner.

In reviewing the Draft Supplement to the Final Generic Environmental Impact Statement (hereinafter, "Draft GEIS"), NUREG – 0586, we have several concerns.

CL-11/2 CL-11/3 CL-11/4

1. Considering the importance of the Great Lakes, which represent 20% of the world's freshwater supply, the NRC should prepare a site-specific impact analysis for the 18 nuclear facilities located on the United States side of the Great Lakes. The potential threat of a release along the shoreline or into the lake of radioactive material during decommissioning or storage of spent fuel requires special consideration. The Draft GEIS does not adequately consider the effects on aquatic ecology caused by an accidental, radioactive release.

Template - ADM-013
E-RIDS = ADM-03
Add = M. Masnik (MTM2)

CL-11/5
CL-11/6

Other aquatic environmental impacts also merit site-specific review. The location of intake and outfall structures in the lake alone requires site-specific analysis. As written, the Draft GEIS does not make clear whether an intake/outfall structure on the facility1 is considered part of a previously disturbed area If deemed part of the previously disturbed area, any work on the intake/outfall structure will be deemed generic and the impact small.

CL-11/7

Any work on or removal of an intake/outfall structure should trigger site-specific analysis. Indeed, the Draft GEIS explains that the removal of near-shore or in-water structures could result in the establishment of non-indigenous species to the exclusion of native species. DGEIS, 4-17. It also explains that in some cases wetlands will develop in areas where the construction of the facility alters surface drainage patterns. DGEIS, 4-18. The Draft GEIS suggests that site-specific analysis is appropriate in certain circumstances when the impact is beyond the previously disturbed area and when there is a potential to impact the aquatic environment. DGEIS, 4-19. The above examples of establishment of non-indigenous species or wetlands are exactly the types of impacts that require site-specific analysis. Yet, the site-specific analysis recommended may not cover these examples because they may occur within the previously disturbed area.

CL-11/8

Removal of intake/outfall structures may be the most beneficial action to the aquatic ecology, but it should not go forward without site-specific study of the environmental impacts.

CL-11/9

2. Sixty years is an arbitrary and inappropriate time period to allow a nuclear reactor to remain in SAFSTOR, where the contaminated facility will largely remain intact and spent fuel may remain on-site. According to NRC staff, **no technical basis** exists for this 60-year timeframe.2 See Transcript, December 6, 2001 Public Meeting, Drake Hotel, Chicago. First, if a company waits too long to decommission, it will lose its institutional memory and familiarity with the facility's structures because current workers may be deceased or otherwise unavailable. Such intricate knowledge of the facility is critical to avoiding radioactive releases during decommissioning.

CL-11/10

Second, we are concerned that over the course of 60 years, the ownership of nuclear plants, financial status of licensees, and decommissioning obligations for many plants could change; if companies have not operated the facility long enough to accrue sufficient funds for decommissioning, and then go into an extended SAFSTOR period, bankruptcy of the facility owner could jeopardize clean up at the site. The extended time of storage combined with reduced staffing associated with SAFSTOR could mean that these sites are more likely to be subject to accident, theft of equipment, or attack.

CL-11/11

Third, the Draft GEIS does not explain at what point in time radioactive decay of the material will make it sufficiently safe to proceed with any further dismantling. NRC should shorten the acceptable time period for SAFSTOR and link it to the timeframe that would make the material safer. NRC should encourage licensees to go forward with dismantling the facility under DECON as soon as appropriate, even if they start with placing the facility in SAFSTOR.

CL-11/12

3. The terrorist attacks of September 11, 2001 have raised many issues concerning the currently, inadequate security of our nation's nuclear reactors. Because decommissioning creates opportunities for release of spent fuel and structures contaminated with radioactive material, the

CL-11/13

Final GEIS should revisit the appropriate security needed during decommissioning. Indeed, under the current plan, facilities under SAFSTOR will have fewer personnel at the site even though the

1 If the intake/outfall structure is located off the facility, it is excluded from the Draft GEIS analysis and may not be given appropriate consideration.

2 Moreover, the 60-year period may be inconsistent with the explanation on page 1-6 of the Draft GEIS that spent fuel may be stored safely on-site for approximately 30 years after the licensed life of the facility.

radioactivity of the material will still be high. With less security, these facilities are at greater risk for attack.

CL-11/14

5. The NRC should be required to expressly approve a post-shutdown decommissioning activities report ("PSDAR") before a licensee initiates decommissioning activities Otherwise, the licensees have little incentive to perform a rigorous analysis of whether their decommissioning activities fit within the envelope of environmental impacts set forth in the GEIS Instead, they will likely assume they fit within the guidelines when they prepare their PSDAR. Moreover, a formal approval process should incorporate more opportunity for public input.

CL-11/15

6. The Final GEIS should directly indicate that licensees must obtain all necessary environmental permits prior to beginning the decommissioning process. Omitting this information may imply that the compliance with the requirements of this GEIS is adequate.

Letter 11, page 5

The Lake Michigan Federation and the Environmental Law & Policy Center of the Midwest urge the NRC to do more to protect the Great Lakes from the risks associated with decommissioning as it prepares the Final GEIS.

Respectfully submitted,

Debbie Musiker
Assistant Director, Special Initiatives
Lake Michigan Federation

Paul Gaynor
Staff Attorney
Environmental Law & Policy Center
of the Midwest

11/9/01

66 FR 65721

(12)

From: "Ed Martin" <edmartin@law com>
To: <dgeis@nrc.gov>
Date: 12/31/01 2:29PM
Subject: Draft Supplement 1 to NUREG-0586

I attach hereto my supplemental comments on the above.

Thank you for your kind attention to this submission. Please do not hesitate to contact me if you have any questions. I look forward to hearing from you.

Sincerely,

Ed Martin

Sent by Law Mail

Ed Martin
ATTORNEY AT LAW

P.O. Box 2753
Decatur, GA 30031

Voice (404) 371-0024
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December 31, 2001

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

By Electronic Mail

Re: Draft Supplement 1 to NUREG-0586

Ladies and Gentlemen:

This will supplement my comments at the December 12 public meeting in Atlanta. As I noted at the time, I am concerned about the silence of the draft supplement on public participation in the decommissioning process. Commenters raised these concerns 18 months ago, but the draft supplement does not seem to address them.

As I read the supplement, its effect will be to predetermine a number of issues about decommissioning of all public-utility power reactors. This will remove those issues from examination in trial-type proceedings, where licensees' evidence or the NRC's assumptions and conclusions could be tested and exposed to public scrutiny.

Unless the public is allowed to intervene in decommissioning proceedings and participate fully in those proceedings, it cannot be certain that trustworthy decisions will result. Your 1996 brochure Public Involvement in the Nuclear Regulatory Process, NUREG/BR-0215, assures us that "the public has an opportunity to participate in NRC's decisionmaking process to . . . decommission a facility."

Public participation short of party-intervener status and review of less than all issues relevant to each plant seems to me a recipe for inadequate decisionmaking. If your agency restricts review, I believe you will be reneging on your promises to the public, as well as violating NRC's laws and regulations and the Administrative Procedure Act.

Thank you for the opportunity to supplement my earlier comments. I look forward to your response.

Yours very truly,

CL-12/1

CL-12/2

CL-12/3

November 2002

P-133

NUREG-0586, Supplement 1

Template = ADM-013

E-RIDS = ADM-03

Add = H. Hasnik (HTM2)

Letter 13, page 1

11/9/01
66 FR 45721
(13)

From: shadis@prexar.com
To: <dgeis@nrc.gov>
Date: 12/31/01 5.31PM
Subject: COMMENTS on DECOM GEIS

Attached as Ms WORD FILE. Please aknowledge receipt. Thank You and Happy New Year. Ray

Template = ADM-013 E-RIDS = ADM-03 Cee = M. Masnik (MJM2)

Letter 13, page 2

New England Coalition on Nuclear Pollution
VT . NH . ME . MA RI CT . NY
POST OFFICE BOX 545, BRATTLEBORO, VERMONT 05302

December 31, 2001

Chief, Rules and Directives Branch
Division of Administrative Services
Mail Stop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: NUREG – 0586 Draft Supplement 1, Generic Environmental Impact Statement on Decommissioning Nuclear Facilities, Draft Supplement Dealing With Decommissioning of Nuclear Power Reactors

Written Comments Prepared by Raymond Shadis on Behalf of the New England Coalition on Nuclear Pollution

CL-13/1

1. **Not Risk-Informed** - The U.S. Nuclear Regulatory Commission (NRC) has applied extraordinary effort to risk-inform reactor oversight but, save for Appendix G of this report, has avoided translation of environmental impacts from dose based-language to

CL-13/2

risk-based language. The US Environmental Protection Agency (EPA) and most state agencies that set radiation exposure standards employ measures, limits, or goals expressed in terms of risk. NRC Radiological Site Release Criteria appear to yield a higher risk to the public than those risk levels acceptable to EPA under CERCLA. If this is so, then the GEIS should contain the comparisons (risk to risk, nuclear to chemical, one in ten thousand to one in a million) in plain language. The presentation of risk in Appendix G is unnecessarily obtuse and murky. It appears not to contain a comparison to permissible or target risks from non-radiological pollutants, which in all fairness, it should.

CL-13/3

Appendix 1, Summary of Accidents For PWR and BWR Plants Undergoing Decommissioning Operations, Table 1-3 lists accidents considered in various individual plant evaluations but lists no potential consequences and no probabilities. So what good is this list except to show the random and will-nilly cafeteria approach to individual plants picking out and designing bounding accident scenarios? At one plant the limiting scenario is fuel handling accident; at another it is a fire in the low level waste storage building. Case in Point: No fire scenarios are listed for Maine Yankee under Table 1-3, yet recently a fire occurred in a low-level waste dewatering unit and burned a several hundred degrees for more than an hour. A local volunteer fire company approached the fire without respirators and without advice from radiation protection personnel. A GEIS should contain a comprehensive generic list of potential accidents (scenarios) together with probabilities and potential consequences.

CL-13/4

Presenting licensee estimates of consequences without comment or qualification as in

1

Table 1-4, Highest Offsite Doses Calculated for Postulated Accidents in Licensing Basis Documents, provides an incomplete picture of real potential consequences. For example, Maine Yankee asserts that loss of spent fuel pool heat sink will result in the same offsite dose as a liquid waste spill, that of .23 REM. Other than a reference to another study, NRC does not bother to explain what sort of dose spent fuel pool drain down might result in if remedial action is not taken. As dose consequences can be rather large, the actual figures should be included in the GEIS.

CL-13/5 **2. Impact of Closure** -The draft supplement attempts to reflect the impact of plant closure on jobs, community tax revenues, and population. The impact of reactor shutdown a must be considered apart from decommissioning. The decision to shutdown, to lay-off workers, to devalue the plant for tax purposes and so on, is not automatically a decision to decommission the plant. It may be a shutdown for a long-term repair or upgrade period. Or it may be intended to mothball the facility with the decision to decommission or not delayed a decade or more. In any case, if workforce reduction at shutdown is a part of decommissioning, then workforce replenishment because of fuel storage or enforcement of administrative site release conditions should also be considered.

CL-13/6 If decommissioning is to be risk-informed and the impacts of shut down are to be considered, then the cost and environmental and risk impacts of continued operation should also be compared. Maine Yankee shutdown rather than face the costs of steam generator replacement and correction of a host of safety defects, including system-wide cable separation issues, inadequate high energy line break protection, inadequate containment volume, marginal emergency diesel generator capacity, 95 percent of fire seals defective, undersized atmospheric steam dump valves, and on and on. Haddam Neck had similar problems. Just prior t the closure of Yankee Rowe, NRC staff was arguing internally about the sanity of permitting the plant to run one more fuel cycle with a badly embrittled reactor vessel.

CL-13/7 If the costs of the decision to shutdown are included, then the cost of the immediate alternative, repair and continued operation, ought to be included as well as comparative environmental impact and comparative risk.

CL-13/8 Table J-1 Impact of Plant Closure and Decommissioning at Nuclear Power Plants Currently Being Decommissioned includes three plants that have already passed from decommissioning to license termination. Maximum workforce and post termination workforce figures are scant, incorrect, misleading, and more or less, useless for the purpose of gaining usable information. Maine Yankee currently has more than 400 workers on site; not 295 as listed. Without a reference date, maximum workforce numbers mean what? During outages? During major repairs and retrofits? Of twenty-two plants listed, workforce figures are given for only seven.

CL-13/9 Table J-2 Impact of Plant Closure and Decommissioning on Population Change shows no causal relationship between closure, decommissioning and population change. Of twenty-one plant locations listed, all save two show population increases in the host county following plant closure. Did Rainer County, Oregon increase its population by 16.5 percent as an impact of the Trojan Nuclear Plant shutdown? It is even harder to credit that the impact of the closure of 65 MWe Humbolt Bay is an increase in the population of

California of 25.8 percent. This may be the stupidest table ever presented in an NRC document.

CL-13/10 Table J-3 Impact of Plant Closure and Decommissioning on Local Tax Revenues does not show any impacts of decommissioning activities on tax revenues there fore the table is incorrectly titled. There could be some small near term impact of decommissioning on tax revenues, for example, taxes levied on capital equipment purchased by local vendors working on decommissioning and taxes on spent fuel storage facilities.

CL-13/11 No effort is made to determine if marketability of local homes is increased by nuclear plant close. Marketability would determine price and ultimately impact tax-base.

CL-13/12 At sites considered for re-powering, no consideration is given to the tax worth of the re-powered site. Haddam Neck, for example, has applied for early partial site release so that the construction of a gas-fired plant may begin even before decommissioning is completed. Fort St. Vrain hosts a gas-fired plant. If impact of closure is to be considered in a GEIS on decommissioning, so then should reuse be considered.

CL-13/13 In Maine, utility ratepayers are entitled to share in moneys recovered from the sale of plant components and commodities, such as pipe and cable, as well as real estate and unspent decommissioning funds. While not taxes, per se, these are funds or credits added to the general public revenue.

CL-13/14 **3. Environmental Impacts** Section 4.3.8.2, Potential Radiological Impacts from Decommissioning Activities, fails to adequately consider the potential for decommissioning activities to spread or hide radiological contamination. The presumption is that accidents or mistakes will not take place, when experience at decommissioning plants shows that they do. The report fails to draw from this experience. For example, early in the decommissioning of one site and prior to complete radiological survey, a trench was dug across an impacted area to lay an electrical cable to power equipment no longer serviced through the plant. The trench was left open to the weather for a few days, then backfilled with loose material and thus could permit rainwater to carry contamination deeper and spread it further. Individually, such activities may not provide what are termed significant doses, but they have the potential to add incremental to the dose of future site occupants and overall risk and may violate ALARA principles. The potential environmental impacts of such activities should be evaluated. Incidents have occurred in which workers left the site with contaminated clothing and in which train car loads of class A waste were permitted to languish for weeks on a siding in a residential community. Although radiation levels in these instances were extremely low, the potential for greater exposures existed. Such scenarios should be considered, worst case, in preparing the GEIS.

CL-13/15 Section 4.3.11.2 Potential Impacts of Decommissioning Activities on Cost correctly points out that there are many variables in decommissioning that affect cost; among them are the size and type of reactor, the extent of contamination, property taxes and so on. However the GEIS does no more than list these variables without any attempt to assign the weight which any of them contribute. The GEIS correctly points out that only three commercial power reactors have successfully completed decommissioning, but does not

say that they can hardly be considered typical of those plants under and entering decommissioning. Fort St. Vrain was a modest sized plant of oddball High Temperature Gas design and decommissioned on a fixed price, loss-leader price by a large manufacturing firm, Shoreham only ran the equivalent of one full power day, and Pathfinder was a 59MWe peanut of a plant. Thus it would be instructive to look at how costs are apportioned among today's more representative plants currently under decommissioning and from this base, knowing which are sensitive to scale and which are sensitive to choice, project final costs. These costs should be broken down and compared in the GEIS.

CL-13/16 Section 4.3.16.2 Potential Impacts of Noise from Decommissioning Activities seems to deal with noise as significant only at hearing-loss levels, however the admission is made that noise can be annoying. It can also degrade the general environment, and the aesthetic environment, lead to sleep loss, diminished creativity, and lost sales of goods and property. Where decommissioning schedules require night work, large pneumatic hammers can be heard miles distant from the site. The GEIS should also consider noise from explosive demolition.

CL-13/17 Table 4-6 Radiological Impacts of Transporting LLW to Offsite Disposal Facilities is something of a puzzle. Waste volumes and radiological impacts in the table are much greater for the SAFSTOR decommissioning option (45,000 cubic meters/ 78 person-rem) than for the DECON option (10,000 cubic meters/ 48 person-rem). Same plant, if you let the radiation dissipate with time, you wind up with more waste. With all due respect, this makes no readily apparent sense.

P-136

CL-13/18 3. **Spent Fuel Storage** The GEIS does not consider the impacts of spent fuel storage. We believe this to be based on artificial distinctions. Both Maine Yankee and Haddam Neck have identified establishing an Independent Spent Fuel Storage Facility as a " critical pathway" in decommissioning. ISFSI construction has been regulated under the very same Part 50 license that will be terminated upon successful decommissioning. Only then will a Part 72 license be issued. The ISFSI is in the middle of a decommissioning site and physically inseparable from decommissioning. Its impacts should be considered among the impacts of decommissioning in the GEIS.

CL-13/19 4. **Exported Impacts** The on site disposal of radiological demolition debris (rubblization) is considered in the GEIS. With rubblization abandoned at Maine Yankee, the cumulative effect of disposal of the debris at a licensed facility elsewhere is not considered. This makes no sense. Nor does it make sense to "lose" impacts when contaminated materials are shipped to handling facilities for recycling. Different choices made at the decommissioning site will result in different impacts to workers and other citizenry offsite and away. These effects should not be artificially separated from the environmental impacts of decommissioning simply because they are exported.

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(207) 882 – 7801 shadis@ime.net

From: Mark Oncavage <oncavage@bellsouth.net>
To: <dgeis@nrc.gov>
Date: 12/31/01 7:45PM
Subject: Decommissioning Comments

66 FR 65721
(14)

Dear Sir:

I am submitting the following comments to draft Supplement 1, NUREG-0586, Generic Environmental Impact Statement on Decommissioning Nuclear Facilities.

Sincerely, Mark P. Oncavage

Comments on NUREG-0586 Draft Supplement 1

by Mark P. Oncavage

CL-14/1 1. The evaluation of each nuclear plant site for radioactive contamination can only be done on a site-specific basis. Data of site contamination from Shoreham with zero years of operating experience cannot be compared with 33 years of operation at Big Rock Point and either of those sites can not be compared with a potential 120 years of Calvert Cliff operation or a potential 180 years of Oconee operation. Stating that, generically, all impacts of radioactive contamination from all sites are similar (P. 4-28), is simply wrong. The important concept underlying the Environmental Impact Statement for decommissioning nuclear plants is the health and safety of the public. The Nuclear Regulatory Commission Staff (NRC) is writing an EIS based on an unsupported assumption. The impacts of a nuclear plant site contaminated with radioactivity can be SMALL or MODERATE or LARGE, but the impacts are site-specific and are not similar nor generic.

CL-14/2 2. The evaluation of each nuclear plant plant site for radioactive contamination can only be done on a site-specific basis. The liquid low-level radioactive waste dump for St. Lucie 1 and 2 Is the Atlantic Ocean, whereas the dump for liquid low-level radioactive wastes at Turkey Point 3 and 4 is a closed cooling canal system. The northern end of the canal system, Lake Warren, is the designated dump. If the sediments of Lake Warren and the cooling canals contain levels of radioactivity above those levels that are deemed safe for unrestricted human activity, then Lake Warren is one of the "safety-related structures, systems, and components" that needs to be decontaminated and dismantled. Lake Warren and the canals are also safety related as they function to mitigate the effects of a design basis accident by collecting and concentrating radioactive spills, dumped liquids, leachates, and site runoff. Other nuclear plants that dump their liquid radioactive wastes into closed waters will also require site-specific evaluations.

Template = ADM-013 E-RIDS = ADM-03
Cod = M. Masnik (MTM2)

CL-14/3 3. The evaluation of each nuclear plant site for radioactive contamination can only be done on a site-specific basis. In NUREG-0743, page 4-11, Turkey Point units 3 and 4 averaged 340 curies of radioactive solid waste per year. Twenty two years later NUREG-1437, Supplement 5, page 2-12 states that in 1999, units 3 and 4 shipped solid waste containing 834.3 curies per year, an increase of 145 %, yet Turkey Point is only 47 % through its potential operational life. Projections concerning the amounts of radioactivity in solid waste, gaseous waste, liquid waste, and site contamination appear to be pure guesswork with a potential operational life of 60 years per unit. For the NRC Staff to conclude that site contamination for all nuclear plant sites is generically similar and that the impacts to the human environment are SMALL, has no basis in fact. The NRC Staff needs to present the reasoning behind its projections to the scientific community for scientific scrutiny.

P-138

CL-14/4 4. Rubblization (p. 4-14), the breaking of contaminated concrete structures into gravels and blocks cannot be considered an option where:

A. the leachate plume could contaminate potable water,

B. the leachate plume could contaminate water used for food production such as farming, fishing, seafood harvest, or dairy,

C. the leachate plume could contaminate closed bodies of water such as cooling canals or cooling ponds, and

D. airborne particles could contaminate food crops, fishing waters, seafood harvesting waters, or dairy areas.

All contaminated building materials must be removed from the nuclear plant site.

CL-14/5 5. The Generic Environmental Impact Statement needs to specify inappropriate uses of decommissioning funds.

A. Using funds for temporary procedures, such as SAFSTOR, is inappropriate.

B. Using funds for the maintenance and monitoring of temporary procedures, such as SAFSTOR, is inappropriate.

C. Transferring funds from PSC/PUC control to licensee control is inappropriate.

D. Using funds for the temporary storage of spent fuel, such as ISFSI or PFS, is inappropriate.

E. Using funds for the settlement of bankruptcy claims is inappropriate.

F. Using funds as collateral is inappropriate.

G. All other uses of funds that do not directly result in the permanent cleanup of contaminated nuclear plant sites, is inappropriate.

Since the funds were obtained as an extra fee from ratepayers for the purpose of safely decommissioning nuclear plants, all of the funds need to be used for that purpose.

CL-14/6 6. The massive destruction of September 11th accomplished by the Al Qaeda terrorists has rendered the Waste Confidence Policy ineffective and obsolete. No reasonable person can be assured that high-level nuclear waste can be safely stored at plant sites under present conditions. The GEIS fails to consider the consequences of acts of terrorism and acts of war perpetrated by suicidal zealots against spent fuel facilities at decommissioned nuclear plant sites. This failure of the GEIS needs to be remedied.

CL-14/7 7. The GEIS needs to create a chronological list of all the decommissioning activities that accept public participation. All public participation opportunities such as meetings, hearings, oral comments, written comments, petitions, and

interventions need to be listed. At later times when specific dates are known, this list needs to be advertised locally in the affected area. The licensee should also solicit public input on the formulation of decommissioning plans well before the decisions are made.

Submitted
December 31, 2001

11/9/01
66 FR 65721

15

From: "Sokolsky, David" <DDS2@pge.com>
To: "dgeis@nrc.gov" <dgeis@nrc.gov>
Date: 1/2/02 5:29PM
Subject: FW: GEIS COMMENTS

<<FGEIS_comments1.doc>>
The above file represents Pacific Gas & Electric Company's revised comments to the draft Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586, Supplement 1. The comments in the above file are identical to the comments previously sent to you on December 21; however, the previous comment on Section 4.3.4.2, page 4-13, is withdrawn because the FGEIS Scope states "... activities performed before permanent cessation of operations or impacts that are related to the decision to cease operations (for example, the impact from the loss of generation capacity) are outside the scope of the FGEIS." In this case the air impact of replacement power would/should have been addressed in the original EIR for SAFSTOR.

David Sokolsky
Supervisor of Licensing
Humboldt Bay Power Plant
Phone 707-444-0801
Internal 8-375-0801

> -----Original Message-----
> From: Sokolsky, David
> Sent: Friday, December 21, 2001 4:38 PM
> To: 'dgeis@nrc.gov'
> Cc: Moulia, Thomas; Nugent, Patrick
> Subject: GEIS COMMENTS
>
> <<FGEIS_comments.doc>>
>
> The attached WORD file contains Pacific Gas & Electric Company comments on
> the draft Generic Environmental Impact Statement on Decommissioning of
> Nuclear Facilities, NUREG-0586, Supplement 1. If you have any questions
> on these comments, please contact me.
>
> David Sokolsky
> Supervisor of Licensing
> Humboldt Bay Power Plant
> Phone 707-444-0801
> Internal 8-375-0801
>
>

original comment ltr #7

CC: "Moulia, Thomas" <TAM1@pge com>, "Nugent, Patrick" <PxN2@pge com>, "Williams, Terry" <TJW3@pge.com>

Templeton = ADM-03

E-RIDS = ADM-03
Acc = M. Massik (MTM2)

PG&E COMMENTS TO FGEIS

DECEMBER 20, 2001

CL-15/1 • The last paragraph in the Conclusions section of the Executive Summary, and page 2-3 of Section 2.2.1, state that a licensee would have to submit a license amendment request if environmental assessments are outside the bounds of the GEIS or if the environmental impacts of a decommissioning activity have not been previously reviewed . What is the licensing document that should be modified in the license amendment request? Section 2.2.1 states the Environmental Report should be revised, but the PSDAR may be a more appropriate document.

CL-15/2 • Section 4.3.9.1, page 4-33, refers to the licensee's FSAR. Suggest adding the words "or equivalent" after "FSAR" since some licensees have a defueled safety analysis report (DSAR) instead of a FSAR.

CL-15/3 • Section 4.3.12.1, page 4-47, second line – Add a period after the word "effects" and begin the next sentence with the word "Socioeconomic."

CL-15/4 • The following Conclusions sections discuss environmental impacts that may have small, moderate or large impacts:

- 4.3.1.4 (Onsite/Offsite Land Use)
- 4.3.5.4 (Aquatic Ecology)
- 4.3.6.4 (Terrestrial Ecology)
- 4.3.9.4 (Radiological Accidents)
- 4.3.10.3 (Occupational Issues)
- 4.3.12.4 (Socioeconomics)

The FGEIS is not clear what, if any, actions a licensee should take depending on if the impacts are small, moderate or large?

CL-15/6 • Section 3.1.4, page 3-15, does not reflect that alpha-emitting Transuranic radioactivity is significant at some plants. This radioactivity is formed after failed fuel releases small amounts of Uranium (as well as fission products) to the reactor coolant. Subsequent activation of the Uranium results in the formation of Transuranic isotopes of Plutonium, Americium and Curium, most of which decay with alpha radiations. For the plants where this issue is significant, the production of airborne alpha radioactivity during decommisioning activities must be carefully controlled to avoid radiation exposure from inhaled alpha radioactivity.

December 21, 2001

11/9/01
66FR56721
(16)

Chief, Rules and Directives Branch
Division of Administrative Services
Mail Stop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

U.S. EPA Comments on Draft Supplement to Generic EIS for Decommissioning of Nuclear Power Reactors

Dear Sir/Madam:

In accordance with the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and the Council on Environmental Quality's implementing regulations (40 CFR 1500-1508), the Environmental Protection Agency (EPA) is providing you comments on the Draft Supplement (the Supplement) to the Generic Environmental Impact Statement (GEIS) for Decommissioning of Nuclear Power Reactors, dated October 2001 (NUREG-0586, Draft Supplement 1, CEQ #010416).

The Supplement updates the 1988 GEIS to reflect technological and regulatory changes and NRC's and licensees' experience with decommissioning nuclear power reactors. The environmental impacts described in the Supplement supersede those described in the 1988 GEIS. The Supplement may be used as a stand-alone document without need to refer to the 1988 GEIS.

CL-16/1 EPA supports the approach NRC has taken in the Supplement of establishing an *envelope* of environmental impacts resulting from decommissioning activities and identifying those activities which can be bounded by a generic evaluation and those which require a site-specific analysis. This approach concentrates the environmental analysis on those activities with the greatest likelihood of having an environmental impact. EPA also commends NRC for drafting a Supplement which facilitates public understanding in its use of plain English and explanation of technical terms.

As indicated below and in the enclosed detailed comments, EPA is requesting that NRC provide clarifications, supplementary information and explanations of certain conclusions found in the draft Supplement. EPA is therefore rating this Supplement as "EC-2", Environmental Concerns - Insufficient Information. A summary of the rating definitions is enclosed.

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)

CL-16/2 EPA's major comments on the Supplement are: (1) it is not always clear when a particular decommissioning activity or site/operating condition falls within the envelope of environmental impacts described in Section 4 and when that activity or condition would require
CL-16/3 further analysis; (2) the Supplement should distinguish better among certain of the small, moderate and large impact levels and better explain certain assumptions used in setting these
CL-16/4 levels; (3) the Supplement should address how the environmental analysis of decommissioning activities takes into account changes in the environmental parameters of the site during plant
CL-16/5 operation; and, (4) the Supplement should provide a more robust discussion of ground water impacts. Further detail on EPA's concerns is found in the enclosed "Detailed Comments."

Thank you for the opportunity to review this document. If you have any questions or would like to meet to discuss our concerns, please contact Susan Absher of my staff. She may be reached at (202) 564-7151.

Sincerely,

/s/

Anne Norton Miller
Director
Office of Federal Activities

Enclosures: 2
Summary of Rating Definitions
Detailed EPA Comments on the Draft Supplement to the GEIS

11/9/01
66 FR 46702
16

Summary of EPA Rating Definitions

EPA's rating system was developed as a means to summarize EPA's level of concern with a proposed action The ratings are a combination of alphabetical categories that signify EPA's evaluation of the environmental impacts of the proposal and numerical categories that signify an evaluation of the adequacy of the EIS

Environmental Impact of the Action

"LO" (Lack of Objections) The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal

"EC" (Environmental Concerns). The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts

"EO" (Environmental Objections). The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative. EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory) The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality EPA intends to work with the lead agency to reduce these impacts If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ

Adequacy of the Impact Statement

"Category 1" (Adequate) EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information) The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate) EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

Template = ADM-013

E-RIDS = ADM-03
Cc: M. Massik (MTM2)

Detailed EPA Comments on
Draft Supplement to Generic EIS for Decommissioning of Nuclear Power Reactors
(NRC NUREG-0586, Draft Supplement 1, October 2001)

General Comments

CL-16/6 1. The Supplement should provide more specific guidance to licensees regarding the level of a particular decommissioning activity, or the site conditions in which an activity is occurring, which would trigger a site-specific NEPA analysis of the activity by the licensee. For example, with regard to levels of activity that would require a site-specific analysis, the Supplement should more specifically define what constitutes a major transportation upgrade. With regard to site conditions, it should define how much time may pass after the previous disturbance of an aquatic or terrestrial ecosystem before a site-specific analysis is necessary, or how recent the ecological assessment of that ecosystem must be to rely on the Supplement instead of a site-specific analysis. This will facilitate both licensees' evaluation of environmental impacts in required submissions such as the Post Shutdown Decommissioning Activities Report (PSDAR) and the License Termination Plan (LTP), and NRC's development of site-specific NEPA documents.

CL-16/7 2. In order to provide a complete and up-to-date environmental profile of the site, the Supplement should direct licensees to summarize the following in their site-specific NEPA analyses (and as appropriate in the PSDAR and LTP) (a) pre-plant construction environmental reports (for plants constructed before the enactment of NEPA) and environmental impact statements (EISs) regarding the impacts of plant construction and operation, (b) environmental reports and/or assessments that were prepared during the period the plant was in operation regarding the impacts of plant operation, (c) significant requirements and changes in the licensee's environmental permits, and (d) changes in the environmental parameters of a facility site during operation and the impacts of any such changes (see also Response to Comment #6-A, page A-11).

CL-16/8 3. Response to Comment No. 6-C, page A-13, indicates that impacts from potentially contaminated sediment are addressed in the Supplement, but we did not find this information.

CL-16/9 4. While EPA did not identify security issues during the GEIS scoping process, the events of Sept. 11 have brought them to the forefront of public concern. EPA suggests that NRC include in the final Supplement a general discussion on how the Commission is addressing security from terrorism at plants undergoing decommissioning.

CL-16/10 5. The Supplement (page 3-16) indicates that ENTOMB is still considered a viable option for decommissioning. Section 3 2.3 notes that the Supplement includes a bounding analysis, but that any environmental issues arising from a subsequent rulemaking on ENTOMB will be addressed in that rulemaking and its supporting environmental documentation. EPA urges NRC to consider in any subsequent analysis of EMTOMB the issue of residual dose and the potential need for state approval of any de facto disposal.

Executive Summary

CL-16/11 6 Page xv, Lines 37-38. The document identifies certain issues that are "site-specific for activities occurring outside the disturbed areas in which there is no recent environmental assessment." "Recent" should be defined by, for example, specifying a time frame or "shelf life" for environmental assessments, so that licensees have clear notice of when they must prepare or update such a document for the disturbed area(s) in question. This same problem arises in Table ES-1, which refers to "current" and "recent" ecological assessments.

Introduction

CL-16/12 7. Page 1-5, Section 1.3. This section states that except for decommissioning planning activities, the Supplement only considers activities following removal of the fuel from the reactor. The exclusions include "impacts that result directly and immediately from the act of permanently ceasing operations" such as the environmental impacts of ceasing thermal discharges to receiving waters which the Supplement states "is essentially a restoration of existing conditions." This ignores the potentially adverse effects that the thermal discharges may have had on the ecosystem while the plant was operating; and, while the affected ecosystem may recover from the thermal discharges, such recovery may not be the equivalent of restoration to the originally existing conditions. Also, a species may have become established and dependent upon the thermal discharge.

CL-16/13 8. Page 1-7, Section 1.3, Lines 30-33. The document needs to explain the grounds for the determination that the environmental impacts of concrete leaching into site groundwater as the result of rubblization can be evaluated generically. See also groundwater comments below.

CL-16/14 9. Page 1-8, Lines 10-13 EPA agrees that inadvertent releases resulting from an accident should be handled on a site-specific basis. We would like to see an explanation of how the analysis of impacts from an accident would be handled.

CL-16/15 10. Page 1-8, Section 1.4. EPA encourages NRC wherever possible to make the Levels of Significance (small, moderate and large) used in the Supplement more definitive by including risk ranges, referencing the appropriate NRC regulations or providing examples of impacts. We note that in several cases the qualitative analysis is given in units of person-rem with no regulatory limit provided.

CL-16/16 11. Page 2-5, Section 2.2, Line 10. This section should note that state or local requirements may be more restrictive than NRC's.

Description of the NRC Licensed Reactor Facilities and the Decommissioning Process

CL-16/17 12. Page 3-5, Section 3.1.2, Lines 31-33 and Page 3-8, Lines 13-16. The document states on page 3-5 that "the impacts of dismantling all SSCs (structures, systems and components) that were built or installed at the site to support power production are considered in this Supplement." It then states on page 3-8 that the Supplement does not evaluate switchyards which "may remain on the site". If they are dismantled, would they be evaluated?

CL-16/18 13. Page 3-10, Section 3.1.3, Lines 32-25. The supplement states that "the amount of liquid and gaseous radioactive waste generated is usually lower for decommissioning plants". Must the plant's waste remain within the limits established during operations to be bounded by this GEIS?

CL-16/19 14. Page 3-11, Section 3.1.3, Lines 17-18. Please revise the document to clarify that Resource Conservation and Recovery Act hazardous waste disposal permits and Clean Water Act NPDES permits are administered either by EPA or, where EPA has authorized the state RCRA program or the state has assumed the NPDES program, by the state. (See NUREG 1628, Question 4.2.2) Also, the text should briefly discuss the management of PCBs and PCB-containing materials under the Toxic Substances Control Act.

CL-16/20 15. Page 3-16, Section 3.1.4, Line 1. This line notes that spent fuel comprises the largest amount of radioactive material at a shutdown facility. It would be informative to include here a summary of or reference to the data in Appendix G on the amount of radioactive material at various types of power plants.

CL-16/21 16. Page 3-17, Section 3.2.1, Lines 32-33. Please revise the document to clarify that while the evaluation of ISFSIs is outside the scope of the GEIS, it should be noted that the DECON alternative does not necessarily completely eliminate the need for long-term security and surveillance of a facility; an ISFSI at a decommissioned facility will require long-term security and surveillance.

CL-16/22 17. Page 3-29, Lines 29-39 repeat lines 11-21.

Environmental Impacts

Land Use

CL-16/23 18. Page 4-6, Section 4.3.1.2, Lines 15-16. This section defines a previously disturbed area as an area where land disturbance occurred "during construction or operation of the site." This definition may allow licensees to undertake decommissioning activities resulting in adverse environmental impacts without first performing a site-specific analysis of those impacts. For example, it might allow a licensee to disturb an area that was disturbed several decades ago during plant construction even if that area was not used during plant operation and has essentially returned to its original condition, i.e., native species have fully returned. The Supplement should define what constitutes a "previous" disturbance, e.g., by specifying a time frame, so such adverse impacts are not permitted to occur.

CL-16/24 19. Page 4-6, Section 4.3.1.2, Lines 25-29. The following terms are too broad or too vague to provide licensees sufficient guidance about when a site-specific analysis is necessary: with regard to SMALL impacts, "very little new development" and "minimal changes"; with regard to MODERATE impacts, "considerable new development" and "some changes"; and with regard to LARGE impacts, "large-scale new development" and "major change." Providing specific examples from decommissioning or decommissioned facilities would be very useful.

CL-16/25 20. Page 4-6, Section 4.3.1.3, Lines 33-41. Using NUREG-1437's estimate that ~1 to ~4 ha (~2.5 to 10 ac) of land is needed for steam generator replacement activities, the document assumes that the land use impacts of major component removal during decommissioning "should be similar or less," and that the land used during major component removal "[g]enerally ... has been previously disturbed during construction of the facility." Does this mean that a licensee must perform a site-specific analysis of impacts if the land use impacts of major component removal may or will

be greater than the estimated impacts of steam generator replacement, or if the land used during major component removal has not been previously disturbed during construction of the facility?

CL-16/26 21. Page 4-7, Section 4 3 1.3, Lines 1-2. The Supplement notes that "almost all of the sites" will use land previously disturbed during construction; should one assume that a facility using land not previously disturbed will need to conduct a site-specific analysis? Similarly, under "Conclusions" on that page, it states that impacts for "offsite land use" are considered small unless "major transportation upgrades are necessary." The examples given are establishing water, rail or road transportation links. Is one to assume that any establishment of offsite transportation would require a site-specific analysis? Would impacts only be to off-site land uses or to on-site as well? Specific examples would help here.

CL-16/27 22. Page 4-7, Section 4.3.1.3, Lines 10-12. Please explain the basis for the assumption that where previously disturbed areas are not large enough to support decommissioning activities, "it is likely" that the impact of disturbing previously undisturbed areas would be "temporary and SMALL."

Water Use

CL-16/28 23. Page 4-9, Section 4.3.2.2, Lines 12-14. The Supplement should briefly describe the "common engineering practices to limit water use impacts." When describing how water impacts were evaluated (sec. 4.3.2.3.), it would be helpful to include the average and maximum water usage pre- and post-operation of those plants that have ceased operation.

Water Quality

CL-16/29 24. Pages 4-10 through 4-12, Section 4.3.3. This section focuses primarily on the water quality impacts of nonradiological discharges from point sources to surface water (and the regulation of such discharges under the NPDES program). It should more fully discuss the water quality impacts of both nonradiological discharges to groundwater (and their possible regulation under state programs) and non-point source pollution, and if necessary should indicate that one or both of these types of impacts require site-specific analysis. All of these types of discharges have potential water quality impacts that need to be evaluated.

CL-16/30 25. Pages 4-10 to 4-11, Section 4 3.3 1. This subsection on water quality regulations should distinguish between "intentional" and "unintentional" nonradiological discharges to both surface water and groundwater. As currently drafted, the section blurs these distinct types of discharges, and the regulatory schemes relevant to each.

CL-16/31 26. Page 4-10, Section 4 3 3.1, Line 42. The Supplement refers to a "permitting authority" before it identifies what type of permit is at issue. As a result, the reader does not know who the permitting authority is. It would be helpful to note that "intentional releases of non-radiological discharges" to surface waters are regulated under EPA or state wastewater discharge permitting programs, and such discharges to groundwater may be regulated under state programs.

CL-16/32 27. Page 4-10, Section 4 3 3 1, Lines 41-44 and Page 4-11, Lines 1-2. This paragraph is confusing in light of the statement on Page 4-12 "that the issue of surface or groundwater quality for all decommissioning activities is generic and that the environmental impacts for these activities will

be SMALL." As currently written, it suggests that NRC will obtain a permitting authority's "environmental assessment of aquatic impacts" and "consider the assessment in its determination of the magnitude of the environmental impacts" of decommissioning activities at individual sites. It also suggests that NRC will "establish its own impact determination[s]" on a site-specific basis in the absence of such environmental assessments. Please clarify.

CL-16/33 28. Page 4-11, Section 4.3 3.1, Lines 4-5. Please revise the Supplement to indicate that the NPDES program only regulates point source discharges to surface waters, not discharges to groundwater or non-point source pollution. (See also section 4.3.3.4) As noted above, the document should note that point source discharges to surface waters also may be regulated under state wastewater discharge permitting programs, and discharges to groundwater may be regulated under state programs.

CL-16/34 29. Page 4-11, Section 4.3 3.1, Lines 7-9 and Section 4.3.3.2, Line 16. The document assumes that facilities' NPDES permit limits during decommissioning "are generally the same limits that are enforced for an operating plant," that facilities' permits "may require a monitoring program," and that "these monitoring programs are usually continued through the decommissioning period." Should the reader assume that a licensee must perform a site-specific analysis of water quality impacts if any one of these conditions is not met? If not, why not? (See also section 4.3.3 4: is a site-specific analysis required where discharges to surface water may or will exceed the NPDES-permitted levels? Again, if not, why not?)

CL-16/35 30. Page 4-11, Section 4.3.3.2, Lines 17-18, 21-23. This language could be interpreted erroneously to indicate that discharges to groundwater are monitored under NPDES permits. The Supplement should address the water quality impacts of decommissioning activities on groundwater separately from the impacts on surface water. In lines 34-35, the Supplement should describe the conditions in which nonradiological impacts to groundwater and from non-point source pollution may be considered SMALL, MODERATE or LARGE.

CL-16/36 31. Pages 4-11 to 4-12, Section 4.3.3.3.
The discussion in this section could support a requirement for licensees to perform site-specific analyses of the potential water quality impacts of their decommissioning activities under certain circumstances; notably, language such as performing these activities in different orders can have a "significantly different impact on water quality," that the SAFSTOR option "may exacerbate water quality issues," and that certain activities "may result in changes in local water chemistry" implies the potential need for site-specific analysis.

In particular, the statement that rubblization may affect groundwater pH and thereby "affect the transport properties of radioactive and nonradioactive chemicals in the subsurface" appears to require a site-specific analysis. The document notes in other places (e.g., Page 1-7, Lines 26-33) that the nonradiological impacts of rubblization, including concrete leaching into groundwater, can be evaluated generically. Section 4.3.3.3 does not support this conclusion.

CL-16/37 32. Page 4-12, Section 4.3.3.3, Lines16-17. The Supplement states that unintentional releases of hazardous substances historically have been infrequent at decommissioning facilities, and that except for a few substances, hazardous substances spills are "localized, quickly detected, and relatively easy to remediate." Does this mean that a licensee must perform a site-specific analysis of potential water quality impacts if a hazardous substance is spilled or otherwise

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released to the environment during decommissioning. How is "hazardous substance" defined? Examples or a better definition of "localized", "quickly detected" and "ease of remediation" should also be provided.

CL-16/38 33. Page 4.12, Section 4.3.3 4. As noted above, the NPDES program only regulates nonradiological discharges to surface waters from point sources, not discharges to groundwater. This subsection should also draw conclusions about the potential water quality impacts of nonradiological discharges to groundwater and non-point source pollution during decommissioning.

CL-16/39 34. Page 4-14, Section 4.3.4.2, Lines 6-8. The Supplement states that emissions from workers' vehicles "should be lower" during decommissioning than during plant construction or outages and are "usually lower" than during plant operation. Is there any data from decommissioned plants to support these statements? Also, does one assume that a site-specific analysis of potential air quality impacts is required if such emissions may or will be higher than during plant construction, outages or operation?

CL-16/40 35. Page 4-14, Section 4.3.4.2, Lines 10-24. The Supplement states that most decommissioning activities are conducted in facility buildings with systems that are "typically maintained and periodically operated" during decommissioning to minimize airborne contamination. As a result, "materials released when systems are dismantled and equipment is removed are not likely to be released to the environment in significant quantities." Again, does the reader assume that a licensee must perform a site-specific analysis of potential air quality impacts if a certain level (definition?) of decommissioning activity may or will not be conducted in facility buildings, or if the systems used to minimize airborne contamination may or will not be maintained and/or operated according to a certain level of effort? How is "significant quantity" defined?

CL-16/41 36. Page 4-14, Section 4.3 4.2, Lines 26-33. The Supplement states that fugitive dust emissions during movement of equipment outside of facility buildings are "likely ... to be confined to the immediate vicinity of the equipment," "in general ... limited to a small number of events" and "of relatively short duration." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts where one of these conditions is not met? Also, how are "immediate", "small number of events" and "relatively short duration" defined? Further, must the facility employ mitigation measures to minimize dust; if so, where are these specified?

CL-16/42 37. Page 4-14, Section 4.3.4 2, Lines 40-43 and Page 4-15, Section 4 3.4.2, Lines 1-2. The Supplement states that there is an average of less than one shipment per day of low-level waste (LLW) from a decommissioning plant; that, "in most cases, the number of shipments of other materials to and from a decommissioning facility will be less than that for LLW;" and that therefore emissions associated with the transportation of materials from such a plant "are not expected to have a significant impact on air quality." Again, is the reader to assume that a licensee must perform a site-specific analysis of potential air quality impacts if the number of shipments of materials to or from its decommissioning facility will exceed the level of less than one shipment per day?

CL-16/43 38. Page 4-15, Section 4.3 4 2, Lines 4-7. The definition of what constitutes SMALL, MODERATE and LARGE air quality impacts would be helped by providing specific examples from decommissioning or decommissioned facilities.

7

CL-16/44 39. Page 4-15, Section 4.3.4.3, Lines 21-23. This section states that "[n]o anticipated new methods of conducting decommissioning and no peculiarities of operating plant sites are anticipated to affect this pattern" of managing fugitive dust. Is the reader to assume that a licensee who proposes using a new decommissioning method must perform a site-specific analysis of potential impacts?

Aquatic Ecology

CL-16/45 40. Page 4-16, Section 4.3.5, Lines 25-29. This section's discussion of impacts to aquatic resources following plant shutdown seems to contradict the example given on page 1-5, lines 6-7, of plant discharges post-shutdown being outside the scope of this document. Similarly, the discussion at Page 4-19, Section 4 3.6, Lines 26-29 seems to contradict page 1-5. Note also the comment above on the page 1-5 language.

CL-16/46 41. Page 4-17, Section 4.3.5.2, Line 38 and page 4-18, Section 4 3 5 2, Lines 4 and 14. The term "previously disturbed" needs definition.

CL-16/47 42. Page 4-18, Section 4.3.5.2, Lines 14-17. The Supplement should provide specific guidance on how to weigh the primary factors to be considered in evaluating the adverse impacts of decommissioning activities in "previously disturbed" areas. How much habitat can be disturbed before a site-specific analysis is required? How much time can have passed since the initial disturbance? How is a licensee to evaluate the successional patterns of the aquatic communities?

CL-16/48 43. Page 4-18, Section 4.3.5 2, Lines 17-23. The Supplement states that the potential impact of disturbing areas beyond the original construction area is SMALL and can be characterized generically if "the aquatic environment has been characterized," and that a site-specific analysis is needed if "decommissioning activities occur in aquatic environments have not been characterized." What must this characterization consist of, and when and how recently must it have been performed, to allow a licensee to conclude that it is sufficient and can properly support the conclusion that potential impacts are SMALL?

CL-16/49 44. Page 4-19, Section 4.3 5 4, Lines 4-6. This subsection appears to define a "previously disturbed area" as "within the security fences or surrounding paved, graveled, or otherwise developed areas without removal of near-shore or in-water structures." Does this definition also apply to land use activities on page 4-6, Section 4.3.1.2, Lines 15-16? Does the definition mean that a licensee who plans to remove near-shore or in-water structures in "previously disturbed areas" must perform a site-specific analysis of the potential aquatic ecology impacts?

CL-16/50 45. Page 4-19, Section 4.3.5.2, Lines 8-11. How is "previous" defined? What is the relationship between these "previous ecological surveys that indicate a low probability of adversely affecting ecological resources" and the aquatic environment characterizations referred to on Page 4-18, Lines 17-23? This subsection suggests that the aquatic ecology impacts of decommissioning activities conducted in areas that were not "previously disturbed" will be SMALL if a previous survey has demonstrated a low probability of adverse effects on the ecosystem, while Section 4.3 4 2 suggests that the aquatic ecology impacts of decommissioning activities in such areas will be SMALL if a characterization has demonstrated the possibility of some adverse effects to "sensitive resources," but the facility will manage those resources for their protection during

decommissioning activities.

CL-16/51 46. Page 4-19, Section 4.3.5.2, Lines 11-16. The Supplement should define more precisely the circumstances under which a site-specific analysis of potential aquatic ecology impacts in previously undisturbed areas is required. How is the licensee to determine whether an activity has the potential to impact the environment? How should the magnitude of potential impacts be determined? Also, can a licensee avoid doing a site-specific analysis by implementing a protection plan to protect the aquatic environment?

Terrestrial Ecology

CL-16/52 47. Page 4-21, Section 4 3 6.2, Lines 1, 15 and 24. The term "previously disturbed" should be defined or examples provided.

CL-16/53 48. Page 4-21, Section 4.3.6 2, Lines 15-17. The Supplement should provide specific guidance on how to weigh the primary factors to be considered in evaluating the adverse impacts of decommissioning activities in "previously disturbed" areas. How much habitat can be disturbed before a site-specific analysis is required? How much time can have passed since the initial disturbance? How is a licensee to evaluate the successional patterns of the native communities?

CL-16/54 49. Page 4-21, Section 4.3.6 2, Lines 23-25. What is a "significant" terrestrial resource? What does "potentially" affected mean? These terms need to be defined or examples provided so that licensees understand when they are required to perform a site-specific analysis.

CL-16/55 50. Page 4-21, Section 4.3.6 2, Lines 25-29. The document states that the potential impact of disturbing areas beyond the original construction area is SMALL and can be characterized generically if "the terrestrial environment has been characterized." Moreover, a site-specific analysis is needed if "decommissioning activities occur in terrestrial environments that have not been characterized." What must this characterization consist of, and when/how recently must it have been performed, to allow a licensee to conclude that it is sufficient and can properly support the conclusion that potential impacts are SMALL?

CL-16/56 51. Pages 4-21 to 4-22, Section 4.3.6.3. The document assumes that "[i]n most cases, the amount of land required to support the decommissioning process is relatively small and is normally a very small portion of the overall plant site." It also states that "licensees typically anticipate utilizing an area of between 0.4 ha (1 ac) to approximately 10.5 ha (26 ac) to support the decommissioning process." EPA assumes this means that a licensee must perform a site-specific analysis of impacts if the terrestrial ecology impacts of decommissioning activities may or will be greater than 10.5 ha (26 ac). If this assumption is incorrect, when is a site-specific analysis is required and why?

CL-16/57 52. Page 4-22, Section 4.3 6 3, Lines 27-29. The document assumes that the "activity of rubblization of construction material should not have significant nonradiological impacts beyond other decommissioning activities except for potential short-term noise and dust effects." However, on Page 4-12, the document states that rubblization may affect groundwater pH and thereby "affect the transport properties of radioactive and nonradioactive chemicals in the subsurface." Any radioactive or nonradioactive chemicals in the subsurface that are mobilized as a result of concrete leaching from rubblized material could have an adverse effect on the terrestrial ecology

of a facility. For this reason, EPA recommends that the Supplement require a site-specific analysis of all of the potential environmental impacts of rubblization, both nonradiological and radiological.

CL-16/58 53. Page 4-22, Section 4.3.6.4, Lines 37-39. This subsection appears to define a "previously disturbed area" as "within the security fences or surrounding paved, graveled, or otherwise developed areas." How does this definition relate to the definition provided on Page 4-6, Section 4.3.1.2, lines 15-16?

CL-16/59 54. Page 4-22, Section 4.3.6 4, Lines 40-43. This subsection suggests that the terrestrial ecology impacts of decommissioning activities conducted in areas that were not previously disturbed will be SMALL if a "previous" survey has demonstrated a low probability of adverse effects on the ecosystem. How recent must the "previous" survey have been?

CL-16/60 55. Page 4-22, Section 4.3.6.2, Line 43 and Page 4-23, Section 4.3.6.2, Lines 1-5 The Supplement should better define or provide examples of circumstances under which a site-specific analysis of potential terrestrial ecology impacts in previously undisturbed areas is required. What constitutes a "potential of adverse impact to important terrestrial resources"? What is an "important" terrestrial resource? The document should provide criteria by which a licensee can determine whether an activity has this "potential," as opposed to merely a "low probability of adversely affecting ecological resources." The Supplement should also clarify whether a licensee can avoid doing a site-specific analysis by implementing a protection plan to protect the terrestrial environment.

Threatened and Endangered Species

CL-16/61 56. Page 4-23, Section 4 3 7, Lines 10-12. The supplement should elaborate on the basis for the statement that "the potential impacts of nuclear power facility decommissioning efforts on threatened or endangered species will normally be no greater and likely less than the effects of plant operations."

CL-16/62 57. Page 4-25, Section 4.3.7.2, Lines 3-7. The Supplement should provide guidance on determining the amount of habitat that can be disturbed beyond previously disturbed areas.

Radiological

CL-16/63 58. Page 4-27, section 4 3 8, lines 17-21. The Supplement should clarify the statement about the "relatively lower sensitivity of non-human species to radiation." Is this statement based on scientific studies or is the impact to non-humans not known? Why were decommissioning's radiological impacts on ecological receptors defined as outside the scope of the Supplement?

CL-16/64 59. Page 4-28, Section 4.3.8.3. This discussion in this section indicates that public and occupational dose comparisons were made with the facility's EIS for normal operations and with the 1988 GEIS. This statement appears to contradict earlier statements about the assessment of impacts being based on NRC regulatory limits for worker protection. Please clarify how the comparisons were made.

CL-16/65 60. Page 4-29, Section 4.3.8 3, Line 14 indicates that the data used in the evaluation are those

presented in Appendix G Appendix G uses units of collective dose equivalent; however, as also outlined in the appendix, the radiation protection standards are in units of annual individual dose. The Supplement should use consistent units and provide data on population densities for nuclear power plants.

Appendix G.2 (page G-19) provides the average public dose within a 50 miles radius of a facility The Supplement should clarify if facilities which fall outside this analysis (e g , have denser populations yielding more person-rem than indicated in the appendix) must complete a site-specific analysis.

CL-16/66 61. Page 4-31, Section 4.3.8.4. While the overall worker health impact is SMALL, Appendix G shows data from some decommissioning facilities where worker exposure is higher during decommissioning than during operations. The Supplement should clarify how these higher exposure levels compare with the radiation protection standards. Also, this section should clarify whether an analysis was done of the normal wastewater streams produced during decommissioning that are contaminated with radiation.

CL-16/67 62. Pages 4-30, 4-12 and xii. The Supplement should clarify the circumstances under which rubblization is permitted. It is EPA's understanding that, to date, rubblization has only been permitted after site decontamination. Does the term "rubblization" on page 4-30 refer to the treatment of concrete or structures that have not been decontaminated? Note that page xii indicates that the continued dismantlement of structures that have been radiologically decontaminated falls outside the scope of the Supplement.

Environmental Justice

CL-16/68 63. Page 4-57, Section 4.3.13.4, Lines 36-38. The environmental sections of some PSDARs submitted to date have not provided detailed information. The Supplement should elaborate on the "appropriate information" that licensees should provide relating to environmental justice in the environmental section of their PSDARs to enable NRC to obtain sufficient information on potential environmental justice issues at decommissioning facilities.

Cultural, Historical and Archeological Resources

CL-16/69 64. Page 4-58, Section 4.3.14. EPA appreciates that, on the whole, decommissioning is not likely to affect previously undisturbed archeological resources potentially located near the facilities, but is concerned about the potential loss of these facilities as a body of engineering work. The Supplement mentions that a few facilities may be eligible for listing on the National Register of Historic Places individually and that those facilities would then be the subject of mitigation based upon consultation with the SHPO. Eventually, however, a substantial number of facilities may be decommissioned. While the facilities themselves may not be fifty years old nor require physical in situ preservation, the processes and engineering they employed may merit inclusion in the Historic American Engineering Record (HAER) The HAER is designed to provide uniform documentation standards so future scholars can look back at our achievements and study them for a multitude of purposes. Rather than make this determination on a case-by-case basis, the NRC may want to consider working with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers to achieve a programmatic agreement or other programmatic treatment for these facilities

Transportation

CL-16/70 65. Page 4-68, Section 4 3 17.1. This section should address regulations governing the transportation of hazardous and mixed wastes as well as of low level waste.

CL-16/71 66. Page 4-69, Section 4.3.17 2, Line 5. What is meant by "not large enough to destabilize the important attributes of the system?"

CL-16/72 67. Pages 4-72 to 4-73, Section 4.3.18. The discussion of irretrievable resources more properly belongs in a section that summarizes environmental consequences. The Supplement could benefit from having such a section as was done with the recently issued draft NMSS guidance document on NRC preparation of NEPA documents.

CL-16/73 68. Page 4-72, Section 4.3.18, Line 9. It seems inappropriate to include concrete as an irretrievable resource.

CL-16/74 69. Page 4-72, Section 4 3.18 1, Line 14. The Supplement states that there "are no regulations that deal specifically with the concept of irretrievable resources." It is unclear what is meant by this statement. The following statutory and regulatory provisions pertain to irreversible and irretrievable resources in the NEPA context:
-- NEPA § 102(2)(C)(v), 42 U S C. § 4332(2)(C)(v);
-- 40 C.F.R. § 1502.16 (CEQ regulations); and,
-- 10 C F.R. Part 51, Subpart A, Appendix A (NRC regulations).

Letter 17, page 1

11/9/01
66FR56721 (17)

STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
1035 OUTER PARK DRIVE • SPRINGFIELD, ILLINOIS 62704
217-785-9900 • 217-782-6133 (TDD)

George H. Ryan
Governor

Thomas W. Ortciger
Director

RECEIVED
2002 JAN -3 AM 9:03
Rules and Directives Branch
USNRC

January 7, 2002

TO: USNRC

FROM: Gordon Appel
Deputy Director
Illinois Dept. of Nuclear Safety
217/524-4723

Response to Comments on NUREG-0586

We mailed the response on December 28, 2001. Due to the mail, we are faxing this letter to you.

PAGES... 4
(including transmittal sheet)

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Template = ADM-013
E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Letter 17, page 2

STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
1035 OUTER PARK DRIVE • SPRINGFIELD, ILLINOIS 62704
217-785-9900 • 217-782-6133 (TDD)

George H. Ryan
Governor

Thomas W. Ortciger
Director

December 28, 2001

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chief, Rules and Directives Branch:

The NRC published a Notice of Availability of the Draft Supplement 1 to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586) on November 9, 2001 and invited comments from interested parties. In addition, the NRC hosted a series of public meetings to solicit comments from the public. The Department of Nuclear Safety was represented at one of these meetings and would like to offer these additional comments on the Draft Supplement.

CL-17/1 As mentioned at the December 6, 2001 public meeting in Chicago, the scope of the Draft Supplement is inadequate in its evaluation of the long-term radiological exposure to the public for the reactor entombment decommissioning method. The scope of the radiological impact studies in the supplement appear to focus solely on the actual decommissioning process, not the resultant site conditions remaining after the decommissioning is completed. Specifically, section 4.3.8 Radiological on page 4-26 states:

> "The NRC considers radiological doses to workers and members of the public when evaluating the potential consequence of decommissioning activities. Radioactive materials are present in the reactor and support facilities after operations cease and the fuel has been removed from the reactor core. Exposure to these radioactive materials during decommissioning may have consequences for workers. Members of the public may also be exposed to radioactive materials that are released to the environment during the decommissioning process. All decommissioning activities were assessed to determine their potential for radiation exposures that may result in health effects to workers and the public. This section

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considers the impacts to workers and the public during decommission activities performed up to the time of the termination of the license. Any potential radiological impacts following license termination are not considered in this Supplement. Such impacts are covered by the *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*, NUREG-1496."

CL-17/2 For purposes of this GEIS, the NRC is only focussing on the environmental impact of the actual decommissioning activities between the cessation of operations and license termination. This approach completely and inappropriately ignores the environmental impact associated with any radioactive material remaining following license termination.

CL-17/3 For a site decommissioning that results in a license termination for unrestricted use, the long-term radiological impacts to the public may well be within acceptable limits. However, for a decommissioning that results in a license termination with restricted site use the potential exists for long-term radiological impacts to the public to be far above acceptable limits. The draft Supplement does not consider this potential. While narrowly focussing the radiological studies to the decommissioning process, the NRC does not consider those potential long-term impacts to the public.

When the original GEIS was issued in 1988, the NRC viewed entombment as an unlikely decommissioning method. The issue of entombment was not publicly discussed in the 1997 timeframe that NUREG-1496 was published. It is unlikely that NUREG-1496 addresses the long-term radiological impacts associated with entombment. In 1999, the NRC began to consider entombment as possible decommissioning options or methods and conducted a workshop in
CL-17/4 December 1999 to gain input from the public. On October 16, 2001, the NRC published an advance notice of proposed rulemaking regarding entombment options for power reactors. Even with that notice and this draft Supplement, the NRC has yet to evaluate the long-term environmental impacts associated with
CL-17/5 entombment of power reactors. In this Supplement, the NRC fails to consider whether it has the statutory or regulatory authority to terminate a license that allows for unrestricted site use with residual contamination present on site or to
CL-17/6 terminate the license with restricted site use in an Agreement State. Residual contamination left at a site whose license was terminated for unrestricted use could
CL-17/7 be perceived as disposal of low-level radioactive waste. By definition

CL-17/8 entombment is disposal of low-level radioactive waste in the containment structure. The Atomic Energy Act allows states to assume regulatory authority over the disposal of low-level radioactive waste in their state. In an Agreement State it is the Agreement State not the NRC that has the jurisdiction over disposal of low-level radioactive waste at reactor sites.

The federal government has established policies regarding the disposal of low-level radioactive waste. The federal Low-Level Radioactive Waste Policy Act of 1980 and the Amendments Act of 1985 require the states to provide for the disposal of low-level radioactive waste generated within their borders. States were encouraged to form regional compacts to limit the number of disposal facilities developed. As an incentive to form compacts, compacts were given certain rights to control the import and export of low-level radioactive waste into or out of their region as well as to establish policies regarding the management of waste within their region. To date, 10 such compacts have been formed and ratified by Congress. Most compacts envision having one regional disposal facility that
CL-17/9 would accept and safely dispose of their region's waste. Allowing NRC to determine whether waste can or will remain after a reactor license is terminated is contrary to the policy of the respective compacts and in direct disregard of the federal low-level radioactive waste framework established by Congress.

CL-17/10 As the NRC evaluates the comments received on the GEIS, it should look beyond the actual decommissioning process and focus on what condition the site
CL-17/11 would be in following license termination. If the possibility exists that radioactive material will remain on site under an unrestricted or restricted use condition, the GEIS should consider the associated long-term environmental impacts. In
CL-17/12 addition, the NRC should reevaluated their legal standing in deciding what radioactive material would remain at a reactor site located in an Agreement State and whether their proposed action would be contrary to the waste management policies of the applicable compact.

Any question you may have regarding this letter may be directed to me at 217/785-9868.

Sincerely,

Thomas W. Orciger
Director

TWO:bac

Letter 18, page 1

11/09/01
66FR56721
(18)

From: "Hickey, Eva E" <eva.hickey@pnl gov>
To: "mtm2@nrc.gov" <mtm2@nrc.gov>, "sxf@nrc gov" <sxf@nrc.gov>
Date: 1/15/02 6 25PM
Subject: FW: Comments on NUREG-0586 Draft Supplement 1

-----Original Message-----
From: Jerry Delezenski [mailto:JDeleze@smud org]
Sent: Tuesday, November 20, 2001 11:12 AM
To: 'dgeis@nrc.gov'
Subject: Comments on NUREG-0586 Draft Supplement 1

Cynthia Carpenter, Chief
Rules and Directives Branch
Division of Administrative Services
U.S. Nuclear Regulatory Commission

Re: Comments on NUREG-0586 Draft Supplement 1

Ms. Carpenter:

CL-18/1 We would like to comment on the draft NUREG to correct an error in Table 4-3, line 21 regarding the Cost Impacts of Decommissioning for Rancho Seco. Line 21 should read:

Rancho Seco 913MWe PWR DECON $394

Please refer to our letter submitted to the NRC Document Control Desk dated 3/26/01 entitled Rancho Seco Report on Decommissioning Funding Status. On page 2 of the letter we stated:

"...Their [TLG] estimate was $495.4 million in 2000 dollars. The portion of this total that is non NRC-defined decommissioning activities related to non-radiological dismantlement and management and storage of spent fuel is $101 million, most of which is related to fuel storage costs..."

...TABLE 2...
2000 $495 Million.....

SMUD, when it first established its decommissioning fund, included radiological dismantlement costs and costs related to storing spent fuel. Therefore, $495m -$101m leaves $394 million for equivalent cost discussed in Table 4-3 of the NUREG.

CL-18/2 Since 1999, Rancho Seco has embarked on an extended DECON process scheduled for completion in 2008 (including license termination). After license termination, SMUD will, depending on its business needs, embark on sit restoration currently estimated at ~$45-80 million. This approximate estimate dollar figure was never a part of the decommissioning trust fund. (We assume your number in Table 4-3 includes all the costs of dismantlement, fuel storage and non-radiological site restoration.)

CL-18/3 Also, based on information presented in various industry forums, several

Template = ADM-013

E-RIDS = ADM-03
Add = M. Hasdik (MTM2)

Letter 18, page 2

numbers quoted for some of the other plants may be inaccurate. Each plant should verify the numbers for accuracy.

Thank You,

Respectfully,

Jerry Delezenski,
Supt. QA/Licensing/Admin
Rancho Seco

Stephen A Byrne
Senior Vice President, Nuclear Operations
803 345 4622

SCE&G
A SCANA COMPANY

December 20, 2001
RC-01-0204

11/7/01
66FR56721
(19)

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Gentlemen:

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
COMMENTS ON THE DRAFT SUPPLEMENT TO THE FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON DECOMMISSIONING OF NUCLEAR FACILITIES

Reference: Draft Supplement 1 to NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" November 9, 2001, Federal Register, 66-FR-56721

South Carolina Electric & Gas (SCE&G) company offers the following comments on the above-mentioned document.

CL-19/1 Page 3-24 mentions the containment ceiling being lowered to the top of the pressurizer for a PWR under the ENTOMB2 option. Appendix E, page 9 lists this action as optional. This action needs to clearly be listed as optional on pages 3-24, 3-25, and 3-31. SCE&G believes this action should be optional as listed in Appendix E due to the extreme effort to lower the ceiling of a massive building such as the reactor building and yet maintain it intact for entombment purposes.

CL-19/2 Also, on page 3-24 "low density concrete grout" is mentioned. Grout is not lightweight, but concrete can make use of lightweight large aggregate to lower the weight per volume. Therefore, SCE&G recommends concrete be used in place of grout on pages 3-24, 3-25, 3-31, and 3-33.

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E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Nuclear Regulatory Commission
0-L-99-0290
RC-01-0204
Page 2 of 2

If you have any questions, please call Chris Crowley of my staff at (803) 345-4409.

Very truly yours,

Stephen A. Byrne

CAC/SAB/mb

c: N. O. Lorick
N. S. Carns
T. G. Eppink
R. J. White
L. A. Reyes
R. R. Assa
NRC Resident Inspector
K. M. Sutton
W. R. Higgins
RTS (0-L-99-0290 #4)
File (811.10)
DMS (RC-01-0204)

Letter 20, page 1

21 PAGES TOTAL - COPY

PAMELA BLOCKEY-O'BRIEN, D23 Golden Valley
7631 Dallas Hwy, Douglasville, GA 30134

Chief, Rules and Directives Branch,
Division of Administrative Services,
Mailstop T 6 D 59,
US Nuclear Regulatory Commission,
Washington, D.C. 20555-0001

11/9/01
LGF-E5672/
(20)

Dec. 26th, 2001

RE: Comments for the record on "Draft Supplement 1 to Nureg-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (GEIS), Draft Supplement Dealing with Nuclear Power Reactors".

What a way to spend the day after Christmas-what a way to spend many hours of December and November-having to plow through this document - a monument to mans' arrogance, stupidity, lack of foresight and greed, if there ever was one. However, CL-20/3

CL-20/1 the document can be condensed into three words, namely : "DUMP AND COVER", if one wants a basic overview of what NRC put in it, as that seems to be part of the main CL-20/4 desire of the nuclear industry/NRC (and D.O.E !), concerning what to do with the horrendous nuclear legacy of the atomic age . At the height of the Cold War, in the U.S., defense against the atomic bomb and the hydrogen bomb (which in essence, uses a fission - atomic- device/bomb/reaction to trigger the fusion reaction/bomb/ CL-20/5 device which triggers etc. etc. etc.) was an incredible defense which was called "DUCK AND COVER". They actually had the population believing that if you ducked under a door jamb, or under a desk at school, or under a table in the kitchen, you would survive nuclear war.. While this side of the Atlantic dutifully behaved like a bunch of sheep going over a precipice following the leader, the other side of the Atlantic, thousands upon thousands demonstrated against the insanity of the arms race and nuclear weapons in general. Why was there a difference in behavior ? Because, just like today with this issue of nuclear waste and "decommissioning", (a word everyone swallows it seems - must be a new made up word as it is not in my huge old dictionary) - there was/is almost no discussion of the issues in the press, and no education on the issues, and this is purposeful. There is, and has been, press interference on the issues - by both industry and governments.

CL-20/2 The nuclear issue is the most important issue facing humanity and has been since the atom was first split. The nuclear issue is the Sword of Damocles over the planet and all future generations should we survive the next decade, (as I write India and Pakistan are once again on the verge of war, only they now have nuclear

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E-RIDS = ADM-03
Add = M. Hassik (MTM2)

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weapons, thanks to the fact that they got both nuclear power plants and research reactors, -get those, and with enough money and infrastructure and a government willing to squander billions, just like the Soviets, the British, the US, the French, the Chinese, the Israelis, the South Africans under apartheid, did, -and sooner or later you've got yourself a bomb- THE BOMB - (that old nuclear power/atomic bomb connection no one wants to mention.) You mean NRC thought no one realized the nuclear power route was just a diversion so the public wouldn't realize they were running plants to produce extra plutonium for weapons if needed ? Oppenheimer SAID so. Besides, anyone with common sense could figure that out. Just as anyone with common sense can tell this Draft Supplement 1 to Nureg-0586 will have dire consequences if implemented in its current form. It always amazes me how the Nuclear Regulatory Commission INVENTS its own laws and standards - its own regulations, its own definitions (such as "decommissioning" see p.xii) and most of the public doesn't realize (if they did, it is safe to assume they would probably horsewhip the Commission out of town) what a sham it all is and how industry writes its own ticket. For example, p. xii, the Commission has concluded (says the Commission) that <u>impacts that do not exceed permissible levels in the Commission's regulations are considered small.</u> In other words, using made up regulations based a great deal on that appalling, criminally negligent outfit the ICRP, (one of the dumping grounds for Manhatten Project scientists post WWII - for anyone reading this from the younger generations, the Manhatten Project was the name of the project that built the atomic bombs dumped on Hiroshima and Nagasaki) and its, (the ICRP's) early determinations that they would set allowable levels of exposure that were at levels that would allow the emerging atomic energy industry, and everything that went with it, to operate with all the releases which they knew and admitted would cause genetic damage, but they decided it would be acceptable to damage sperm and ovum . To damage countless generations (until they die out) to cause countless birth defects, countless miscarriages, countless cases of spina bifida - look at South Carolina, nuclear power plants and the Death of the Earth squad's Savannah River Nuclear Site and the highest spina bifida rate in the US. CL-20/6 NRC has absolutely no basis to say whether impacts will be small etc. based on that

CL-20/7 sort of garbage. The great R.M. Sievert (after whom the unit the Sievert is named) pointed out that there was no level below which radiation did not cause damage, no threshold that must be exceeded for damage to occurr, yet NRC says a threshold must be exceeded for effect to occur, I believe Sievert. The ICRP standard of 5Rem per year is based on a principle called risk/benefit that allows a one in five thousand chance of contracting cancer. In other words, the death or cancer risk is the workers and the publics' , the benefits are the dollars flowing to the industry and the NRC (from the industry in return for NRC services and licenses etc) The NCRP also pushes the 5 Rem standard - this is the same bunch of bozos who in trying to refute the world renowned findings of Dr. Alice Stewart and the famous Oxford Study accepted worldwide, that showed x-raying a developing fetus caused a major increase in childhood cancer - claimed obstetricians had x-rayed those fetuses which they somehow KNEW would get cancer, which explained why the x-rayed fetuses went on the get childhood cancer!!,(See "The Woman Who Knew Too Much - Dr. Alice Stewart and the Secrets of Radiation" by Gayle Greene. Read it and learn all about the Commission and its buddies. Read it and weep for humanity, then , if you have something called a concience at the NRC, go do something about this Draft so it is no longer an industy wish list.) The ALARA principle that NRC uses which basically says that doses must only be kept As Low As Reasonably Achievable (ALARA) based on the state of the technology and the amount of money spent by the industry - what Dr. Gofman calls "planned deaths" as NRC knows -

CL-20/8 is referenced by NRC many times, and the Draft even says during licensing the applicants commit to implement ALARA programs. The combination of ICRP, NRC, NCRP and ALARA standards is, and has been a recipe for premeditated murder and/or illness,

CL-20/9 genetic damage and great suffering as it is, NRC saying that it has not established standards to biota other than humans on the basis that limits established (by the aforementioned) for the public would provide adequate protection for other species is outrageous and contrary to what has been established for decades. Plus, to

then cite the bozos at NCRP again, saying that the "fate of individual non-human organisms is of less concern than the maintainance of endemic population," shows A COMPLETE LACK OF UNDERSTANDING OR COMPREHENSION OF THE WEB OF LIFE AND THE NATURAL WORLD. The effects of ionizing radiation exposure on ALL life forms includes: sterility and genetic damage which can lead to extinction.(Think fruit flies and Herman Muellers experiments which gave him a Nobel Prize.. Think the

CL-20/10 effects to fish, proved years ago.) When thinking about exposure to plants and animals and fish, one needs to take the effects to an infant and to a child in the womb to better approximate the effects to wildlife, the smaller the non-human entity (e.g. a bird, a frog) the child in utero down to embryonic level would be appropriate. We all know what happens when an embryo is exposed - namely death or severe damage.. The same happens to birds eggs.. The International Atomic Energy Agency is about as trustworthy on the radiation dose issue as Attila the Hun would have been on the gentleness issue - the IAEA has a charter that states its sole purpose in life is to push all things nuclear. Just what does NRC expect them to say ?

Almost 50 years ago, the Georgia ecologist Eugene Odum, who did a lot of work for the Atomic Energy Commission/DOE (a fact that is not now widely known) under contract, wrote of the need to "accelerate the study of the function of intact biotic communities in order that the total radiation effects can be evaluated" of the need for "an understanding on the long term influences of low level radiations on aquatic and terrestrial environments into which the by-products may be released," and that it was concievable "that every large atomic power plant of the future will need a radiation ecologist to work with environmental problems outside of the plant" and that there was a need to train "young men simultaneously in the fundamentals of modern ecology and radiation biology in order that this inevitable need can be met." How terribly sad - the NRC has one doctor for the entire NRC. Radiation biologists.? Stop me before I scream.. It is obvious that an inventory of all life forms on a site should be made and that they be screened for chromosome aberrations and radioactive contamination, then

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a similar comparison be done at a site as similar as possible to the plant site about twenty miles away upstream and out of the predominant windpath on a thirty year wind rose. It would not be half as good as one would want, but it would be better than nothing and establish some differences and give a better idea of the contamination problems, even though a site twenty miles away will have recieved some airborne deposition from the plant. In terms of aquatic species, the record from State sources and the licensee on tests run on fish/mussels etc. can be used and compared to the fact, repeat FACT, that contaminants such as Cobalt-60, Sr-90 Cs-137, H-3 above the minute natural burden, plutonium etc. are not natural and should never be found in fish, mollusks etc. and one can look for chromosome aberrations. Diatoms can be examined for bioaccumulation of the uraniums from the plant. Centuries hence - in some cases decades - a measure of aquatic health would be the decrease in levels of contaminants found in species and decrease in aberrations etc. It is vital, that contaminated sediment found downstream (and also some upstream due to airborne deposition on water sinking down) be removed for many miles downstream. This should be done by perhaps sucking it up via vacuum type hoses as opposed to dredging which could dislodge and spread the contamination further.

With regard to plant life, microorganisms etc. one could compare plant seed production of say twenty species on site, with production twenty miles away, and number and type etc. of microorganisms likewise, as well as radioactive contaminat -

CL-20/11 ion. I don't really know why I am bothering to write all this, as the NRC will ignore it anyway, but hope springs eternal as they say. If we don't have comparisons, we can't have at least some idea of what constitutes the start of a return to a more unpollutted site, and we can't establish what needs bulldozing and taken to a radioactive waste national sacrifice area.

CL-20/12 THERE SHOULD BE ABSOLUTELY NO UNRESTRICTED USE OF THE PROPERTY EVER. THE ADDITIONAL EXPOSURE IS TOTALLY INSANE. WHEN DR. KARL MORGAN WAS ALIVE * THE FATHER OF RADIO-

CL-20/13 LOGICAL HEALTH PHYSICS, FORMERLY WITH OAK RIDGE FOR DECADES, HE SAID LESS THAN ONE MILLIREM PER YEAR ONLY WOULD BE PERHAPS ACCEPTABLE FROM ALL PATHWAYS. THERE NEVER

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SHOULD BE A LACK OF INSTITUTIONAL CONTROL EITHER.

CL-20/14 The Technical Specifications and what the facility was allowed to dump under the license are outdated and bear no resemblance to current knowledge and should

CL-20/15 be junked and the whole thing done over. Furthermore, the way the environmental and water issues were looked at during the time of plant licensing were often equally awful. It all needs reconsidering.

What is ridiculous, is the worry about messing up the environment while decommissioning the dump. For crying out loud, every second the plants are running they are contributing to ecological ruin, at the microscopic level, and impacting human health to a distance of approximately 100 miles.

CL-20/17 This Draft 1 references MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual.) I commented on the Draft, never saw the final, never heard from anyone again on it. It was mindnumbingly awful. Put together by some people from NRC, DOE, Dept. of Defense, and EPA. Industry was represented big time. In it the DOD said how committed it was to protecting the environment - this from an entity that had left thousands of contaminated sites on and off bases, themselves requiring an estimated (govt. estimate) $100 BILLION to $200 Billion to cleanup worldwide. In its introduction, Draft "Marssim" did not address all sorts of things - from contamination on vicinity properties through contaminated subsurface soil, water, construction materials and on and on. All of which must be cleaned up/have the contamination removed. They showed a lack of understanding of the groundwater cycle, and groundwater issues JUST LIKE THIS DRAFT DOES (in fact I am still looking

CL-20/18 for it to be addressed), Groundwater is used by countless communities, groundwater is eventually released to surface and other water bodies and, as groundwater onsite is usually radioactively contaminated, (At Plant Hatch they contaminated it by 1979 and that was just for starters) it is a SERIOUS issue that MUST be dealt with, groundwater that is contaminated MUST be pumped out etc. (Refers to what I

CL-20/19 said in earlier comments) THIS GROUNDWATER CONTAMINATION ISSUE IS ANOTHER REASON WHY "RUBELIZATION" MUST BE FORBIDDEN, THE CONTAMINATION IN WHAT THEY WANT TO RUBELIZE AND BURY WILL LEACH TO THE GROUNDWATER AND DIRECTLY IRRADIATE SOIL AND MICROORGANISMS. The industry just wants to save money and "dump and cover".

CL-20/20 The fact that the Staff and the Commission have even considered rubblization.
shows an utter disregard for the health and welfare and safety of the public
CL-20/21 and the ecosystem upon which life depends. Anything dumped or buried from the past
practices on site must also be dug up and removed.
CL-20/22 To find out the extent of past problems, and contamination levels, IT IS VITAL
THAT THE NRC, THE LICENSEE (as some are new owners/licensees), AND THE CONTRAC-
TORS AND SUB-CONTRACTORS, GET ALL Reports of ACCIDENTS, LICENSEE EVENT REPORTS, VIOLATIONS,
INSPECTION REPORTS, SPILLS AND CONTAMINATION EVENTS FROM THE DOCKET FOR THE
REACTOR AND SITE IN QUESTION, AND BLOODY WELL GET OFF THEIR REAR ENDS AND EARN
THEIR MONEY AND READ THEM. THEY NEED THE WHOLE LOT, SINCE START-UP, EVEN IF IT
TAKES TWO MONTHS TO READ THEM. I AM SICK AND TIRED OF EVERYONE, NRC INCLUDED,
REFUSING TO READ THOSE REPORTS FROM THE DOCKET AND IN THE PUBLIC DOCUMENT ROOM. CL-20/28
THEN, AS THE LICENSEES USUALLY PUT A GOOD SPIN ON IT, PEOPLE SHOULD REALIZE THE
PROBLEMS LISTED WERE PROBABLY WORSE. Another issue, which I touched on in my
comments on MARSSIM, was the fact that in the real world, many people can not
read or write very well, and if things are contracted out, this could have
CL-20/23 serious consequences. NRC must stipulate, that ALL CONTRACTORS AND SUB-CONTRAC-
TORS RIGHT DOWN TO THE BACK-HOE OPERATORS MUST BE HIGH SCHOOL GRADUATES. Cleanup
cannot just be dished out to any contractor, all involved should not only have a
stirling track record, but experience in nuclear fields. There should be a radiation
biologist on site, plus a health physicist, plus a wildlife biologist with a CL-20/29
knowledge of radiation effects, plus there must be federal and state oversight CL-20/30
CL-20/24 ON THE SITE at all times. I noticed that the Draft blabbers on about OSHA standards-
YET FAILS TO MENTION THAT OSHA DOES NOT COME ON SITE AND IS NOT ALLOWED TO ACCORDING CL-20/31
TO OSHA, EVERYTHING IS UNDER NRC. So let's print the truth shall we ?
CL-20/25 The Draft says, p.1-6, that the NRC and the Commission are not considering the issue CL-20/32
of spent fuel storage (in a pool or in one of those ridiculous casks outside in CL-20/33
plain view for every terrorist to see) as part of decommissioning. The excuse is
CL-20/26 that it's dealt with under other license aspects. It also says that the Commission
has made a finding that the DEADLY, RADIOACTIVE SPENT FUEL CAN BE STORED SAFELY

AND WITHOUT SIGNIFICANT ENVIRONMENTAL IMPACTS FOR AT LEAST THRITY YEARS BEYOND
THE LIFE FOR OPERATION ETC. ETC. IS THE COMMISSION OUT OF ITS COTTON-PICKING MIND?
CL-20/27 Those issues are of grave concern. What happens , if during decommissioning (i.e.
during "dump and cover", amidst much licensee laughter about how they stuck it to
the rate payers and taxpayers and local community yet again) terrorists take out
three spent fuel casks blasting them to kingdom come (the Milan anti-tank weapon
would do that, as I wrote NRC before) OR two casks had a major problem and needed to
be opened under shielding inside the spent fuel pool and there was either no room
in the spent fuel pool or the cask came apart while trying to move it due to em-
brittlement of the cask from the radioactive decay heat coming off the spent fuel ?
Whatt will NRC do, what will the licensee do , send for Ghostbusters ?
CL-20/28 Under Water Quality p.4-10,4-11 The NRC must stop giving the impression that
it is sheer chance that nuclear reactors are located on water, when in fact they
require millions of gallons of water a day to operate and that water source is con-
sidered the ultimate heat sink in the case of a meltdown - it'll ooze on down the
river, hissing and sputtering like a volcano hitting water. NRC assumes compliance
with NPDES discharge permits for non-radioactive contaminants (NPDES and the Clean
Water Act do not cover most radioactive contaminants, this was purposeful, so industry
and the armsme_nts crowd could do what they liked,) however, NPDES permits are
often violated or bypassed - just look at the NPDES situation in Georgia as one
example. Discharges should never have been allowed without prior cleanup and should
not be now. Surface and groundwater quality, p. 4-12, should NOT be considered a ge-
neric decommissioning issue - climate zone can also create unique problems, terrain
likewise, it should be site specific. Air quality issues, p. 4-12 etc., do not address
the fact that HEPA filters are about as good as useless for radioactive particulate
holdup and sand filters should be added as well. All workers must have self-contained
breathing systems (moon-suits) . The area being worked in should be covered to con-
tain dust if it means covering the whole site with a tent with an adhesive inner
surface to capter particulates - after all if flypaper is good enough for the DOE capture
when it, like the NRC was called the AEC, to capture particulates on, a tent with

some sort of a sticky undersurface is a step up! The point I'm getting

CL-20/34 at, is,one does not want radioactive and chemical particulate matter getting

CL-20/35 offsite if possible. If such a tent system were used, afterwards it would be disposed of as rad waste. Also, workers and the public MUST understand the fact that one can not clean up radioactive contamination, only contain it to some extent and remove contaminated materials to better sites where they can be better contained - in other words to national sacrifice areas remote from all human habitation and far from water sources, where wild life is fenced out.

CL-20/36 Regarding aquatic ecology p.4-16, as touched on earlier, the environmental impact statements originally written for the plants were often very poor, and did not mention that the discharge water would be radioactively contaminated nor that sediment would be contaminated for miles etc. In the long term, if the contaminated sediment is removed and no further radioactive and chemical releases

CL-20/37 are made to water and air, the aquatic ecology can only improve. Water quality should continue to be tested for radioactive contaminants for at least 600 years which is the full radioactive hazardous life approximately for cesium-137 which is a contaminant of concern in fish and shellfish as it migrates to muscle in

CL-20/38 particular. The aquatic ecology issue should also be site specific, for example, Plant Hatch in Southern Georgia had a massive spent fuel pool spill which contaminated not only the river and sediment but also a huge wetland area which has many creatures feeding in it and becoming contaminated, including threatened and endangered birds. And on the endangered bird subject, let me address the

CL-20/40 Migratory Bird Treaty Act of 1918 — (p. 4-20) It is a proven fact - proven by the old Atomic Energy Commission and its contractors,- that migratory birds become contaminated eating seeds,drinking water and so on at radioactively contaminated sites, wetlands areas etc. and the birds carry this contamination in their bodies worldwide. NRC ,DOE and licensees violate the MBT by not protecting birds from such contamination, and by spewing radioactive noble gases out that impact passing birds. No wonder birds are declining. This is one of the reasons I suggest that netting or similar should be placed over the sites in

question, fine wire mesh set at an angle that can have leaves and other debris hosed off it, it must be small enough to keep birds out down to the size of hummingbirds. Enclosed, such an obscenem site poses slightly less of a threat to birds and other wildlife, the utilities can pay for it all, it can come out ofthe salaries of the top management and company owners. NRC better set it up now, before they all pull an "Enron" - i. e., an "end run" round everyone.

CL-20/41 I notice that the General Accounting Office has slammed the NRC for its lack of oversight of transfers and mergers in the nuclear industry and had not verified that new owners would have guaranteed acess to the decommissioning charges that their affiliated utilities would collect, in some cases, plus, a host of other safety and other issues were raised, all of which are troubling. The NRC must immediately address problems, and should demand that companies provide enough money for oversight - to include security staff,maintainance staff, nuclear engin-

CL-20/42 eers, radiation safety officers etc. - essentially forever. Even after all fuel is removed from the site and the entire structure is removed, the site will still be radioactive forever and still need a security person, basic maintainance person (for upkeep of fences, gates, runoff detention ponds etc.) and regular visits from

CL-20/43 a radiation safety officer. It is absurd that NRC states that "decommissioning activities do not include the maintainance, storage or disposal of spent nuclear fuel, or the removal and disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license.....they are not considered as a cost impact because the licensees are not required to accumulate funds for these activities." (See p. 4-42) Why not ? This is an outrage! The NRC must pass a Rule at once requiring such money be set aside, some of it perhaps in form of gold and silver bullion at bank deposit in case of financial collapse. The fact of the matter is this: the licensees must be held responsible and accountable for everything about and on the site and generated by the site past, present and future. As NRC states (p.43) local jurisdictions may impose stricter"cleanup" or waste

CL-20/44 or contamination containement and this will cost more. The NRC should add a 10% surcharge to any calculated fees for decommissioning to help cover those costs

11.

CL-20/45-46 that are unforseen which may arise. And of course they must pay for the "spent" deadly radioactive fuel storage at the sites, whether in pools or casks at ISFSI's and the maintainance and upkeep and security and waste handling and fire preventiom and similar. This MUST be addressed as part of this decommissioning, it must be

CL-20/47 incorporated. THE COSTS MUST NOT BE PASSED ON TO THE RATEPAYERS as NRC says they

CL-20/48 are currently. Furthermore, the most expensive estimate should always be assumed for everything as a wise precaution. NRC lists the decommissioning costs in MILLIONS as estimated by the utilities - however, NRC WELL KNOWS THE COSTS ARE IN THE BILLIONS WHEN EVERYTHING FROM SPENT FUEL ON DOWN IS FACTORED IN, AND THAT MUST BE REFLECTED, PLUS THE NRC INSPECTOR GENERALS OFFICE SHOULD GO OVER ALL ESTIMATES

CL-20/49 MADE BY UTILITIES TO SEE HOW TRUSTWORTHY AND ACCURATE THEY ARE. Inflation must also be added to costs.

CL-20/50 Regarding the loss of local tax revenues dua to "decommissioning". The utility must be required to notify the local government as far in advance as possible that they will lose taxes. The fact that the local government should never have allowed such nuclear dumps, posing as power plants, into their communities is another issue. They need to understand that they better diversify their tax base in a hurry.

CL-20/51 HOWEVER, the nuclear industry - the entire industry - (from nuclear plant owners to uranium enrichment plants to users of radiation for medical experiments posing as "therapy" etc) should have a tax levied on it by NRC to be paid into a special account to go towards compensating the communities. An additional tax can be levied on them yearly in the form of a small, flat fee which would help pay for the NRC and the EPA to do quarterly inspections at facilities, in perpetuity.

CL-20/52 Before I forget : NRC MUST MAKE LICENSEES, CONTRACTORS, SUBCONTRACTORS AND ANYONE WHO WORKS ON DECOMMISSIONING TAKE THE EFFECTS OF RADIOACTIVE "DAUGHTER" PRODUCTS INTO CONSIDERATION AS THEY MAY HAVE VERY DIFFERENT PHYSICAL, CHEMICAL AND RADIO-ACTIVE PROPERTIES THAN THE RADIOACTIVE "PARENT". THIS MUST BE PART OF DECOMMISSION-ING STANDARDS. MARSSIM basically ignored that, another reason their Draft was so

CL-20/53 awful. NRC seems to have ignored it in this Draft also. This is an important health and also environmental issue that cannot be ignored.

12.

CL-20/54 Regarding Occupational Dose and nuclear power plant exposure data (p.G 12, etc) The regulatory limits for exposure were not set based on medical reasons but were set in order to enable the industry to operate - that is historic FACT - because what people are being exposed to is either not found in nature (i.e.

CL-20/55 it is man-made) or found in nature at far, far lower levels. The exposure allowed by regulation is, in fact, slow death, and furthermore, worker doses can't always be trusted because of faulty measuring equipment, horror stories of workers being told not to wear their dosimeters periodically, and so on. The dose recieved also has a different effect on each person depending on age, sex, current and past health status and many other factors, plus each organ is affected differently. The fact that the ICRP, DOE, NRC etc. didn't know what on earth they were doing -other than guesswork - regarding exposure levels set, is shown by the fact that they had to keep adjusting the "allowable" regulatory limits down-ward. A sort of continuous "Oops, we screwed up ! But don't worry, this time we've got it right." All the blather on "Risks" from radiation exposure can't hide the fact that it kills - not just cells here and there - such as cells about to form the septum of a babys heart so the child is born with a hole in it's heart, because a bunch of murderers at the ICRP decided the risk was acceptable - but it kills people. To KNOWINGLY ALLOW PEOPLE TO BE EXPOSED TO SOMETHING THAT WILL KILL A CERTAIN PERCENTAGE OF THEM, HAS A NAME, PREMEDITATED MURDER * JUST BECAUSE A REGULATION WAS WRITTEN SAYING ITS OK, DOES NOT CHANGE IT. Further, the ICRP does not consider effects manifested after the second gen-eration in assessing the genetic risks to workers offspring (p.G 5) again showing they don't give a damn about the workers and their families and whether or not workers great grandchildren are born deaf, or with learning disabilities, or

CL-20/56 unable to reproduce. For the Draft to take the attitude of "well, the doses at plants being decommissioned are generally only a small fraction of doses at operating plants " p. G.13 is no comfort, and all the charts show, concerning Occupational doses (page G 14 and on), is thousands upon thousands of contaminated workers . It is obvious that this contamination of workers (and the environment)

13.

must be massively reduced.

CL-20/57 I noticed that it said cutting methods included abrasive water C-17, but in any case where there is plutonium contamination or depleted uranium metal, that all is meant to be cut under heavy oils and mushh else besides, Since many of the components will have been contaminated with plutonium, or were made of depleted uranium (when is the NRC going to tell the public that DU is NOT radioactive

CL-20/58 waste.?) it is obvious that the reactor vessel should NEVER be cut up, but do what was done with the Trojan veisel (p. C-18, Remove the whole thing offsite)

CL-20/59 However, the vessel should have additional shielding placed around it prior to placement on the heavy haul trailer, and upon arrival at the disposal site it

CL-20/60 should be further encased in what would amount to a giant burial cask. Removing the vessel offsite massively reduces worker doses, water contamination and the contamination to the local community and the environment. Obviously, the spent fuel is /has been removed from the reactor vessel and all liquid radwaste etc.

CL-20/61 too ! UNDER NO CIRCUMSTANCES SHOULD A FACILITY BE ALLOWED THE OPTION OF CHOOSING

CL-20/62 THE METHOD OF DECOMMISSIONING IT WANTS, AS IS THE CURRENT CASE. Combinations of DECON and SAFSTOR would be the best, however, under no circumstances should SAFSTOR continue past five years (the regulation should be changed, as to expect that oversight will continue for 60 years at such sites is ridiculous) that would enable workers familiar with the plant to be still available, but at the same time allow for the decay of some of the radioactive contaminants which have shorter full hazardous radioactive lives prior to removal ,thus lowering

CL-20/63 worker exposure etc.. NO WAY THIS SIDE OF HELL SHOULD ENTOMB I OR ENTOMB II BE ALLOWED. BOTH STAFF AND THE INDIVIDUAL COMMISSIONERS SHOULD BE CHARGED WITH CRIMINAL NEGLIGENCE – ALONG WITH THE LICENSEE – IF THEY PUSH THAT THROUGH, AND I AM CONFIDANT THAT MANY WOULD ENSURE SUCH CHARGES ARE FILED. THERE IS INDIVIDUAL RESPONSIBILITY CONCERNING THESE MATTERS, AND IF NRC CANNOT UNDERSTAND WHY THE ENTOMB OPTIONS ARE AN ABSOLUTE NO-NO, THOSE WHO CAN'T GRASP THE "WHY" PART SHOULD RESIGN AND STICK TO SOME EMPLOYMENT WHERE THE USE OF THE BRAIN IS NOT HIGH ON THE

14.

LIST OF JOB REQUIREMENTS.

CL-20/64 It appears that the nuclear industry has written its own ticket , as usual, on the issues in the Draft. P. E-5 notes the help from the Nuclear Energy

CL-20/65 Institute in gathering information. HOW ABOUT THE NRC ACTUALLY READING THE INSPECTION REPORTS AND VIOLATIONS ETC. ON THE DOCKETS OF EACH FACILITY AS I

CL-20/66 SAID EARLIER . HOW ABOUT TESTS BEING RUN BE THE NRC ON THE SITE .HOW ABOUT INTERVIEWS WITH LONG TIME STAFF CONCERNING PAST PROBLEMS THAT COULD BE EN-

CL-20/67 COUNTERED? NRC should take its own independant samples of offsite water and sediment and soils, as well as onsite.

The NRC must not go by the original Offsite Dose Calculation Manuals as what was allowed in then, went out with the ARK – i.e. the levels were terrible, a recipe

CL-20/68 for radioactive pollution. I cannot stress enough that the groundwater issues

CL-20/69 are not adequately addressed. The use of high pressure water sprays is obscene.

CL-20/70 WHAT IS WRONG WITH THE NRC ? DOESN'T NRC UNDERSTAND THAT ONE CANNOT DECONTAMINATE SOMETHING RADIOACTIVELY CONTAMINATED IN THE TRADITIONAL SENSE, UNLIKE WITH A CHEMICAL OR OTHER CONTAMINANT, WHATEVER IS DONE TO SOMETHING RADIOACTIVE DOES NOT CHANGE THE CHARACTER OF THE RADIATION, IT CONTINUES TO EMIT ITS DEADLY ALPHA, BETA, GAMMA , NEUTRON ETC. RADIATION THROUGH THE FULL RADIOACTIVE HAZARDOUS

CL-20/71 LIFE. YOU CAN'T BURN IT/ INCINERATE IT, IT GOES OUT THE STACK AND POLLUTES THE STACK, YOU CAN'T WASH IT, IT WINDS UP ALL OVER THE PLACE AND IN THE WATER, IT IS ALWAYS THERE, THE DEADLY, INVISIBLE KILLER . AT MOST YOU CAN TRY AND CONTAIN IT. The Tritium can't even be contained.

CL-20/72 The original site maps and drawings and photos made during construction should be consulted (some building techniques may have changed) all modifications and revisions should be tracked down. All vent systems should go through both HEPA (for the chemicals) and sand filters. Additional containment should be added around spent fuel pools including over the top and beneath it, extra supports, new liners. They will suffer serious embrittlement and activation,

CL-20/73 same goes for the casks. Such issues must be addressed. Again THERE MUST NEVER BE A PARTIAL OR FULL SITE RELEASE. ALL PROPERTY DEEDS MUST STATE THE SITES ARE

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NOT ONLY RADIOACTIVE, BUT SUPERFUND SITES, AS THAT IS WHAT THEY ARE. THE RIVER, LAKE, OCEAN BEACH STRETCH OR WHATEVER IS NEXT TO THE SITE SHOULD BE POSTED AS RADIOACTIVE ALSO, EVEN IF THE SEDIMENT IS REMOVED, AS IT IS IMPOSSIBLE TO GET EVERYTHING.

CL-20/74 Security must be upgraded, not downgraded.

CL-20/75 No structural remains should be sent to local landfills - the landfill will be

CL-20/76 radioactively contaminated more than at present. As all landfills leak, it will

CL-20/77 go to the groundwater and migrate offsite. None of the mixed-waste should be dealt with as mixed waste (i.e. a combination of chemical/hazardous and radioactive) because MIXED WASTE FALLS THROUGH ALL REGULATORY CRACKS, BUT IT SHOULD BE TREATED

CL-20/78 AS RADIOACTIVE WASTE. WASTE OILS SHOULD NOT BE SENT TO VENDORS FOR INCINERATION OR RECYCLING OR RE*USE AS THEY ARE CONTAMINATED.

CL-20/79 EVERY SITE, OPERATING OR NOT OPERATING, IS A PRIME TERRORIST TARGET AS I HAVE

CL-20/80 SAID FOR DECADES. THE SPENT FUEL IS THE ULTIMATE IN TERRORIST TARGETS.

CL-20/81 Years ago, when people spoke of some type of monitored, retrievable spent fuel storage, they meant monitored, so repairs could be made by remote control if needed, and retrievable so problems could be addressed - no one in their worst nightmares with any sense, ever imagined that a bunch of nuclear bozos would be allowed to stick the most deadly stuff known to humanity in a cement and metal barrel and stick it outside in plain view. Spent fuel is the stuff (ALL TOGETHER NOW...) that the Department of Energy has been charged with trying to contain for approx. 10,000 years removed from the biosphere, after which it becomes the radioactive blob from hell under whatever piece of dry land they stick it. That assumes they can contain it for 10,000 years, which I doubt. I have many concerns with the Yucca Mountain site. I will not elaborate on here, but will mention that the "dump it on the Native Americans" idea is odious and immoral in the extreme. Yucca Mountain is sacred to them. That having been said, the site is already contaminated due to fallout from the weapons tests, and Nevadas belated concern about radioactive issues is hypocritical and distasteful, as this is the state that did not give a damn that hundreds of nuclear tests were conducted on Indian

16

CL-20/82 land (The Western Shoshone Nation, AKA the Nevada Nuclear Test Site) that blew radioactive fallout across the nation causing serious illness, birth defects and cancers, besides doing the same to some nearer the site in Nevada. The only thing Las Vegas worried about, was if the tests shook their gambling tables according to press reports. When the wind blew towards Las Vegas they tried not to test. For Nevada to now whine that they don't see why they should get the spent nuclear fuel as they have no reactors - power reactors - is obscene, considering that a huge Curie quantity of the spent fuel was generated making/creating the plutonium and the tritium for the nuclear weapons most of them supported and didn't care that the fallout dumped on their fellow planetary citizens. The fact that there were, and are, some small groups who were, and are, against the weapons and the testing and the horrors of nuclear power does not, LATER the fact that the State didn't protest it. The States current protests, even if valid for other reasons; ring hollow against that history of nuclear collaboration, when they use the "no power reactor" excuse to keep the waste out. It is time history was set straight.

CL-20/83 The NRC in this Draft says p. D-2 that the temporary storage or future permanent disposal of spent fuel at a site other than the reactor site is not within the scope of this Supplement. Why the hell not ? It MUST BE, OTHERWISE THIS DRAFT IS

CL-20/84 EVEN MORE MEANINGLESS. THE SPENT FUEL IS THE MOST SERIOUS ISSUE THERE IS. ANYONE WHO DOES NOT UNDERSTAND THAT SPENT FUEL CANNOT BE LEFT WHERE IT IS ON SITE, IN POOLS OR ~~XXXXX~~ ISFSI'S BEYOND A VERY LIMITED NUMBER OF YEARS, BUT MUST BE PLACED DEEP UNDERGROUND, IN A DRY LOCATION, GEOLOGICALLY AS SOUND AS POSSIBLE, MONITORED FOR ETERNITY, DOES NOT UNDERSTAND RADIATION OR THE NUCLEAR ISSUE AND SHOULD NOT BE WORKING FOR THE NRC. NRC MUST BITE THE PROVERBIAL BULLET AND SET THE TIME WHEN THE SPENT FUEL SHOULD ALL BE REMOVED OFFSITE AS NO LATER THAN TWO YEARS AFTER THE LAST CORE OFFLOAD HAS SPENT TEN YEARS IN THE SPENT FUEL POOL, I.E. FROM SPENT FUEL REMOVED FROM THE REACTOR INTO THE SPENT FUEL POOL AND THEN THE TEN YEAR "COOL DOWN" PLUS TWO YEARS, (A SAFETY MARGIN), AFTER WHICH IT MUST BE MOVED. IF SUCH A DEADLINE IS NOT DECIDED, AND SET, COMMUNITIES ARE GOING TO BE STUCK WITH

17.

IT , WITH AWFUL CONSEQUENCES.

The "Mobile Chernobyl" issue - the dangerous moving of the spent fuel to a REPOSITORY , can be somewhat alleviated by addressing the concerns people

CL-20/85 have, instead of ignoring them, as follows : The Draft shows the awful DOT and NRC regulations for transport and radiation levels allowed p. 3-14, these should be changed to be massively lower, this can be done by better shielding and more shielding and the transport of fewer assemblies per cask or fewer rods per cask, and shielding that is thick enough that anti-tank weapons would not penetrate through to the fuel. Disguising the shipments is not an option due to the size of the casks, therefore far stricter security i.e. military escorts and the sealing off of roads ahead of transports would be a

CL-20/86 must. The NRC needs to pass rules on these issues, and put out orders for more and better transport casks and vehicles. All shipments of LLW should also fall under these better packaging and shielding standards. If the NRC does not address all these issues as part of decommissioning, future generations (that means YOUR children and grandchildren) are going to die due to NRC's lack of

CL-20/87 actions today. It is murderous that potential radiological impacts following lice nsing/license termination that are related to activities performed during decommissioning are not in the Supplement - this allows the licensee to slowly murder a community as the radiological criteria for license termination

CL-20/88 by NRC was woefully inadequate anyway. The NRC must continue to monitor sites FOREVER after license termination in case of sudden increases in radiation leve ls from a source on the site no one had either considered or knew was

CL-20/89 there. All sites should have audible(sirens) alarms that are triggered during decommissioning , and after decommissioning, when monitors exceed the EPA levels EPA allows, but reduced below what EPA allows to give an advance warning.
Such audible alarm systems are absolutely vital also during the the time radioactive spent fuel is still on the site, these alarms should be at various locations onsite, including next to the spent fuel pool and one above it, and next to an ISFSI/cask area and suspended on a wire or pole above it. The alarms should be audible miles offsite via relay loudspeakers.

18.

CL-20/90 Under "Dose to members of the public" p. G-19, and following pages, the doses to the public are listed in the usual deceptive and innacurate manner.

CL-20/91 The radioactive material releases is not released in stringently controlled conditions, technical specifications are often violated, monitoring is only

CL-20/92 done at select locations and frequently monitors don't work, emissions are allowed to be averaged out to make them appear less, and there is no independant

CL-20/93 monitoring and utilities do and say whatever they please. Tritium can't be

CL-20/94 contained. The direct gamma radiation coming off the plants to the public is the equivalent of a continuous X-ray emanating from their midst. No X-ray is "negligable". (This sort of garbage was probably written by someone who is

CL-20/95 not a medical proffessional) . Often the plants DO NOT HAVE TO REPORT THEIR RELEASES UNTIL THOSE RELEASES REACH A CERTAIN LEVEL, IT DEPENDS WHAT THEIR

CL-20/96 LICENSE STATES. FOR THE NRC TO HAVE USED DATA FOR SOUTHERN COMPANY'S PLANT HATCH IS SICKENING - WHEN HATCH HAD THEIR DISASTROUS SPENT FUEL POOL SPILL, DID ANYONE ADD THE EXTRA DOSES AND CONTAMINATION IN ? THIS IS THE SAME HATCH

CL-20/97 WITH OVER 1200 WORKER CONTAMINATION EVENTS IN ONE YEAR. WHEN YOU CALCULATED THE RADIO-IODINES, DID YOU ADD IN THE HUGE RADIO-IODINE RELEASE OFF PLANT FARLEY THAT WENT OVER GEORGIA ?

CL-20/98 The point is, that no one asked to be exposed to ANY dose of radiation, and most people in surrounding communities don't even know they are being exposed, or if they know, they think they are being protected because they think there

CL-20/99 is a safe level of radiation, when of course even the NRC admitted back in the late '70's that there was no safe level.

CL-20/100 Perhaps most disgusting is that under "Consequence of Potential Accidents"p.I-16 the impression given is that spent fuel pool accident risks are low, when in fact NRC's own cited document shows, hundreds upon hundreds would die and also many spent fuel pools were highly vulnerable to catastrophic accident due to earthquakes and a lot more besides - spent fuel pool accidents would have terrible consequences. The fact that licensees determined that basically even if the damned site was hit by a meteor and a nuclear bomb and a

and a hurricane all at the same time (obviously I am being sarcastic) nothing would happen and there would be "no dose consequence" is to be expected as the licensee analyses are a bad joke.

CL-20/102 THE NRC SHOULD READ ITS OWN DOCUMENTS AND THE FAMOUS "CRAC-2 " REPORT DONE BY SANDIA LABS, THE NRC AND THEN CONGRESSIONAL OVERSIGHT BECAUSE TO PRESENT DATA TAKEN FROM LICENSING-BASIS DOCUMENTS WHICH HISTORICALLY HAVE DOWN-PLAYED ANYTHING THAT COULD HAPPEN IS OUTRAGEOUS, AND IF THERE IS STILL FUEL IN THE REACTOR AND A LOSS OF WATER COOLANT HAPPENS, EVEN IF THE REACTOR HAS BEEN SHUTDOWN RECENTLY, THERE WILL BE A MELTDOWN.

CL-20/101 I challenge any licensee and any NRC staffer, to walk into the area where the spent fuel pool is after the water has drained from the spent fuel pool, and try and refill the spent fuel pool with a garden hose (that is what they thought they'd do at the Georgia Institute of Technology Reactor) and see how well they can "mitigate" the situation before "offsite dose consequences could occur" -- they'd be dead before they could pick up the hose. To say that such an accident could be mitigated is the height of deception.

CL-20/103 On p. M-2 it says., under the glossary , under Background Radiation, that "the typically quoted US average individual exposure from background radiation is 360 mrem per year" It may be typically quoted, but it is a blatant LIE. For example, typical background radiation in Georgia is 42 mrem year according to the State (which recently upped it a notch probably due to the radioactive fallout on the State from nuclear power plants and the Savannah River Nuclear

CL-20/104 Site on its borders.) The definition of CONTAMINATION is also a LIE, in that it states that something is contaminated if it's in excess of "acceptable

CL-20/105 levels". There are no "acceptable levels" - the public does not accept any level of radioactive contamination -- plutonium, cobalt-60, Strontium-90 etc. or

CL-20/106 tritium ,radioactive iodine and so on and on - Contamination means : that some thing/someone etc. has been brought into contact with something that defiles or pollutes it etc. -- go look the word up - NRC must stop redefining words and lying about their meaning.

CL-20/107 What the NRC decides to do concerning decommissioning, is what the following

generations of children, wome, men, plants, animals, insects, birds, fish - all life, is going to suffer from, and die by. A small bunch of (mainly) men in an office complex in Washington, along with a few cohorts elsewhere, plus an immoral multinational polluting industry (in the business for money only) are seemingly se tting a set of criteria that will impact the whole world to no

CL-20/108 good end and cause great misery , in this Draft. Have you all no shame ?

CL-20/109 The radioactive components, parts, liquids i.e. anything part of or to do with or emanating from the structures and the site MUST NEVER BE RE-CYCLED, OR RE-USED.

CL-20/110 NRC MUST IMMEDIATELY CEASE ALLOWING , OR THINKING OF ALLOWING, RADIOACTIVELY

CL-20/111 CONTAMINATED SOIL TO BE RE-USED FOR ANYTHING. IT MUST FORBID THE MELTING, SMELTING OR RE-USE OF RADIOACTIVELY CONTAMINATED METALS, PIPING, PLASTICS, WOOD, (INCLUDING

CL-20/112 FORBIDDING THE BURNING OF WOOD) , ASPHALT, AND SO ON. IF NRC, EPA, THE DOE AND OTHERS DO NOT STOP THIS INSANE RUSH TO RE-USE, RECYCLE, DUMP AND COVER ETC. NUCLEAR MATERIALS, RADIOACTIVE MATERIALS, ACTIVATED MATERIALS ETC. , WITHIN FIFTY YEARS NO LIVING BEING WILL BE BORN WITHOUT SOME TYPE OF DEFORMITY, GENETIC ABNORMALITY, CHROMOSOME ABERRATION ETC. AND THE IMMUNE SYSTEMS OF EVERY LIVING BEING WILL BE SERIOUSLY COMPROMISED DUE TO RADIATION SUPPRESSING THE IMMUNE SYSTEM RESPONSE, AND ALL BECAUSE WE WILL BE COMPLETELY ENGULFED IN A MIASMA OF MAN-MADE, OR MAN ENHANCED, RADIOACTIVE CONTAMINATION..

I have written this on and off over a series of days after finding out

CL-20/113 the comment period had been extended. I recognize that it has probably been a waste of my time and will be ignored, as usual, therefore I am not bothering to write it again with every paragraph in the right place.. In any event I speak, read and write three languages and the grammar and spelling in all of them suffers somewhat --

CL-20/114 but it is the content that matters. The fact is, wherever this radioactively contaminated refuse winds up - from spent fuel to contaminated rags - it can't be contained forever and will reach the environment, which is why it must go to a remote location, below ground. (none of this idiot parking lot out in Utah or Nevada cask storage either) in dry, geologically sound (as far as possible in a moving planet) location where monitoring could alleviate problems that arise prior to reaching the public and wildlife. NRC must recognize that this solution --

while not a perfect solution, as there is no perfect solution to the nuclear waste issue, is the solution that has been gone back to repeatedly over the decades, after thousands of studies contemplating what to do with the waste failed to identify anything better, or safer. What NRC and industry are proposing in this Draft, flies in the face of the thousands of prior studies by some of the worlds most renowned people who understand the horror of the dilema, and the ir conclusions. Leaving all this contamination on sites around the nation to contaminate and kill hundreds of communities is simply barbaric

CL-20/115 and must be stopped at all costs. Furthermore, no new nuclear plants should be allowed or built as they will just add to the existing contamination, and all operating plants should be shutdown to stop further "waste" – such as plutonium–

CL-20/116 generation. None should be re-licensed – the NRC should be ashamed of relicensing. This Draft is an absolute horror – for future generations who will suffer if

CL-20/117 this goes through as proposed, I would point out that on pages C-1 and C-2 are the names of those responsible for this abomination for reference in case of future lawsuits, so the public should make a note of that (this is, after all public record, what I have written). Plus the Utility in question and the ever helpful nuclear pushers at the NEI, should be remembered too, for their contribution to the nuclear nightmare.

CL-20/118 There is still time to correct all the serious problems in the Draft, still time for the NRC to turn from the path of wickedness and ruin the Draft Supplement and Gets will lead to if passed as is. Remember the Creator. Do not allow the further desecration of the world, the NRC will also be accountable to God one day for what it allows to be done to God's Creation. Think on that, and correct this Draft to the better.

Pamela Blockey-O'Brien.

Pamela Blockey-O'Brien.

Copies to: EPA, GEORGIA DNR/EPD, USFWS, GEORGIANS FOR CLEAN ENERGY, U.S. ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE, CENTERS FOR DISEASE CONTROL, AND OTHERS.

11/9/01
66 FR 56721
(21)

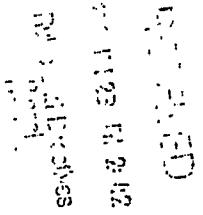
From: "Sharon Guynup" <sguy@cybernex.net>
To: <dgeis@nrc.gov>
Date: 1/19/02 4:37PM
Subject: comments on Decommissioning US Nuclear Power plants

CL-21/1 I am violently opposed to the Nuclear Regulatory Commission's proposal to further relax its decommissioning requirements for nuclear power reactors. This is nothing but a sellout to the nuclear industry-- which puts citizens at risk--with no recourse in case of liabilities.

This is wrong and dangerous.

Thank you for your time.

Sharon Guynup
Hoboken, NJ



Template = ADM-013

E-RIDS = ADM-03
Add = M. Hasnik (MTH2)

Letter 22, page 1

11/9/01
66FR56721
22

From: <sublimation@webtv.net>
To: <dgeis@nrc.gov>
Date: 1/19/02 10.57PM
Subject: decomissioning reactors: environmental impact supplement 1

CL-22/1 This is ridiculous!

http://community.webtv.net/sublimation/DisregardAllAdsHere

Template = ADM-013

E-RIDS = 03
Add = M. Masnik (MTM2)

Letter 23, page 1

11/9/01
66 FR 56721
(23)

From: "Fred Long" <ajlong999@earthlink net>
To: <dgeis@nrc gov>
Date: 1/20/02 8 59AM
Subject: DECOMMISSIONING NECLEAR FACILITIES

CL-23/1 Has the NRC no common sense at all?
Releasing radioactvely contaminated materials into daily consumer use and commerce and unregulated disposal is a direct assault on humanity.
Don't let this happen.
AJ Long
20550 Earl St
Torrance CA 90503

Template = ADM-013 E-RIDS = ADM-03
Add - U. Vasnik (MTH2)

Letter 24, page 1

11/9/01
66 FR 56424
(24)

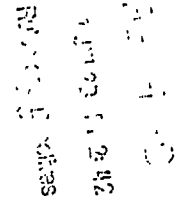
From: "rsja" <rsja@email msn com>
To: <dgeis@nrc gov>
Date: 1/20/02 2 03PM
Subject: Public comment on USNRC Decommissioning US Nuclear Power Reactors

To. Chief,
Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington DC 20555-001

CL-24/1 I am appalled at the NRC's draft of decommissioning requirements for nuclear power reactors. The requirements should be made stricter not more relaxed!!!!!!!!!!!! I oppose the use of "Generic" listing of
CL-24/2 issues. I support "Site Specific" listing so that local communities can still raise issues they have.
CL-24/3 I support the designation of environmental justice and endangered species issues as site-specific, NOT generic.
CL-24/4 I oppose Rubblization but support its designation as site-specific.
CL-24/5 I Firmly oppose the "release" of radioactively contaminated materials into daily consumer use and commerce and unregulated disposal.

CL-24/6 This is common sense people. You need to start doing what is safest and in the best interest of the people of the United States and its land, NOT what is going to relieve the nuclear power companies of their responsibility to what they have created and profited off.

Citizen of the United States of America
Rachel Griffiths
2022 West Chicago Avenue
Chicago, IL 60622



Template = ADM-013

E-RIDS = ADM-03
Add = M. Hasdik (MTM2)

11/9/01
66 FR 56721
(25)

From: <EdRussel@aol com>
To: <dgeis@nrc gov>
Date: 1/20/02 9 34PM
Subject: Decommissioning rule changes

Law Offices of
Edward T. Russell
725 Long Pond Road
Plymouth, MA 02360
508-224-2007

January 20, 2002

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Decommissioning Nuclear Power Reactors
Environmental Impact Statement Supplement 1

Dear Sirs:

I am a resident of, and practice law in, Plymouth MA. For years I have lived at peace with the neighboring Pilgrim nuclear plant. However, Sept 11 was an awakening for me and for many others in eastern Massachusetts.

CL-25/1 I strongly object to the proposed changes to the decommissioning rules. We have recently become more sensitive to the rules governing nuclear power plants, even their decommissioning Since these proposals were begun before September 11, I hope and expect that they will be dead on arrival at the Commission.

CL-25/2 The only rules changes that I want to see until spent rods are removed to Yucca Mountain are to stricter rules.

CL-25/3 Utility deregulation has put the ownership of these plants in hands that are not as responsible as they once were. Plymouth MA suffers financially because of the loss of tax revenue from the Pilgrim Plant - we cannot assume the
CL-25/4 additional risk these rules would place on us. Until the spent rods are removed from local nuclear power plants the decommissioning rules should be tightened, not loosened. Your proposal may have seemed reasonable earlier this year but we live in a very different world now It can no longer be business as usual at the NRC

CL-25/5 Many key issues that local communities face as reactors close and owners leave (liability-free) will be unchallengeable, because they are being listed
CL-25/6 as "generic" issues. I support the designation of environmental justice and endangered species issues as site-specific (not generic) and designation of Rubblization as site-specific.

CL-25/7 The proposed rules ignore radiation dangers after decommissioning The NRC
CL-25/8 must incorporate offsite contamination in all evaluations of environmental impacts. The National Environmental Policy Act was written for a purpose, your proposed rules side step that purpose.

CL-25/10 You must not remove license amendment requirements when changing from an
CL-25/11 operating license to a nuclear materials possession-only license. I stand firmly against the "release" of contaminated materials into daily consumer contact and commerce or unregulated disposal.

CL-25/12 Deregulation has already had serious negative impact on local municipalities this will be just another blow

Sincerely,

Edward T. Russell

Template = ADM-013 E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Letter 26, page 1

11/9/01
66 FR 56721
(26)

From: Dave Matthews <david matthews@sun.com>
To: <dgeis@nrc.gov>
Date: 1/21/02 10.52AM
Subject: Decommissioning Nuclear Power Reactors EIS Supp1

Dear Sirs,
I am writing to comment on the EIS supplement 1.

CL-26/1 In general, I am strongly opposed to the attempts to designate many issues as generic instead of site specific and thus to remove these issues form public review and comment.

CL-26/2 Specifically , I am opposed to the following proposals in the EIS:

NRC allows "rubblization" (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed.

CL-26/3 NRC allows portions of sites to be "released" from regulatory control before the whole site it released.

CL-26/4 NRC opens up two "entombment" options.

CL-26/5 NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability.

CL-26/6 NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions.

CL-26/7-9 NRC ignores radiation offsite and permits utilities to ignore it in decommissioning planning. I ask that the NRC incorporate offsite contamination into all evaluations of environmental impacts.

CL-26/10 NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process.

CL-26/11 NRC redefines terms to avoid local, site specific opportunity to question, challenge and prevent unsafe decommissioning decisions.

CL-26/12 NRC sets arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site-specific analysis.

CL-26/13 NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no opportunity for public challenge or adjudicatory processes)

CL-26/14 NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling and possibly rubblizing of the reactor.

Template=ADM-013 E-RIDS=ADM-03
Add=M. Masnik (MTM2)

Letter 26, page 2

NRC states that the portion of the decommissioning regulations (10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496) that set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear power sites, are not part of the scope of this Supplement

NRC defines decommissioning, in part, to include the "release of property for unrestricted use. .." and the "release of property under restricted conditions..."

CL-26/15 I stand firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal.

Thank you
David Matthews

Letter 27, page 1

11/9/01
66 FR 56721
27

From: "Klaus Schumann" <jayklaus@email msn com>
To: <dgeis@nrc.gov>
Date: 1/21/02 12 52PM
Subject: comment to nureg 5086

Dear NRC,

CL-27/1 I do not support any attempt of your agency to narrow the scope of site-specific issues by declaring them to be generic.

CL-27/2 While the 9/11 events may call for some more secrecy, in most cases it's a matter of "closing the gates long after the horses are gone". Instead you should adopt a policy of allowing more public participation to ensure public confidence in your process!

CL-27/3 Re 9/11: I direct you to a quote from a recently published German report concerning the vulnerability of the Castor containers to terrorism: "the fact that all the technical data used in the report can ve accessed by terrorists does not imply that a more restrictive policy towards information is required. Rather, it should be regarded as an argument against the use of a technology which is, at the time, hazardous and complex to a large degree, creating a conflict between the necessary societal discussion on the one hand and the protection of society from terrorist attacks on the other." Compare: www bund.net/themen/energiepolitik/StudieCASTORTerror rtf If we eliminate the necessary public discussion the terrorists will have won!
KLaus Schumann

Template = ADM-013

E-RIDS = ADM-03
Add = M. Hasdik (MTH2)

Letter 28, page 1

11/9/01
66FR56721
28

From: Dennis Larson <larsondf@yahoo.com>
To: <dgeis@nrc.gov>
Date: 1/21/02 1:36PM
Subject: reactor decommissioning

Re: decommissioning nuclear reactors

CL-28/1 Issues common to the process of decommissioning nuclear reactors should be raised with every reactor being decommissioned, not excluded from every specific reactor being decommissioned.
These common issues have not been resolved.

Dennis Larson

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http://promo.yahoo.com/videomail/

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTH2)

Letter 29, page 1

11/9/01
66FR56921
29

From: <Tifkel@aol com>
To: <dgeis@nrc.gov>
Date: 1/21/02 7.32PM
Subject: Decommissioning

Dear Mr. Geis:

CL-29/1 CL-29/2 CL-29/3 There are still radioactive dangers after decommissioning. I oppose the concept of rubblization as it is very dangerous; I oppose the release of radioactive contaminated materials into daily consumer or commercial uses. That is an idea that is insanely dangerous. Would you eat off a fork that contains radioactive mataerial? Why would anyone?

Sincerely,

Martin Kellerman

Template = ADM-013

E-RIDS = ADM-03
Add. = M. Masnik (MTM2)

YANKEE ATOMIC ELECTRIC COMPANY
19 Midstate Drive, Auburn, Massachusetts 01501

CONNECTICUT YANKEE ATOMIC POWER COMPANY
362 Injun Hollow Road, East Hampton, Connecticut 06424-3099

December 26, 2001

BYR 2001-084
CY-01-199

11/9/01
66 FR 56721

(30)

Chief, Rules and Directives branch
Division of Administrative Services
Mailstop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Haddam Neck and Yankee Rowe Plant
Comments on Draft Supplement to GEIS

Yankee Atomic Electric Company (YAEC) and Connecticut Yankee Atomic Power Company (CYAPCO) appreciate the opportunity to provide comments on the draft supplement 1 to NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities".

In a letter dated April 25, 2001[1], CYAPCO submitted a response to a Nuclear Regulatory Commission (NRC) request for additional information to support development of the Generic Environmental Impact Statement (GEIS) supplement. Many of these comments were incorporated in the draft supplement. In general the draft supplement meets the goal of updating the GEIS to current decommissioning practices and dismantlement options. We have reviewed the draft supplement and offer specific comments contained in the attachment. CL-30/1

If you have any questions regarding this submittal, please contact Gerry van Noordennen at (860) 267-3938.

[1] CYAPCO letter CY-01-076 to U.S. Nuclear Regulatory Commission, "Response to NRC Request for Additional Information to Support GEIS Supplement", dated April 25, 2001.

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Sincerely,

Kenneth J. Heider
Vice President of Operations & Decommissioning

cc. H. J. Miller, NRC Region I Administrator
J. E. Donoghue, Senior Project Manager, Haddam Neck Plant
R. R. Bellamy, Chief, Decommissioning and Laboratory Branch, NRC Region I
Document Control Desk, U.S. Nuclear Regulatory Commission
D. C. Scalletti, U.S. Nuclear Regulatory Commission
Paul H. Genoa, Nuclear Energy Institute
E. L. Wilds, Jr., Director, CT DEP Monitoring and Radiation Division

U. S. Nuclear Regulatory Commission
BYR 2001-084/CY-01-199 / Attachment 1 Page 1

YAEC & CYAPCO Comments on the draft supplement to the GEIS

CL-30/2 1. The Figure 1-1, "Decommissioning Timeline" should also reflect the 60 year window, mentioned in 10CFR50.82(a)(3), that starts from the permanent cessation of operation.

CL-30/3 2. Revise the first part of the last sentence on page 1-5 to read:

> If a licensee chose to operate the ISFSI under a Part 50 license, they could choose to continue under the Part 50 license, or by way of license amendment request, ...

CL-30/4 3. Delete the discussion of "Rubblization" on page 1-7 and delete the term "Rubblization" in the Glossary (Appendix M). Maine Yankee first utilized this term in a January 13, 2000 letter which served to submit their License Termination Plan (LTP). On June 1, 2001, Maine Yankee filed revision 1 to their LTP. On August 13, 2001, Maine Yankee filed revision 2 to their LTP. In their current LTP, Maine Yankee does not propose to use "Rubblization" and no longer utilizes the term. No licensee is currently pursuing the "Rubblization" concept as described in Maine Yankee's original LTP submittal.

The term which most accurately describes the approach which licensees are currently pursuing is "concrete backfill". Connecticut Yankee described the process as follows in section 4.3.1 of our LTP submitted on July 7, 2000:

> Concrete from contaminated structures will be remediated to a level meeting the radiological criteria for unrestricted release of the site. After completion of final status surveys and absent any findings during NRC inspections, concrete building debris from decontaminated structures may be used as backfill and placed into the remaining subsurface building foundations.

CL-30/5 4. Under the description of the Turbine building (on page 3-6) revise the last two sentences to read:

> Primary coolant is not circulated through the turbine building systems in PWRs. However, it is not unusual for the turbine building to become mildly contaminated during power generation at PWRs.

CL-30/6 5. Add the following sentence to the first paragraph in section 3.1.4:

> Most of the contamination in the reactor coolant system is from the activation of corrosion products and not fuel.

U. S. Nuclear Regulatory Commission
BYR 2001-084/CY-01-199 / Attachment 1 Page 2

CL-30/7 6. Revise the second to last sentence on page 3-15 to read:

> The entire structure (or portions) must be removed.....

CL-30/8 7. The last sentence on page 3-15 is only true if corrosion products are included. The sentence should be revised to read:

> If corrosion products are included, the radioactive decay.....

CL-30/9 8. The last two paragraphs on page 3-15 need to be rewritten. The discussion of contamination and activation needs to be clarified. If requested, CYAPCO will work with the Commission to rewrite this text.

CL-30/10 9. Yankee Rowe should be added to the list of plants mentioned in the second to last paragraph of page 3-26. The Yankee Nuclear Power Station was one of the plants in the AEC's Demonstration's Program. Yankee Rowe's license number is DPR-3.

CL-30/11 10. The second to last paragraph on page 3-32 discusses the creation of nuclear islands. Nuclear islands are not primarily created because of security reasons. The real benefit in creating nuclear islands is to not interfere with spent fuel storage. The purpose for creating a nuclear island is to provide a facility for the safe long-term storage of spent fuel, which is independent of the remainder or the rest of the facility. The purpose of the modifications is to divorce the spent fuel cooling function from dependence on systems which must be dismantled as part of the overall decommissioning process.

CL-30/12 11. Expand the discussion about Stage 4 of the decommissioning process. This discussion should contain as much description as the descriptions under stages 1 through 3.

CL-30/13 12. Delete "groundwater" from the first sentence in section 4.3.3.4. Releases are not made to groundwater under NPDES permits. NPDES discharge points discharge to surface water locations.

Exelon Nuclear

Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

www.exeloncorp.com

11/9/01
66FR56721
(31)

December 28, 2001

Secretary
U.S. Nuclear Regulatory Commission
Attn: Rulemakings and Adjudications Staff
Washington, DC 20555-0001

Subject: Comments Concerning Draft Supplement 1 to NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" (66FR56712, dated November 9, 2001)

Dear Sir or Madam:

This letter is being submitted in response to the NRC's request for comments concerning Draft Supplement 1 to NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" which was published in the Federal Register (i.e., 66FR56712, dated November 9, 2001). The NRC is proposing that this Supplement updates information in the existing 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor stations. Additionally, this Supplement goes beyond the 1988 GEIS by considering high-temperature gas-cooled reactors and fast breeder reactors. The NRC's intent is that this Supplement be used to consider, in a comprehensive and generic manner to the extent practicable, the environmental impacts of radiological decommissioning of nuclear reactor facilities by incorporating updated information, regulations, and analyses.

Exelon Generation Company, LLC (Exelon) appreciates the opportunity to comment. Generic and specific comments follow in Attachments 1 and 2, respectively. If you have any questions, please do not hesitate to contact us.

Very truly yours,

Barry Gallagher for

Michael P. Gallagher
Director, Licensing and Regulatory Affairs
Mid-Atlantic Regional Operating Group

Attachments

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)

ATTACHMENT 1
Generic Comments on NUREG-0586 Draft Supplement 1

CL-31/1 1. Exelon believes the proposed Draft Supplement correctly concludes that most of the environmental issues assessed result in impacts that are generic and SMALL for all plants. We reach this conclusion based upon our experience decommissioning one BWR (Dresden 1), two PWR's (Zion Station), one HTGR (Peach Bottom 1), and our observation of other industry decommissioning projects We have not seen to date – and currently do not expect to find – environmental impacts different from those addressed and bounded by this Supplement to the GEIS.

CL-31/2 2. Exelon continues to maintain that providing guidance, which addresses environmental issues generically, provides the highest standard the public at large can use effectively to challenge industry to return power plant sites to beneficial use upon facility retirement.

CL-31/3 3. The Supplement properly addresses the ENTOMB decommissioning option Issues related to the ENTOMB option after the facility has terminated its NRC license and entered the entombment period are outside the scope of this GEIS. Power reactor entombment is not construction of a LLW disposal facility – it is properly classified as a decommissioning scenario, which creates an assured storage facility for radioactive material to decay in place, until it no longer represents a hazard considering future public use of the site. The clear distinction between entombment as a decommissioning scenario and a LLW disposal facility may be found in the ability to reuse the site in the future for other purposes. Regulation governing LLW disposal facilities does not contemplate future use of the site, restricted or unrestricted. Future use of an entombed site will be dictated by the dose-based performance criteria found in 10 CFR Part 20, Subpart E.

CL-31/4 4. The Supplement improperly addresses rubblization by stating it will require a site-specific analysis at the time the license termination plan is submitted Rubblization should be addressed generically as a part of the decommissioning process. The NRC should continue to maintain that to the extent that 10 CFR Part 20, Subpart E dose performance criteria are met – and that decommissioning has been performed using the ALARA principal, rubblization has a SMALL environmental impact.

CL-31/5 5. The Supplement incorrectly addresses the impact on the SAFSTOR scenario due to the time gap between cessation of operations and decommissioning activities. The Supplement expects the time gap will result in a shortage of personnel familiar with the facility when decommissioning activities commence. Our own experiences have shown us that both DECON and SAFSTOR decommissioning scenarios can be conducted in a safe and efficient manner. Regarding the familiarity of the facility at the end of licensed life, whether the plant begins decommissioning immediately or waits for some defined period – the most difficult aspect is retrieving records from the earliest days of operation. Recently retired facilities have taken the appropriate step of preparing a site historical assessment – documenting the operating years of the facility. This historical assessment will guide the decommissioning process whether it begins immediately upon retirement or 50 years later.

ATTACHMENT 2
Specific Comments on NUREG-0586 Draft Supplement 1

CL-31/6 1. On Pg 3-17 there is a discussion of the advantages of the DECON alternative for decommissioning. One advantage of DECON is not discussed and should be Generally speaking the shorted lived nuclides are easier to detect because of their beta/gamma emissions, versus the alpha emissions of longer lived nuclides. The difficulty of detecting the alpha emitters will increase analysis costs and increase the difficulty of performing surveys. Ultimately the cost of providing RP coverage and of performing the Site Characterization and Final Status Survey will also be increased.

CL-31/7 2. On Pg 3-19 the discussion of the SAFESTOR option assumes that there is a savings associated with less Solid RW disposal costs. However they do not consider that the current NRC guidance for release of material includes a no detectable criteria. In order for the reduction of Solid RW to be achieved, significant quantities of plant matenals would need to be released from the site. The current regulations do not support this assumption.

CL-31/8 3 On Pg 4-9 the NUREG concludes (Sec 4 3 2.4) that the environmental impact of water usage will be small. In the evaluation they consider the anticipated reduction in water usage for cooling in the condenser. This conclusion appears reasonable, however the analysis should also consider the environmental effects of the loss of heat provided by cooling water discharged to a closed lake or pond system that is a habitat for aquatic animals and vegetation. Many nuclear facilities are on natural or man-made bodies of water making this environmental effect generic in nature.

CL-31/9 4 On Pg 4-16 the NUREG concludes (Sec 4.3 4 4) the environmental impact of air emissions will be small In the evaluation they did not consider that many sites use extraction steam to provide plant heat in the winter months The shutdown of the reactor means that Aux Boilers will be operated for longer periods to provide heating steam. This needs to be considered in the NUREG or many facilities will need to address this issue in their PSDAR

CL-31/10 5 On Pg 4 –29 the NUREG (section 4.3 8.3) concludes that it is not necessary to update estimates for collective dose due to decommissioning activities. This is an important conclusion that is supported by the current range in collective dose that decommissioning plants have experienced. Any change to this conclusion needs to be well supported by actual data and needs to be thoroughly studied to identify all potential impacts.

CL-31/11 6 Table 4 –1 on page 4 –30 is misleading The totals given include 100 rem of transportation dose that is not tracked by the facility undergoing decommissioning. It also does not include dose incurred during construction of a Spent Fuel Pool Island or in support of a dry cask storage campaign. A footnote should be added explaining these differences

CL-31/12 7. Table 4-3 lists the decommissioning cost of Peach Bottom Unit 1 to be 54 million dollars (in January 2001 dollars) In our letter submitted on March 30, 2001, in accordance with 10CFR50.75 the decommissioning cost estimate for Peach Bottom Unit 1 reported in beginning of year 2001 dollars is 65 4 million dollars Table 4-3 should be changed to reflect the latest cost estimate.

CL-31/13 8. Table 4-4 lists the decommissioning cost of the high-temperature gas-cooled reactor in SAFSTOR (Peach Bottom Unit 1) to be 54 million dollars (in January 2001 dollars). In our letter submitted on March 30, 2001, in accordance with 10CFR50.75 the decommissioning cost estimate for Peach Bottom, Unit 1 reported in beginning of year 2001 dollars is 65 4 million dollars. Table 4-4 should be changed to reflect the latest cost estimate.

CL-31/14 9. Table F-1 lists the total site area for Peach Bottom Unit 1 to be 620 acres. 620 acres is the total site area reported in the Peach Bottom Unit 2 and 3 Updated Final Safety Analysis Report However, Table F-2 reports the total site area for Peach Bottom Units 2 and 3 to be 618 acres. Table F-2 should be changed to reflect the total site area for Peach Bottom Units 2 and 3 to be 620 acres.

CL-31/15 10 Table I-3 incorrectly lists site flooding as the only accident analyzed for Peach Bottom Unit 1 in the documents referenced in Appendix I for Peach Bottom Unit 1. The additional accidents analyzed for Peach Bottom Unit 1 that should be added to Table I-3 are:

- Release of helium coolant under containment breach (open penetration to containment) for accidents involving radioactive materials (non-fuel–related) on page I-9
- Fire inside reactor vessel under fire for accidents involving radioactive materials (non-fuel –related) on page I-10.

CL-31/16 11. On page L-6 of Appendix L, line 4 refers to criticality accident monitoring requirements described in 10CFR7.24 Criticality accident monitoring requirements are described in 10CFR70 24. This typographical error should be corrected.

CL-31/17 12. On page L-6 of Appendix L, line 17 refers to 10CFR50 73 as requiring a licensee event report within 30 days 10CFR50 73 was recently revised to require a licensee event report within 60 days This change should be made to Appendix L.

CL-31/18 13 While the Supplement addresses two entombment options stating they have prepared as extreme cases to envelop a wide range of potential options, there should be additional language early in Section 3 2.3 ENTOMB clarifying that utilities are likely to develop entombment scenarios based upon their site specific needs.

CL-31/19 14. All spent fuel at Dresden Unit 1 will be moved to dry storage on site by the end of the first quarter of 2002. This change needs to be reflected in Table 3-2.

Letter 32, page 1

11/9/01
66FR56721
(32)

From: <GEORGNBAY@aol.com>
To: <dgeis@nrc.gov>
Date: 1/24/02 9.17AM
Subject: relaxing standards

Dear Sir/Madame,

CL-32/1 I urge you to stop any further relaxing of nuclear power reactor decommissioning requirements. Enough is enough. The suggestions you are making toward relaxing further standards will create massive public health and economic problems. Just one example is letting the concrete reactors
CL-32/2 erode naturally which is extremely unsafe. And to ignore radation concerns
CL-32/3 to the unsuspecting public health is criminal.
It is out rageous to allow the reactors to be liability-free. That is like saying to the consumer " Your money AND your life". We have paid and paid for nuclear power and we all know it is the biggest welfare mother of all time.

Yours in concern

Susan Clark

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTH2)

Letter 33, page 1

From: Margaret Nagel <formargaretn@earthlink.net>
To: <dgeis@nrc.gov>
Date: 1/24/02 1 51PM
Subject: Weakening Requirements for Decommissioning US Nuclear PowerReactors

11/9/01
66FR56721
(33)

From:

Margaret Nagel
631 Hinman Ave
Evanston, IL 60202-2514

To:

Chief, Rules and Directives Branch/Division of Administrative Services
Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

January 24, 2002

CL-33/1 In setting requirements for decommissioning US nuclear power reactors, please bear in mind other things besides the needs of Richard (Enron) Cheney, Halliburton Inc., Brown & Root, and other powers that be. Long after these miserable "powers" have crumbled away, your children and grandchildren
CL-33/2 and mine, and their descendants, will have to live in this world. The nuclear power industry was a colossal mistake to begin with, as we all know.
CL-33/3 Most of us also realize that the immune systems of every living thing on this planet -- human systems included -- are becoming intolerably stressed by mounting (and synergistically interacting) levels of pollution of all
CL-33/4 sorts. To add to these levels by deliberately ignoring the dangers of radiation exposure is wantonly criminal. Those who do so will go down in history as villains of the worst sort: smug, obtuse, shrivel-hearted, deceiving, opportunistic, self-serving, cowardly, corrupt people who really
CL-33/5 ought to know better. I fail to see any moral difference between terrorists who fly planes into buildings, and bureaucrats who are perfectly willing to
CL-33/6 expose whole populations to additional dangers from radiation. In the name of humanity and morality, you should all leave your jobs now in righteous protest at what you're being asked to do. Walk out. Say goodbye. Go work at Wal-Mart if you have to But don't recklessly endanger the health of this nation by acquiescing in these evil plans

I utterly oppose:

CL-33/7 1. "rubblization" with no opportunities for meaningful public intervention ahead of time

CL-33/8 2 allowing portions of sites to be released from regulatory control before the whole site is released.

CL-33/9 3 ignoring readiation dangers after decommissioning is done and utility is relieved of liability.

CL-33/10 4 ignoring radiation exposures to children and other vulnerable members of the population and creating a fictitious highest exposed "critical group" based on unsubstantiated assumptions.

Template = ADM-013

E-RIDS = ADM-03
Add = M. Mossik (MTM 2)

Letter 33, page 2

CL-33/11 5. ignoring offsite radiation and permitting utilities to ignore it in
CL-33/12 decommission planning NRC should incorporate offsite contamination into all evaluations of environmental impacts

I also utterly oppose:

CL-33/13 1. Preventing the National Environmental Policy Act from applying to most of the decommissioning process.

CL-33/14 2. Making most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites

CL-33/15 3. Redefining terms to avoid local, site-specific opportunity to question, challenge, and prevent unsafe decommissioning decisions.

CL-33/16 4 setting "low, medium, and high" environmental impact categories for each of the steps in decommissioning, to give the appearance that some things have negligible effects that don't warrant further consideration.

CL-33/17 5. removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license, thereby eliminating the opportunity for public challenge or adjudicatory processes.

CL-33/18 6. attempting to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until activities such as flushing, cutting, hauling and possibly rubblizing of the reactor are complete -- in other words, until the damage has irretrievably been done.

CL-33/19 7. stating that 10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496, are not part of the scope of this Supplement.

CL-33/20 8 defining decommissioning, in part, to include the "release of property for unrestricted use" and the "release of property under restricted conditions" -- in other words, releasing radioactively contaminated materials into daily consumer use and commerce and unregulated disposal How can you contemplate such a thing!!!!!!!!!!!!!!

Sincerely,

Margaret Nagel

CC: Margaret Nagel <formargaretn@earthlink.net>, "Richard J Durbin" <dick@durbin.senate.gov>, "Peter G Fitzgerald" <senator_fitzgerald@fitzgerald.senate.gov>

Letter 34, page 1

11/9/01
66FR56671
(34)

From: "Liane Casten" <lcasten@interaccess.com>
To: <dgeis@nrc.gov>
Date: 1/24/02 3.40PM
Subject: NUCLEAR POWER PLANTS

CL-34/1 To even think that decommissioning nuclear power plants' regulations via presidential fiat is acceptable is beyond logic and reason.
CL-34/2 You are insuring the further deterioration of health for innocent civilians and this planet.
CL-34/3 Bush is stripping us all of those safeguards we all need to protect citizens--and this includes you. He has
CL-34/4 only corporate interests--the nuclear power industry being one. To enforce no liabilty after they leave is
CL-34/5 simply criminal. You do not need to further endanger our lives while the polluters go scott free..
Enough.
Liane Casten

Template=ADM-013

E-RIDS=ADM-03
Add=M.Masnik (MTM2)

Letter 35, page 1

11/9/01
66 FR 56721
(35)

From: <little lamb@att.net>
To: <dgeis@nrc.gov>
Date: 1/25/02 1 00PM
Subject: Public Comment=Shame on you!

Public Comment re: the U.S. Nuclear Regulatory Commission's (NRC) draft Decommissioning Nuclear Power Reactors Environmental Impact Statement Supplement 1.

Dear Nuclear Regulatory Commission,

CL-35/1 Please increase, rather than decrease, public participation in every single aspect of the planning, building, and running of Nuclear Power Plants. Please do this even if you don't want to.

The public, to you, may seem like a thorn in your side, something that gets in the way of your plans. But a democratic government should not seek to shut their people out of decisions that effect their lives. It is a very sad reflection on the state of our democracy that this seems to be precisely the aim of your draft regulations. -Don't you believe in democracy? Are you tired of playing by democratic rules if it means you can't win each and every time? Is democracy too inconvenient for you?

If you were busy doing the "right thing" you would be excited and proud to open your process to the public. If you were involved in an honest process, you would be eager to engage your opponents in debate about it. You would not have to stack the deck, hide your process, shut the people out. Shame on you! See if you have the courage to do the right thing! --- And have the courtesy not to send one of those dummy automatic replies!

Mary Kim
116 Pinehurst Avenue #C3
New York City 10033

212.923.7800 x 1303

Template = ADM-013

E-RIDS = ADM-03

Add = M. Hasnik (MTH2)

Letter 36, page 1

11/9/01
66 FR 56721
(36)

From: Donald Miller <d.w miller@csuohio.edu>
To: <dgeis@nrc gov>
Date: 1/25/02 5.56PM
Subject: NRC's supplement to NUREG-0586, re decommissioning

I have some questions.

CL-36/1 Why, in this same democracy that we hold up so proudly to the world, does the NRC seek to prevent public comment on the basic issue of public health in a nuclear world?

CL-36/2 If the NRC is confident--as its supplementary changes to NUREG-0586 suggest-- that onsite and offsite radioactive contamination during decommissioning and afterward will be minimal, why does it seek to remove all liability from the owner even before the process is complete? (If the NRC is wrong, who will pay?)

CL-36/3 It is my understanding that the purpose, and certainly the effect, of the proposed supplement to NUREG-0586 is to reclassify many decommissioning issues as "generic" in order to avoid a community's right of challenge and to allow owners to depart without liability. I understand that the NRC supplement seriously limits a community's ability to challenge even those issues that are considered "site-specific".

The designation of environmental justice issues and endangered species issues must remain viable SITE-SPECIFIC matters for public debate and legal challenge, as must the hazardous technology (I think of the continuing, poisonous twin-towers fallout) of rubblization.

CL-36/4 The NRC must retain regulatory control of the entire site. The NRC must require a LICENSE AMENDMENT when an owner is granted a change from an operating license to a materials-possession-only license.

CL-36/5 The owner must remain fully liable.

CL-36/6 The NRC must address the subject of radiation dangers after decommissioning HONESTLY, USING THE BEST INDEPENDENT RESEARCH, including
--exposure of children
--exposure of the weak, the ill, the elderly
--offsite contamination
--credible, not arbitrary, environmental impact categories
FOR EACH STEP OF A DECOMMISSIONING.

CL-36/7 The NRC must NOT permit "release of property for unrestricted use" or under "restricted conditions" To permit the release of radioactively contaminated materials into daily consumer use and commerce, or to allow unregulated disposal of such materials is abhorrent. Bin Laden might approve of such an interesting experiment; I trust that the NRC does not and will not.

CL-36/8 The NRC must resist the pressure of the nuclear industry If their profits are waning, they have had their turn. The citizens of the U.S., who pay everyone's way, have a right to expect a healthy environment, and a right to fight for it within the U S. legal system. (But what a shame that a fight is ever needed)

Sincerely yours,

Template = ADM-013 E-RIDS = ADM-03
Add. = M. Hasdil (MTH2)

Letter 36, page 2

Suzanne Miller
3142 Yorkshire Road
Cleveland Hts , Ohio 44118

Letter 37, page 1

Doris Mendiola - Comments on the N R C draft, please add them :) Page 1

From: "James Nordlund" <reality@pld com>
To: <dgeis@nrc gov>
Date: 1/26/02 7:32PM
Subject: Comments on the N R C draft, please add them :)

11/9/01
66 FR 56721
(37)

CL-37/1 Hello! As NIRS, I stand firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal.

I hope you'll give these matters the serious attention they warrant. Viva la evolution, viva green party! reality Thanx for your attention, time, and efforts!

Matutinally Yours,

Name = james m nordlund

Preferred E-Mail Address = reality@pld com

Additional E-Mail Address = jamesmnordlund@yahoo.com

Web Site URL = www everythingforeveryone org

Home Address = p o.b. 982, lakin, KS 67860-0982

Work Address = s a a.

Send Correspondence = Home

Home Telephone = [redacted]

Work Telephone = 209-844-3835

Fax = 209-844-3835

Work Sector = nonprofit, human services

Professional Field = psychology

Professional Field (others) = evolution

Specialization = mental health counseling

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)
Home phone number removed per Mike Lesar.

Letter 38, page 1

From: Roger Voelker <regor@scblackmedia.com>
To: <dgeis@nrc.gov>
Date: 1/27/02 8:01PM

11/9/01
66 FR 56721
38

Chief, Rules and Directives Branch
Division of Administrative Services
US Nuclear Regulatory Commission
Washington, DC 20555-0001

To Whom it May Concern:

The following constitutes my comments on NUREG¡V0586 Draft Supplement 1 Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities--Draft Supplement Dealing with Decommissioning of Nuclear Power Reactors:

Several years ago I attended a meeting between representatives of several investor-owned electric utility companies that were attempting to work out a common position on utility deregulation for the state of Indiana.

At one point in the discussion a representative of American Electric Power, owner of the D.C. Cook Nuclear Plant, made a most revealing statement. Concerned that nuclear power could not compete with other forms of electric generation, the AEP representative pointed out that, following decommissioning, they could not just come in with a wrecking ball, knock the plant down and haul the rubble off to the nearest landfill. Instead, he said, the closed plant would have to be indefinitely isolated from the environment. His exact words (delivered with great emphasis) were ¡§that means fences, guards and guard dogs FOREVER!¡□

CL-38/1 Now, with Supplement I to NUREG¡V0586, the NRC would appear to be paving the way for the very rubblization and possible release into the environment of ¡§slightly contaminated¡□ material that the AEP rep said could not happen.

The vehicle to allow this would appear to be the declaration of more decommissioning issues ¡§Generic¡□ rather than ¡§Site-Specific,¡□ thus preempting the right of local residents to raise concerns during the License Termination Plan review.

CL-38/2 Some of my concerns about NUREG¡V0586 include.

„h the use of generic proceedings to eliminate site-specific evaluation of concerns;

CL-38/3 „h the generic approval of rubblization of reactor buildings and leaving them on site,

CL-38/4 „h the vague and arbitrary use of ¡§Small, Moderate, and Large¡□ significance levels and the intent for use of these designations, which echoes previous attempted bogus designations such as ¡§below regulatory concern¡□;

CL-38/5 „h the extent to which radioactive contamination levels that are permitted to be ¡§released¡□ from regulatory control for decommissioning would result in the release of radioactive materials routinely;

CL-38/6 The draft GEIS says that ¡§low-level¡□ radioactive waste disposal is not part of the scope of this GEIS. However, this would appear to be contradicted by the definition of decommissioning (pg. xii), and by the scope, the release and removal of Sites, Systems and Components (SSCs).

CL-38/7 I specifically oppose any release of contaminated materials during decommissioning or other times/ procedures.

Template - ADM-013

E-RIDS = ADM-03
cc = M. Masnik (MTM2)

Letter 38, page2

Roger Voelker
5849 E. North St.,
Tucson, AZ 85712

Letter 39, page 1

From: "Anne and Tom Moore" <c3moore@hotmail com>
To: <dgeis@nrc gov>
Date: 1/28/02 7:41AM
Subject: NUREG-0586

11/9/01
66 FR 56721
(39)

Chief, Rules and Directives Branch,

CL-39/1 I find the proposals in Supplement 1 to the Generic Environmental Impact Statement on Decommissioning unrealistic when it comes to the health of U.S. citizens at the time of decommissioning and to those living years later.

CL-39/2 To catergonze as "generic" "the release" from regulatory control portions of sites before they are completely decommissioned is not responsible.

CL-39/3 No radioactivity cotaminated parts should be allowed into consumer use, commerce, or unregulated disposal

CL-39/4 To allow utilities to have no liability after decommissioning is done when the proposals are seen as "generic" does not provide any protection to local citizens. Accountibility for our actions is important and utility companies should not be exempt from that.

CL-39/5 There should be a requirement for a license amendment when a utility changes from being a nuclear power operating license to a nuclear materials possession-only license.

CL-39/6 I know that I am not alone in asking you to protect our citizens from radioactivity on such a large scale and hope that you will live up to your responsibility by not lessening the requiremets that utility companies face when decommissioning takes place.

Sincerely,

Anne H. T. Moore

Rules and Directives Branch
02 JAN 28 AM 11:55

Join the world's largest e-mail service with MSN Hotmail.
http://www hotmail com

Template-ADM-013 E-RIDS=ADM-03
Add=M. Masnik (MTM2)

Letter 40, page 1

11/9/01
66 FR 56721
(40)

From: "john runkle" <jrunkle@mindspring.com>
To: <dgeis@nrc gov>
Date: 1/28/02 1:11PM
Subject: Decommissioning Nuclear Power Reactors EIS Supplement 1

VIA EMAIL & Mail

1/29/02

From: Conservation Council of North Carolina, Post Office Box 12671, Raleigh, North Carolina 27605; telephone: 919-839-0006

To: Chief, Rules Directives Branch; Division of Administrative Services,Mailstop T 6 D 59; U.S. Nuclear Regulatory Commission; Washington D.C. 20555-0001

Re: Draft Decommissioning Nuclear Power Reactors EIS Supplement 1 (Supplement to NUREG-0586)

Dear Sir:

The Conservation Council of North Carolina is a statewide environmental organization with a long history of involvement in nuclear plant licensing, waste storage and decommissioning. We offer the following comments on the NRC's Draft Decommissioning Nuclear Power Reactors EIS Supplement 1:

CL-40/1 1. We are deeply concerned about the NRC's proposal to treat almost all decommissioning issues in a generic EIS rather than in an individual EIS for each plant. As we have seen in many of the licensing proceedings, nuclear plants have a wide variety of dissimilarities, even with other plants owned by the same utility and constructed by the same companies. These differences are compounded when it comes to decommissioning as the different work plans for each plant may have considerably different impacts on workers on-site and the public off-site.

CL-40/2 2. All decommissioning activities need to consider the impacts of radiation exposure to workers and the public. Radiation exposures to children and other vulnerable members of the population should be separately and realistically addressed with all pathways to exposure closely examined. Assumptions about off-site exposure should be substantiated with full peer-review from neutral parties, i.e. not employees of the nuclear utilities. The risk to public health cannot be minimized or discounted.

CL-40/3 3. Decommissioning should never be deemed to be complete until the entire site is no longer radioactive. We understand that this means extremely long-term oversight of the reactor sites. Some of the decommissioning wastes, such as the nickel compounds, have extremely long half-lives and remain dangerous for millennia. Liability for the site needs to remain with the utilities and the NRC must retain regulatory control over the entire site.

CL-40/4 4. As we have previously commented in other dockets, there should be no release of radioactively contaminated material of any kind into consumer use or into general commerce. Disposal of all materials from decommissioning need to be regulated, regardless of whether they are radioactive or not.

Please notify me of any decision you make regarding this docket.

Sincerely,

John D. Runkle

General Counsel

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Letter 41, page 1

Letter 41, page 2

11/9/01
66 FR 56721
(41)

From: Benjamin Schlau <benitothecat@yahoo com>
To: <dgeis@nrc gov>
Date: 1/29/02 2 56PM
Subject: subtle deregulation

Chief, Rules and Directives Branch/ Division of Administrative
Services/ Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

CL-41/1 It has come to my attention that the Nuclear Regulatory Commission is possibly compramising the securrity of our nations future by making way for further build up of nuclear waste that will theoreticly be safe in so many thousands of years

CL-41/2 I am opposed to any extensions on operating licenses for nuclear facilities of any sort and wish for a move to cleaner renewable energy.

Thank you.
U S. Voter
Benjamin Schlau
1163 Lazy Ln. Ct.
Mt. Pleasant, SC
29464

The Nuclear Regulatory Commission has already relaxed and is further
relaxing its decommissioning requirements for nuclear power reactors.
NRC is justifying these regulatory changes by "supplementing" the 1988
Generic Environmental Impact Statement on Decommissioning Nuclear
Facilities (NUREG-0586) with new, "updated" information on nuclear
power
reactor decommissioning If NRC succeeds, many key issues that local
communities face as reactors close and owners leave (liability-free)
will be unchallengeable, because they are being listed as "generic"
issues. "Generic" decommissioning issues are ones that NRC determines
apply to numerous reactors and which are supposedly being resolved with
this Supplement to the Generic Environmental Impact Statement. "Site
specific" issues are ones that can still be raised in local
communities,
but the opportunities to address even site-specific issues is being
curtailed dramatically. NIRS supports the designation

Template = ADM-013

E-RIDS = ADM-03
Add = H. Masnik (NTUR)

of environmental
justice and endangered species issues as site-specific (not generic).
NIRS opposes Rubblization but supports its designation as
site-specific

Letter 42, page 1

11/9/01
66 FR 56421
(42)

From: Tom Ferguson <thinkspeak@earthlink.net>
To: <dgeis@nrc.gov>
Date: 1/29/02 4.13PM
Subject: comment (NRC) draft Decommissioning Nuclear Power Reactors EIS

CL-42/1 One of the important and obvious things to be said about decommissioning nuclear power plants is that it is expensive, potentially dangerous and nearly unprecedented. We appreciate that entombment is now being considered.

CL-42/2 It ought to be equally obvious that

1.Since a satisfactory waste isolation solution evades us (we do not agree with Secretary Abraham that Yucca Mountain is a suitable repository based on science – the DOE itself admits that the site is not geologically suitable and the GAO raises serious questions about the selection process).

CL-42/3 2.That a serious accident or terrorist act in this industry could be catastrophic, leaving immense fatalities, injuries, future cancer victims and vast areas uninhabitable for years

CL-42/4 3 That without public subsidy (via Price-Anderson) nuclear power is economically untenable

CL-42/5 4.Given these factors the complete phase-out of nuclear power should be a high priority Alternative power sources such as wind, solar, hydrogen fuel cell [and conservation] should be vigorously pursued in its stead

Tom Ferguson
Cyndia Hunnicutt
Kallio Hunnicutt-Ferguson
372 Oakland ave se
Atlanta, GA 30312

RECEIVED
01 JAN 29 PM 4:10

Template = ADM-013

E-RIDS = ADM-03
Add = M. Hasdik (MTM2)

Letter 43, page 1

11/9/01
66 FR 56721
(19)

From: "Mary S Reed" <maryreed@localnet com>
To: <dgeis@nrc gov>
Date: 1/29/02 5 44PM
Subject: NUREF-0586 Comments

Chief, Rules and Directives Branch/ Division of Administrative Services/ Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

CL-43/1 I am opposed to the following changes to NUREF-0586

In Supplement 1 to the Generic Environmental Impact Statement on Decommissioning:

NRC allows "rubblization" (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed

CL-43/2 NRC allows portions of sites to be "released" from regulatory control before the whole site it released

CL-43/3 NRC opens up two "entombment" options

CL-43/4 NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability.

CL-43/5 NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions.

CL-43/6 NRC ignores radiation offsite and permits utilities to ignore it in decommissioning planning NIRS calls on the NRC to incorporate offsite contamination into all evaluations of environmental impacts.

CL-43/7 NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process (The claim appears to be that this proposed Supplement 1 satisfies the Environmental Policy Act for most of the decommissioning issues)

CL-43/8 NRC makes most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites.

CL-43/9 NRC redefines terms to avoid local, site specific opportunity to question, challenge and prevent unsafe decommissioning decisions

CL-43/10 NRC sets arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site specific analysis.

CL-43/11 NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM2)

Letter 43, page 2

opportunity for public challenge or adjudicatory processes)

CL-43/12 NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling and possibly rubblizing of the reactor.

CL-43/13 NRC states that the portion of the decommissioning regulations (10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496) that set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear power sites, are not part of the scope of this Supplement

CL-43/14 NRC defines decommissioning, in part, to include the "release of property for unrestricted use.." and the "release of property under restricted conditions."

CL-43/15 If the changes pass, many key issues that local communities face as reactors close and owners leave (liability-free) will be unchallengeable, because they are being listed as "generic" issues. "Generic" decommissioning issues are ones that NRC determines apply to numerous reactors and which are supposedly being resolved with this Supplement to the Generic Environmental Impact Statement. "Site specific" issues are ones that can still be raised in local communities, but the opportunities to address even site-specific issues is being curtailed dramatically I support the designation of environmental justice and endangered species issues as site-specific (not generic) I oppose Rubblization but supports its designation as site-specific.

CL-43/16 Please consider my opposition to many of the proposed Supplements. The public should not be further shut out of the decommissioning process. Nuclear waste is deadly and it's handling should not be downgraded in any way.

Sincerely,
Mary S. Reed
29 Sunnyside Road
Scotia, NY 12302

CC: "Senator Charles Schumer" <senator@schumer senate gov>, "Senator Hillary Clinton" <senator@clinton senate gov>, "Rep Mike McNulty" <mike mcnulty@mail house gov>

Letter 44, page 1

Donn endiola - Comments-NRC Rules on Decommissioning - EIS Supplement I Page 1

11/9/01
66FR56421
(44)

From: <Pdbsongs1@cs.com>
To: <dgeis@nrc.gov>
Date: 1/29/02 7.04PM
Subject: Comments-NRC Rules on Decommissioning - EIS Supplement I

D. Geis - NRC

I am forwarding Attachment (word document) letter to NRC, with my personal comments on proposed NRC Rules on Decommissioning.

Please confirm their receipt and acceptance by email.
Thank you in advance
Patricia Borchmann

Template=ADM-013

E-RIDS=ADM-03
Add-M. Mashik (MTM2)

Letter 44, page 2

FROM : BE GOOD FAX NO. : 7609419625 Jan. 30 2002 11:16AM P1

Patricia Borchmann
176 Walker Way
Vista, Ca 92083
(760) 941-9625

January 30, 2002

Chief, Rules and Directives Branch
Division of Administrative Services / Mailstop T 6 D 59
U.S. Nuclear Regulatory Commission
Washington DC 20555-0001

Email to: dgeis@nrc.gov

RE: U.S. Nuclear Regulatory Commission's Draft Decommissioning Nuclear Power Reactors E.I.S. Supplement 1

CL-44/1 I am very strongly opposed to the regulatory changes sought by NRC to further relax decommissioning requirements for nuclear power reactors, as proposed by the 1998 "Generic" E.I.S. on Decommissioning Nuclear Facilities (NUREG-0586), with new "updated" information on nuclear power reactor decommissioning. **The Proposed regulatory changes sought by N.R.C. are an insult to the public interest.**

CL-44/2 I also strongly oppose, and object to the proposed supplement to the "Generic" E.I S., and the deliberate and inappropriate exclusion of "site specific" issues, which should be an imperative part of any analysis, for any form of an E.I.S. Supplement.

CL-44/3 "Site specific" issues are of vital importance, especially at San Onofre Nuclear Generating Station (SONGS) where Unit 1 is currently being decommissioned. It is imperative that N.R.C. evaluate and analyze SONGS Decommissioning on a "site specific" basis instead of a "Generic" basis, due to the very unique physical site characteristics at SONGS, which other existing nuclear plants in U.S. do not possess.

The distinctions, and physical characteristics which make conditions at SONGS so different and unique are vitally important, and are of utmost importance in any analysis of Decommissioning at SONGS, in order to ensure the level of public health and safety will be assured, and provided without compromise to citizens in communities surrounding SONGS. As SONGS Unit 1 is currently being Decommissioned, the site specific analysis must include both the short term and long term effects, and must also analyze effects of offsite contamination, effects of cumulative contamination and exposure, and must provide realistic mitigation measures..

A Summary of the "site specific" physical characteristics and conditions at SONGS, which should justify "site specific" analysis (as opposed to a Generic E.I S. Supplement) include the following:

- SONGS is located in a highly populated area, with dense populations in both Orange County and San Diego County, where citizens may be exposed to potentially significant offsite effects.
- SONGS is located in a highly active seismic zone, where seismic activity is speculated by some geological experts to generate quakes up to 7 6 Magnitude on the Richter Scale (by new evidence of local off-shore blind thrust faults, which cause a greater extent of groundshaking and acceleration than the manner in which quakes are traditionally studied). SONGS was only designed and constructed to withstand a maximum quake of 7.0 Magnitude.
- SONGS is located in a area immediately on the southern California coastline, with most facilities elevated only to a level of 20' ft. above mean sea level. These facilities are highly exposed and vulnerable to effects of rising sea levels, and tsunamis, and are insufficiently protected.

CL-44/5 **I am opposed to NRC regulations pertaining to Decommissioning which would allow:**

- Rubbilization (crumbling the concrete reactor building) of nuclear reactors, without
- opportunity for public intervention until the action is completed.

CL-44/6
- Allows portions of sites to be "released" from regulatory control before the whole site is released.

CL-44/7
- Allows offsite radiation to be ignored, and permits utilities to ignore it in decommissioning planning. It is imperative to include offsite contamination into all aspects of decommissioning planning and evaluation of environmental impacts.

CL-44/8
- Allows NRC to make most aspects of decommissioning "generic" rather than site specific so NRC cannot be legally reviewed or challenged at individual sites.

CL-44/9
- Allows NRC to redefine terms to avoid local, site specific opportunity by public to question, challenge and prevent unsafe decommissioning decisions.

CL-44/10
- Allows NRC to set arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now, and to prevent their inclusion in site-specific analysis. This use of this piecemealing approach is unacceptable.

CL-44/11
- Would allow (with this supplement), NRC to legally justify removal of existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed, including activities as flushing, cutting, hauling and possible rubbilization of reactor.

CL-44/12
- NRC asserts that the portion of decommissioning regulations (10 CFR 20 section E and its EIS, NUREG 1496) set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear plants sites, and are not part of the scope of this Supplement. I disagree, and consider the inclusion of exposure from closed decommissioned plants a necessity to develop an accurate and realistic analysis of cumulative impacts.

CL-44/13
- Allows NRC to define decommissioning in part, to include "the release of property for unrestricted use" .. and the "release of property under restricted conditions." It is entirely inappropriate and scientifically ludicrous to allow "release" of highly radioactively contaminated materials into daily consumer use and commerce, or unregulated disposal, or the recycling of such materials into any form which causes public exposure with radioactively contaminated materials.

CL-44/14 In conclusion, it is with utmost disappointment to again observe with each and every new NRC Rulemaking, important components of the public's existing "right to know" and the public's right of active involvement in plant processes, decisions and their methodology, on all aspects of decommissioning activities routinely appears to be further diminished. As proposed, the EIS (Supplement I) would eliminate all opportunities for public intervention, and public oversight and/or intervention entirely with use of a "generic" EIS In such cases, the loss of public oversight and intervention on projects with a scope as large as decommissioning at SONGS, such losses may be unparalleled, or fully understood without a site specific issue analysis. **The citizens in local communities surrounding nuclear plants such as SONGS deserve this entitlement, and demand this entitlement.**

CL-44/15 The public has not only the "right to know", but NRC and the industry has the duty to fully disclose all related impacts, short and long term, on and offsite, direct and indirect, as well as cumulative effects resulting from decommissioning to citizens and members of the public living in local communities surrounding the nuclear plants.

CL-44/16 We are tired of being unknowingly treated as an entity from whom the industry can escape the obligation of full disclosure, and "used" as the entity upon whom the industry dumps the real long term costs, and as the entity who absorbs the costs.

Patricia Borchmann

Letter 45, page 1

01/30/2002 16:01 16126233354 CLEAN WATER ACTION PAGE 02

CLEAN WATER ACTION ALLIANCE

11/09/01
66FR56721
(45)

January 30, 2002

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

To Whom It May Concern:

Pursuant to the Federal Register Notice of November 9, 2001 on the availability of the draft supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586), Clean Water Action Alliance (CWAA) provides the following comments under the extended comment period ending January 30, 2002. CWAA is a citizen-based environmental organization with over 55,000 members throughout Minnesota. As a member of the Sustainable Energy for Economic Development (SEED) coalition and the Minnesotans for an Energy-Efficient Economy (ME3) Coalition, CWAA has worked for the transition away from coal and nuclear generation towards cleaner, non-polluting sources of energy for nearly ten years.

CL-45/1 CWAA supports the comments of NIRS, Public Citizen and the Critical Mass Energy Project. We concur with these organizations that changes in the supplement designed to limit citizen's opportunities to review or challenge decommissioning projects are undemocratic and ill advised. It is imprudent to reduce public oversight of these projects, no matter how much more
CL-45/2 convenient it seems. Environmental and health risks from improper decommissioning are very
CL-45/3 high, particularly to neighboring communities. Labeling certain issues 'generic' and making them unchallengeable is a disservice to those communities and citizens around the country who may be exposed to radioactive waste during the transport and disposal process.

Thanks you for your consideration.

Sincerely,

Diana S. McKeown

Diana S. McKeown
Energy Program Coordinator

Template-ADM-013
E-RIDS=ADM-03
Add=M Masnik (MTM2)

Midwest Regional Office • 326 Hennepin Avenue East • Minneapolis, MN 55414 • (612) 623-3666
Duluth • 394 Lake Ave. So. #312A, • Duluth, MN 55802 • (218) 722-4557
Fargo/Moorhead • 118 N. Broadway, #314 • Fargo, ND 58102 • (701) 235-5431

Letter 45, page 2

01/30/2002 16:01 16126233354 CLEAN WATER ACTION PAGE 01

CLEAN WATER ACTION

FAX COVER

To: Chief, Rules & Directives Branch Pages 2

From: Date 30 Jan 2002

(612) 623-3354

Notes

attn: Rules

Midwest Regional Office • 326 Hennepin Avenue East • Minneapolis, MN 55414 • (612) 623-3666

PHYSICIANS FOR SOCIAL RESPONSIBILITY / ATLANTA
P O. Box 95190, Atlanta, Georgia 30347 404-378-9078 PSRatlanta@aol.com

11/09/01
66 FR 56721
46

NRC
EMAIL: dgeis@nrc.gov
MAIL: Chief, Rules and Directives Branch/ DMsion of Administrative Services/ Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ladies and Gentlemen:

CL-46/1
CL-46/2 In keeping with appropriate medical and public policy principles, we urge total transparency. We urge that the Commission always lead it's interactions with the public at large by being fully open and informative about the potential dangers, the expense and the limited experience we as a nation have with the decommissioning of nuclear reactors United States citizens deserve nothing less than total transparency.

We believe that the following statements are true and belong in the public dialogue, as the issues associated with decommissioning are presented to citizens:

CL-46/3 1. **A satisfactory waste isolation site evades us.** Yucca Mountain is not a suitable geologic repository based on science – the DOE itself admits that the site is not geologically suitable; storage canisters will be required to protect the waste from exterior environmental contamination. Additionally, the GAO raises serious questions about the selection process.

CL-46/4 2. **A serious accident or terrorist act could be catastrophic.** Such an occurrence could result in large numbers of human fatalities, injuries and illnesses and vast areas of land uninhabitable for years.

CL-46/5 3 **The enterprise of electricity generation using nuclear fission requires public subsidy.** Without Price-Anderson protection, nuclear power would be economically untenable.

CL-46/6 4. **Consideration of these factors must be fully and publicly discussed before exposing our citizens to additional exposures through development of new nuclear generation facilities.** The complete phase-out of nuclear power should be considered based on objective analysis of health and economic effects including probability evaluation of all possible accidents and incidents, and comparison of all potential energy sources such as wind, solar, hydrogen fuel cell and including conservation.

Tom Ferguson, Physicians for Social Responsibility/Atlanta
PO Box 95190
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404 378-9078
PSRatlanta@mindspring.com

www.PSRatlanta org

Template = ADM-013 E-RIDS = ADM-03
Add = H. Hasnik (HTH2)

Letter 47, page 1

11/09/01
66 FR 56721
(47)

From: "Dave Ritter" <dritter@citizen.org>
To: <dgeis@nrc.gov>
Date: 1/30/02 4.22PM
Subject: Decommissioning comments

see below....

Template = ADM-013

E-RIDS = ADM-03
Add = M. Masnik (MTM 2)

Letter 47, page 2

January 30, 2002

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
US Nuclear Regulatory Commission
Washington, DC 20555-0001

To Whom It May Concern:

Please accept the following comments in regard to Draft Supplement 1 to NUREG-0586, "Draft Supplement Dealing With Decommissioning of Nuclear Power Reactors," and place them into the public record.

CL-47/1 Public Citizen is very concerned about several aspects of this supplement to NUREG-0586, specifically those that could pose risks to public health, the public's right to

CL-47/2 participate in decisions that affect them, and environmental quality. Additionally, Public Citizen is concerned that the provisions outlined in the Supplement might allow owners and operators of nuclear power reactors to reduce or completely evade their civic, environmental, economic and legal responsibilities.

CL-47/3 Having stated that, we would like to make it abundantly clear that we see decommissioning to be the most appropriate and responsible action to take with all

CL-47/4 nuclear reactors. Nonetheless, any and all decommissioning activities should be performed methodically and with great caution, ensuring that the public is appropriately

CL-47/5 involved in the processes and thoroughly protected from dangers every step of the way. Certainly, every reactor shut-down is another step away from further creation of

CL-47/6 radioactive waste, the ever-present possibility of nuclear terror (be it a reactor accident or terrorist attack) and the continuing irradiation of our everyday lives. Every shut-down

CL-47/7 reactor can take us a step closer to a sustainable energy future but, unfortunately, reactor shut-down is not the threshold of safety, where the public can be assured that no health or environmental dangers will originate from the site. There still remains a mountain of radioactive waste after shut-down, including the reactor itself and, typically, an incredibly dangerous stockpile of irradiated reactor fuel. Whereas the reactor itself and the equipment and materials of the central facilities are often treated as the object of decontamination, it must be noted that the previous operation of the plant has dispersed radiation and contamination that did not regard the facility's fenceline as a barrier. Any serious approach to decommissioning a site must take this into account.

CL-47/8 Decommissioning should not be a final opportunity for the nuclear industry to "take the money and run" - be it to make a profit from inadequate cleanup and monitoring, or to

CL-47/9 limit losses from costs that had been underestimated for decommissioning throughout the operating lifetime of the nuclear reactor. There should be no allowance for the industry to

hurriedly raze structures, sweep the radioactive mess under a porous and permeable carpet (or disperse the remains and cleanup materials in many unregulated forms far from the reactor site), cut corners and add risks and contamination to an already precarious clean-up operation. The public must be protected.

Our specific concerns are as follows:

Relegation of More Decommissioning Processes to Generic Status

CL-47/10 In establishing 80% (24 of 30) of the environmental impacts of decommissioning as being "generic" the NRC is doing the industry's bidding to restrict or eliminate the affected public's opportunities to comment on, guide, monitor and review the decommissioning of

CL-47/11 nuclear power reactors in their communities. Regardless of any uniformity that may or may not exist as issues to consider at decommissioning reactors - and our position is that any concerns of the relevant communities are site-specific - the NRC's move to make most considerations within the decommissioning process "generic" is a thinly veiled

CL-47/12 project to eliminate public review and full disclosure through public hearings. Further, this move runs counter to NRC's "Openness" Principle of Good Regulation, wherein "Nuclear regulation is the public's business, and it must be transacted publicly and candidly. The public must be informed about and have the opportunity to participate in the regulatory processes..." and to NRC's Organizational Value of "Service to the public, and others who are affected by our work." (both found at http://www.nrc.gov/who-we-are/values.html)

Arbitrary and Capricious Determination of "Levels of Significance" for Decommissioning Environmental Impacts

CL-47/13 NRC's "Levels of Significance and Accountability of Environmental Impacts" assign values of risk to affected communities as "small," "moderate" and "large" as determinants for the denial or approval of a public site-specific review and, potentially, a public adjudication for environmental mitigation. Public Citizen maintains that these categories are excessively arbitrary and broad, and largely groundless for the following reasons:

1. The biological effects of ionizing radiation are destructive. No safe "threshold level" for exposure to ionizing radiation exists for the general population (including the fetus).

2. There is a long history of unresolved regulatory conflict over radiation protection standards that are utilized to determine NRC risk assessments. Federal regulators, including the NRC and the Environmental Protection Agency, have not reached a consensus on residual radiation criteria for decommissioning, with EPA standards being significantly lower (more protective) than NRC criteria. To our knowledge, this conflict has not been resolved and, therefore, it appears that the NRC has unilaterally and arbitrarily concluded what standards would apply in determining whether a risk is "small," "moderate" or "large."

3. The NRC risk assessment inappropriately ignores the population of children in its "critical group" evaluation as the population most vulnerable to residual radioactivity exposure from decommissioning operations. This runs counter to NRC's Organizational Value to a "Commitment ... to protecting the public health and safety."

4. The NRC has a documented history of significant lapses in effective oversight of decommissioning operations as reported by the General Accounting Office in a May 1989 report, "NRC's Decommissioning Procedures and Criteria Need to be Strengthened" (GAO/RCED-89-119). The GAO not only found that complete information does not exist for all licensed activities or buried wastes, but that NRC was found to have terminated a license with radioactive contamination in excess of its own guidelines. Further, the report noted that NRC regulations lacked a time requirement for document retention. NRC's questionable past performance does not support the agency's move toward generic treatment of decommissioning nuclear facilities where affected communities are denied public review and full disclosure of contamination, the decommissioning plan and license termination plan.

Rubblization

CL-47/14 NRC's proposal to allow "rubblization" (defined as: "the demolition of onsite concrete structures. Rubblizing these structures could result in material ranging from gravels to large concrete blocks, or a mixture of both.") of concrete structures at the reactor site to take place without opportunity for public intervention until after the action is completed

CL-47/15 is outrageous. Rubblization poses some specific risks to the surrounding communities and the site workers, as the rubblized material could contaminate via air, soil, and water pathways. Thus, Public Citizen insists that it is only appropriate that the affected communities surrounding the reactor site be given opportunities to review rubblizing plans and procedures, and that this issue be addressed on a site-specific basis.

Partial Site Release before License Termination

CL-47/16 The Supplement indicates that portions of a nuclear reactor site could be released from regulatory control prior to the site operator's license termination. This would relieve the nuclear utility of responsibility and liability for portions of sites (be they materials or real property) while still being licensed for the control of the entire site. Public Citizen is completely opposed to any such practice, which would allow radiation/radioactively-contaminated materials and wastes to be released, reused, or recycled, without restriction, into the unregulated industrial, commercial, and public environment.

Externalizing Costs to Ratepayers/Taxpayers

CL-47/17 Public Citizen is opposed to any policy that would shift the financial burden of decommissioning to ratepayers. The cost of properly decommissioning (including thorough decontamination) a reactor site can vary widely, depending on the size of the facility, the amount of time in which it was operational, and the degree of contamination.

As the NRC itself stated in the Supplement, the lack of adequate decommissioning funds can potentially result in delays and/or unsafe and improper decommissioning. Further, with utility deregulation and the attendant shuffling of corporate ownership, much uncertainty has developed regarding the ability of the owning and operating utilities to pay for proper decommissioning of their facilities. Public Citizen insists that site-specific reviews are necessary so that the public has an opportunity to ensure that the utility will be able to pay for the entire, thorough decommissioning process.

Relevance of "Out-of-Scope" Activities

CL-47/18 There are several issues in the Supplement which are briefly addressed and dismissed as "out-of-scope" which we insist need to be dealt with as site-specific issues for any thorough EIS on decommissioning, with full public rights to hearings, review, oversight, and disclosure maintained. These include:

1. Spent fuel storage and maintenance - The public at each reactor site community should determine how irradiated/"spent" fuel is stored/dispositioned. If a centralized high-level waste repository is opened at some future date to accommodate the irradiated fuel and high-level waste from a community's decommissioned reactor, the communities that exist along the possible transportation paths should also be involved in site-specific environmental impact reviews/assessments. To exclude spent fuel storage, maintenance, transport, and disposal away from the reactor location from the scope of this GEIS/Supplement, and the opportunity for site-specific EIS reviews, is arbitrary and capricious.

2. Low-level waste disposal at a a LLW site - The concept of rubblizing and capping a reactor site and allowing it to function as a low-level waste disposal facility without having the appropriate permitting and licensing hearing process is a serious departure from past NRC licensing practices, and any such "rubblizing" proposal should not be approved without a site-specific EIS review. To exclude this or any similar proposal from a site-specific EIS review, and the scope of this GEIS/Supplement, is arbitrary and capricious.

Please enter these comments into the public record.

Sincerely,

David Ritter
Policy Analyst
Public Citizen/Critical Mass Energy and Environment Program

Letter 48, page 1

Doris Mendiola - NIRS, WMEAC, DWM, CFNFGL Comments on DGEIS Supp 1 Page 1

From: dianed@igc org
To: <dgeis@nrc gov>
Date: 1/30/02 4.55PM
Subject: NIRS, WMEAC, DWM, CFNFGL Comments on DGEIS Supp 1

TO. NRC
FROM: NIRS, WMEAC, DWM, CFNFGL
RE: Comments on NRC Draft GEIS Supplement
Decommissioning of Nuclear Facilities
NUREG 0586 draft supp 1

11/9/01
66 FR 56721
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Template = ADM-013

E-RIDS = ADM-03
Add = U. Masnik (MTM2)

Letter 48, page 2

Doris Mendiola - NRC Decommissioning GEIS Supp 1 Comment multigp final doc Page 1

January 30, 2002

Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T 6 D 59
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

Nuclear Information and Resource Service (NIRS)
Coalition for a Nuclear Free Great Lakes (CNFGL)
Don't Waste Michigan (DWM)
West Michigan Environmental Action Council (WMEAC)

Comments on Decommissioning GEIS Supplement 1

To Whom It May Concern:

Pursuant to the Federal Register Notice of November 9, 2001 on the availability of the draft supplement to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586) for public comment, Nuclear Information and Resource Service, Coalition for a Nuclear Free Great Lakes and Don't Waste Michigan provide the following comments.

CL-48/1 NIRS reiterates and incorporates our previous comments and fundamental disputes with regard to the decommissioning GEIS as submitted in formal comments to NRC on July 11, 13 and 14, 2000. Our organizations request that NRC include with this submission all of our organizations' previous comments on this and related rulemakings (including but not limited to the environmental procedures on BRC and those that led to the development of 10 CFR 20 section E, the License Termination Rule). CL-48/2 Our organizations continue to assert that NRC is deferring its regulatory responsibility of radiological decommissioning to facilitate a cost driven utility self assessment through an expedited decommissioning licensing process and by restricting a duly promulgated public hearing process for affected communities as embodied under the 1988 law. CL-48/3 We contend that decommissioning practices on nuclear facilities and its environmental impacts as major federal actions must be conducted under public review with full disclosure and documentation of the amount of radioactivity, the location of residual contamination and the types of radioactive contamination that remain on-site and off-site and are subject to site specific public hearings.

CL-48/4 The NRC claims the agency and the industry have accumulated substantial decommissioning experience and that this is justification for hastening the generic treatment of Environmental Impact Statements. In effect, this eliminates meaningful public involvement in site-specific reviews and prevents CL-48/5 the necessary full disclosure of nuclear facility contamination and decommissioning practices. The fact is that decommissioning has a long and significantly checkered regulatory history. The draft supplement to NUREG-0586 does not address or acknowledge these repeated oversight failures including numerous decommissioning experiences where licensees did not adequately decontaminate their facilities. These failures include but are not limited to:
the NRC does not know the types, amount and location of buried radioactive waste at some of its decommissioned facilities;
-many licensee decommissioning records are nonexistent or incomplete;
-ground water contamination is higher than federal drinking water standards allow and
-the long standing failure of the responsible federal regulatory agencies to prevent and prohibit radiation contamination that can remain after the NRC terminates a nuclear facility license. (The Environmental Protection Agency is on record requiring more protective cleanup levels than NRC, evidence that NRC's requirements are inadequate.)

CL-48/6 These events do not warrant nor should they instill public confidence in staff conclusions that the agency and the industry can reasonably make the leap to the generic treatment of environmental impact statements for decommissioning nuclear facilities and effectively take away a community's review and the

full disclosure of the extent and location of radioactive contamination both on and off site.

CL-48/7 Our organizations are fully supportive of the permanent closure of nuclear power reactors. Our decommissioning comments are not intended to deter or delay the soonest possible shut down of nuclear

CL-48/8 reactors. Our goal is to require that nuclear facility owners and operators, to the best of their ability, function as the good neighbors and responsible corporate citizens they claim to be. That would include fully encapsulating and isolating all of the wastes and radioactively and chemically contaminated materials resulting from their operations and decommissioning. It includes doing everything possible to:

1) Prevent public exposures in the current and future generations to radiation and chemicals from nuclear power production, waste management, transportation, "clean up" and decommissioning,
2) Prevent additional environmental contamination both on-site and off-site and to remediate and minimize that which has already occurred;

CL-48/9 3) Paying the full costs for long-term monitoring and isolation of radioactive wastes Decommissioning should not end up as a new set of public subsidies for nuclear power by allowing the long term costs (economic, health, resource, etc.) to be denied, ignored or defined away by NRC with no recourse for the local community or state and federal taxpayers that will end up with the costs by default.

CL-48/10 Inherent in the decision to operate the reactors is an acceptance on the part of the generator and the regulator of the production of long-lasting radioactive waste and radioactive and chemical contamination of large volumes of resources. Decommissioning should include responsibly managing that material, not denying its existence.

The Commission's Definition of Decommissioning is Fundamentally Flawed and Limited in Scope

CL-48/11 Our organizations have a fundamental dispute with the Commission's definition of decommissioning. The NRC currently defines decommissioning as "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license."

Decommissioning should not permit the release of radioactive contamination from regulatory control and the control of some identified responsible party. At public meetings (in 1993 and in 2001) across the country on the issue of "clean-up," the public consistently called for continued regulatory control over any and all wastes, materials, properties and sites with contamination from nuclear power and weapons fuel chain activities. Rather than requiring the identification, capture and isolation of the remains of nuclear power operations, NRC is legalizing the release of contaminated sites, properties, materials and natural resources. By segmenting the portions of the decommissioning process into separate Environmental Impact Statements and supplements, the public is prevented from addressing the amount and method of identifying residual contamination of the environment, natural resources, the community and downstream and downwind ecosystems. The public is prevented from addressing and preventing the concept of allowable doses to the public from nuclear power operation, wastes and decommissioning activities. We protest the designation of issues related to allowable contamination levels and doses being deemed "out of the scope" of this document.

NRC ignores "offsite" radiation exposure

CL-48/12 This agency's definition of "decommissioning" is fundamentally flawed in limiting its scope of "property" to the site boundaries. The NRC scope needs to be broadened to encompass the decontamination or mitigation of "property" in addition to structures, systems and components of the nuclear power station that exist beyond the fence line that have been contaminated none the less as a direct result of station operation.

1) Radiological effluent pathways from nuclear facilities (water and air) must be included in the decommissioning analysis and mitigation plan.

CL-48/13 Nuclear facility operation results in significant offsite radiological contamination that is ignored under the current definition. For example, one known pathway occurs over the course of reactor operation as the direct result of fuel rod degradation giving way to pin-hole leaks, cracks and loss of rod integrity with radioactive contamination to the reactor coolant system. Primary and secondary coolant piping leakage results in radioactive contamination releases being deposited and accumulated as sediment on river and lakebeds and coastal receiving waters from deteriorated reactor coolant discharge systems. This is of particularly more concern for utilities that operated once-through cooling systems and/or boiling water reactor technology though not exclusively so. Some of our organizations are aware that reactor operators, as in one case of the Big Rock Point nuclear generating station, have argued that offsite radioactive sediment areas should not be disturbed by removal/decontamination efforts and are better left alone than decontaminated. The decommissioning definition does not require the utility to analyze the scope of this offsite contamination, consider its cleanup nor effectively regulate the enforcement of decontamination of residual radioactivity that has migrated from the reactor site and accumulated off site in affected communities resources such as fresh water supplies. These advertent releases of radioactivity as the result of station operation need be covered within the scope and disclosure as environmental impacts within the decommissioning process.

NRC in its evaluation of the environmental impacts acknowledges "Levels of radionuclide emissions from facilities undergoing decommissioning decreased, because the major sources generating emissions in gaseous and liquid effluents are absent in facilities that have been shut down." Consequently, the NRC currently only considers radiological effluent impacts as a result of decommissioning operations while ignoring the potential need for mitigation of cumulative and persistent toxic radioactive materials deposited downstream over the decades of operation of a reactor.

CL-48/14 2) The contamination of soil, land and property beyond the station boundary line must be included in the decommissioning analysis and plan.

Offsite migration of radioactive materials has occurred through both deliberate and inadvertent removal of materials originally contaminated onsite (tools, concrete construction blocks, etc) For example, concrete cinderblocks used to construct a shield wall at the Connecticut Yankee's Haddam Neck nuclear power station were inappropriately distributed to affected communities as construction materials for buildings including a children's daycare facility. We believe the Connecticut Yankee incident is not an isolated case. The scope of the current definition does not provide for the investigation, analysis and mitigation of radioactive materials, equipment and components originating from a nuclear facility that have been deliberately or inadvertently released to affected communities.

CL-48/15 3) The historic undocumented burial of nuclear waste onsite at nuclear power stations must be investigated, surveyed and mitigated by station owners under the decommissioning plan

As the United States General Accounting Office (GAO) May 1989 "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened" (GAO/RCED-89-119) reports in its Executive Summary.

"For almost 25 years, NRC allowed licensees to bury radioactive waste on-site without prior NRC approval. NRC required the licensees to retain records on the amounts and substance buried rather than provide them to NRC. In five of the eight cases GAO reviewed, licensees buried waste onsite, but four licensees either did not keep disposal data or the data are incomplete. In one case, NRC terminated a license and 10 years later learned that radioactive material had been buried on the site. Also, NRC generally does not require licensees to monitor for groundwater or soil contamination from buried waste.
All five licensees have found ground water contaminated with radioactive substances. At four sites, some of the contamination appears to have resulted from the buried waste—
the contamination at one site was 400 times higher than EPA's drinking water standards allow. At another site, the contamination was 730 times higher, but the source was not known."

CL-48/16 4) An inventory of all the radioactivity, radioactive wastes and materials from reactor operation and decommissioning, and independently verified reporting of its disposition (whether onsite or offsite, whether in licensed or unlicensed facilities and specifics of its storage condition) should be a required part of the environmental review and reports. This information must be part of the site-specific Environmental Impact Statement process and fully disclosed at each reactor as site-specific issues, with the opportunity for formal local hearings and legally- binding input. The corporations responsible for the radioactive wastes from nuclear power reactor operations should be required, by NRC, to keep balance sheets of the radioactivity generated by their reactors and the decommissioning process, and track the disposition of that radioactivity whether it is kept onsite, allowed to leak out into the air and water, or shipped to licensed or unlicensed facilities for disposal or processing, and for possible release into household items.

CL-48/17 We oppose any unlicensed disposition of long-lasting radioactivity from the nuclear fuel chain activities As long as radioactive materials remain, someone should retain a license for those materials, and responsibility for them. That burden should not be shifted to the states and local communities without clear acknowledgement of the stewardship responsibility for that material.

CL-48/18 NRC AND INDUSTRY FAILURE TO RELIABLY ESTIMATE THE REAL COST OF DECOMMISSIONING AND REASONABLY ASSURE THE AVAILABILITY OF ADEQUATE DECOMMISSIONING FUNDS DOES NOT JUSTIFY OR SUPPORT GENERIC TREATMENT OF ENVIRONMENTAL IMPACT STATEMENTS

The NRC GEIS does not adequately address the historic inability by the NRC and industry to accurately assess the final and actual costs associated with decommissioning and the associated underestimation of the rate of accrual for funds set-aside by electrical utilities. The final cost for decommissioning remains highly speculative and therefore likely to continue to be significantly underestimated. As NRC has stated in the DGEIS Supplement the unavailability of adequate decommissioning funds potentially can result in delays and /or unsafe and improper decommissioning. Therefore, our organizations contend that site specific reviews are necessary for public review and disclosure of the availability of adequate decommissioning funds assigned to an adopted decommissioning plan

CL-48/19 While the Executive Summary of NUREG-0586 Supplement 1 claims that the NRC and the industry have over 300 years of decommissioning experience with 22 nuclear reactor facilities permanently shut down, the fact remains that the process is still relatively new and NRC has yet to complete a single radiological decommissioning operation to a license termination plan for a typical large U.S. commercial reactor that operated for any significant length of time. As stated by Mr. Michael Masnick with the NRC at the Public Scoping Meeting on Intent to Prepare Draft Supplement To Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities in Boston, Massachusetts, May 17, 2000 with regard to a question on how many license termination plans have been accepted by NRC, he responded, "none

CL-48/20 have resulted in a license termination." It therefore appears that 300 years of decommissioning experience without a single license termination plan approval does not suggest that NRC is prepared to treat the issue of cost to adequately decommission generically.

CL-48/21 The cost of decommissioning nuclear facilities can vary according to the size of the facility and the

CL-48/22 degree of contamination. As a result of electric utility deregulation where a competitive market has replaced regulated rates, traditional methods of amassing decommissioning funds through imbedded utility

CL-48/23 rates have been replaced with by competitive electricity rates. Additionally, ownership of nuclear facilities has changed for more than half of the nuclear power plants in the United States through mergers and transfers. This shuffling of ownership has raised much uncertainty about the availability of adequate funds for the eventual decommissioning of the nuclear facilities.

As reported by GAO December 2001 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could Be Improved" NRC reviews of financial arrangements exchanged in these

transfers and mergers "were not always rigorous enough to ensure that decommissioning funds would be adequate. Moreover, NRC did not always adequately verify the new owners' financial qualifications to safely own and operate the plants."

CL-48/24 The Yankee Rowe nuclear power station is a clear example of the inability to accurately assess the final cost of decommissioning. Originally decommissioning estimates ran under $100 million dollars while the current expenditures are estimated to be just under $500 million for the small 170 megawatt pressurized water reactor.
The Shoreham nuclear power station can not be relied upon as an accurate gauge for decommissioning costs as it never reached full power operation.

NRC SEEKS TO LIMIT PUBLIC REVIEW AND HEARINGS BY ESTABLISHING ARBITRARY "LEVELS OF SIGNIFICANCE" ON DECOMMISSIONING ENVIRONMENTAL IMPACTS

CL-48/25 **We have a fundamental dispute with the NRC effort to eliminate public review and full disclosure through public hearings on decommissioning practices and mitigating environmental impacts based on arbitrary and capricious categories for determining "generic" and "site specific" proceedings for nuclear power station decommissioning.**

CL-48/26 **NRCs "Levels of Significance and Accountability of Environmental Impacts" assign values of risk to affected communities as "small," "moderate" and "large" as thresholds for denying or conducting a public site-specific review and potentially a public adjudication for environmental mitigation. Our organizations argue that these broad categories established by NRC are largely baseless for the following reasons:**

1. The biological effects of radiation are deleterious. No safe threshold for radiation exposure for the general population (including the developing fetus) has been established.

2. There is a long history of unresolved regulatory conflict over radiation protection standards assumed to determine NRC risk assessments. Both federal and state agencies have sought to provide greater protection than NRC requires. In addition, NRC

3. The NRC risk assessment inappropriately ignores the population of children in its "critical group" evaluation as the population most vulnerable to residual radioactivity exposure from decommissioning operations.

4. There is a documented history of significant lapses in effective NRC oversight of decommissioning operations as reported by The General Accounting Office in May 1989 "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened" (GAO/RCED-89-119). The GAO not only found that complete information does not exist for all licensed activities or buried wastes, but additionally that NRC was found to have terminated a license with contamination in excess of its guidelines and NRC regulations lacked a time requirement for document retention. NRC's checkered history does not provide justification for the agency to move forward with generic treatment of decommissioning nuclear facilities where affected communities are denied public review and full disclosure of contamination, the decommissioning plan and

THE DECOMMISSIONING ALTERNATIVES DO NOT WARRANT GENERIC TREATMENT THE ENVIRONMENTAL IMPACT STATEMENT AND ARE THEREFORE SUBJECT TO SITE SPECIFIC PROCEEDINGS

CL-48/27 **Alternative methods being considered by the NRC include "entombment" and "rubblization." These involve leaving more nuclear waste on-site in an effort to reduce industry's short-term decommissioning costs but are likely to increase long term costs to affected communities once the sites are abandoned after license termination. The proposed alternative methods**

additionally raise significant technical and environmental impact issues and conflicts with the permanent emplacement of so-called "low-level" radioactive waste at nuclear facility sites not originally licensed as regulated nuclear waste management facilities. The proposed alternative methods are tantamount to creating an unlicensed radioactive waste disposal site. These alternative methods must therefore be subject to review by the affected communities with full disclosure and documentation of the amount of radioactivity, the location and condition of all residual contamination and the types of radioactive contamination that remain on-site. On-site and off-site contamination and radioactivity and associated issues involved with extended institutional control must all be subject to site-specific public hearings.

CL-48/28 The NRC effort to approve alternate decommissioning methods constitutes significant uncertainty and an impediment to accurately estimate the real cost of decommissioning nuclear facilities. There is no real assurance that adequate funds will be available to safely and properly decommission the site and provide for remediation of all necessary cleanup. These regulatory and environmental issues do not support generic treatment of environmental impact statements. In fact because of the economic and technical and environmental uncertainties of the Rubblization and Entombment options, they should be subject to much more rigorous review than provided by this Supplement. This Supplement gives only cursory attention and unsubstantiated dismissal of potentially very serious environmental consequences of the Rubblization, Entombment and Partial site release options.

The Entombment alternative

As a decommissioning option, entombment provides for the utility to remove the irradiated fuel from the core for disposition through either on-site dry cask storage or away-from-reactor interim storage Once the fuel is removed, the facility is allowed to radioactively decay for a specified period of time up to 300 years before demolition and site clean up is achieved.

Rubblization as an alternative to licensed radioactive waste disposal sites

Rubblization is described as the partial decontamination and demolition of radioactively contaminated buildings at nuclear power stations. The interior concrete surfaces are only partially decontaminated and the entire structure (concrete, steel re-enforcement bar and other materials) is then razed to grade level into the foundation hole. The burial site is then covered over with soil cap. NRC and industry are also proposing that rubblized contaminated material can be hauled to landfills unlicensed for radioactive waste.

CL-48/29 However, the rubblization process must account for the permeation of porous concrete structures (containment dome, basemat, and walls) with radioactivity much deeper that surface contamination that would be sand blasted during a decontamination process. Activated concrete would be rubblized and would thus constitute so-called "low level" radioactive waste. Long-lasting radioactive elements such as cesium-135 and strontium-90 are present with many other fission products and radioisotopes in the concrete and should not be ignored or defined away. No data are provided in this Supplement to justify Rubblization and on-site or off-site disposition. Thus, local communities have every right to participate legally (in adjudicatory proceedings) and be provided with information- full disclosure of such planning.

CL-48/30 Essentially, the agency and industry are proposing that a so-called "low-level" radioactive waste dump can now be grandfathered on a reactor site without a formal permitting and licensing hearing process. The decommissioning utilities will provide an analysis that can "assure" that no ground water movement will occur through the radioactive burial site providing a potential transport mechanism and potential radioactive exposure to the public and environment. The utilities are to provide a "dose model" to "assure" the affected communities that the radioactive site will pose no health risks to present and future public health and the environment. These "assurances" cannot be bona fide by generic treatment and therefore require the availability of site specific proceedings.

CL-48/31 We concur with the GAO findings as reported in GAO-02-48 "NRC's Assurances of Decommissioning Funding During Utility Restructuring Could be Improved" dated December 2001. GAO reported the following conclusions:

"Rubblization represents a departure from NRC's past licensing practice, which emphasized

shipping low-level radioactive wastes from decommissioning sites to disposal sites. Although NRC has estimated that rubblization could save a licensee from $10 million to $16 million in waste disposal costs during decommissioning, its Advisory Committee on Nuclear Waste has concluded that technical factors, such as the depth of radioactive contamination and the volume of rubblized waste, could significantly diminish the potential cost savings. The Advisory Committee also believes that evaluating radioactive material content and doses from rubblization, both at the site and in local groundwater, may prove difficult and expensive."

CL-48/32 "The NRC staff's decision that entombment might reduce decommissioning costs is questionable."

"According to NRC's staff, 'very expensive remedies' could be required if an entombment configuration proved unable to adequately isolate radioactive contaminants over the 100-year or longer [up to 300-years by NRC projections] time period needed for radioactive decay. Given the length of time involved, states are concerned that they will have to pay remediation costs should an entombment fail."

CL-48/33 "Aside from questionable cost benefits, rubblization and entombment raise a number of technical issues. For instance, NRC does not intend to require that sites where rubblized radioactive materials would be buried have protection equivalent to off-site disposal facilities for low-level radioactive waste. Disposal facilities for commercial low-level radioactive waste, which are licensed and regulated by NRC oar by state (under agreement with NRC), must be designed constructed, and operated according to NRC regulations (or compatible regulations issued by the host state). In addition, to obtain a license to build and operate a disposal facility, the prospective licensee must characterize the facility site and analyze how the facility will perform for thousands of years. However, according to NRC, a rubblized site is not comparable to a low-level radioactive waste disposal facility... Nevertheless, 10 CFR Part 61 does not differentiate between what does or does not qualify as a low-level waste disposal action or facility on the basis of the quantity, forms, or range of the low-level radioactive waste to be buried."

CL-48/34 "Water intrusion is also a major concern for rubblized or entombed sites, and the fact that most nuclear power plants are situtated in shallow water table or flood plan locations may limit the viability of these options."

CL-48/35 The above reasons illustrate the lack of a sound basis for staff conclusions that the decommissioning alternatives of entombment and rubblization are of "minor" environment impact and can be treated generically to avoid public review and full disclosure in formal public hearings. We therefore adamantly oppose such generic treatment.

Overall concerns:
NIRS and numerous other organizations and local community groups have concerns with the following overall effects of this Supplement:

CL-48/36 NRC allows "rubblization" (crumbling the concrete reactor building) of nuclear reactors, without opportunity for public intervention until the action is completed.

CL-48/37 NRC allows portions of sites to be "released" from regulatory control before the whole site is released

CL-48/38 NRC opens up two "entombment" options.

CL-48/39 NRC ignores radiation dangers after decommissioning is done and utility is relieved of liability.

CL-48/40 NRC ignores radiation exposures to children and other vulnerable members of the population and creates a fictitious highest exposed "critical group" based on unsubstantiated assumptions.

CL-48/41 NRC ignores radiation offsite and permits utilities to ignore it in decommissioning planning. NIRS calls on the NRC to incorporate offsite contamination into all evaluations of environmental impacts.

CL-48/42 NRC prevents the National Environmental Policy Act from applying to most of the decommissioning process. (The claim appears to be that this proposed Supplement 1 satisfies the Environmental Policy Act for most of the decommissioning issues)

CL-48/43 NRC cleverly makes most aspects of decommissioning "generic" rather than site-specific, so they cannot be legally reviewed or challenged at individual sites.

CL-48/44 NRC redefines terms to avoid local, site specific opportunity to question, challenge and prevent unsafe decommissioning decisions.

CL-48/45 NRC sets arbitrary and unsubstantiated (low, medium and high) environmental impact categories for each of the steps in decommissioning, to give the appearance that they have minimal effects, to justify not fully addressing them now and to prevent their inclusion in site-specific analysis.

CL-48/46 NRC is removing the requirement for a license amendment when changing from a nuclear power operating license to a nuclear materials possession-only license. (With no license amendment, there is no opportunity for public challenge or adjudicatory processes)

CL-48/47 NRC is attempting, with this supplement, to legally justify the removal of the existing opportunities for community involvement and for legal public intervention until after the bulk of the decommissioning has been completed. This includes such activities as flushing, cutting, hauling and possibly rubblizing of the reactor.

CL-48/48 NRC states that the portion of the decommissioning regulations (10 CFR 20 section E and its Environmental Impact Statement, NUREG 1496) that set the 25, 100 and 500 millirems per year allowable public dose levels from closed, decommissioned nuclear power sites, are not part of the scope of this Supplement

CL-48/49 NRC defines decommissioning, in part, to include the "release of property for unrestricted use...." and the "release of property under restricted conditions..."
NIRS stands firmly against the "release" of radioactively contaminated materials into daily consumer use and commerce or unregulated disposal

Respectfully submitted,

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Letter 49, page 1

From: Eileen Greene <egreene@ikano.com>
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Date: 1/31/02 2.23AM
Subject: Comments on Decommissioning Nuclear Power Reactors EnvironmentalImpact Statement

11/09/01
66 FR 56721
49

CL-49/1 I am very concerned that children, who are much more susceptible to the effects of radiation, may not be being looked at in the Environmental Impact Statement. This is a very serious issue, & if left unaddressed, would not only be morally wrong, but could lead to a horrible name in history for the NRC, & possibly legal action.

CL-49/2 I am hopeful that you will act in the interest of the public, & listen to the concerns of all of the communities that will be affected by the by-products of nuclear energy. Offsite radiation is something that must not be ignored.

Thank you for looking into this.

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E-RIDS = ADM-03
Add = M. Yadzik (MTM2).

Letter 50, page 1

From: CAN <can@nukebusters org>
To: <dgeis@nrc gov>
Date: 1/31/02 1:13PM
Subject: Comments onGeneric Environmental Impact Statement onDecommissioning

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Add = M. Masnik (MTM2)

Letter 50, page 2

Citizens Awareness Network
Comments on Draft Supplement 1 of the GEIS on Decommissioning Reactors

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CITIZENS AWARENESS NETWORK

January 30, 2002

Chief, Rules and Directives Branch
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RE: Generic Environmental Impact Statement on Decommissioning Nuclear Facilities: Draft Supplement 1 Dealing with Decommissioning of Nuclear Power Reactors

Dear Sir or Madam:

By this letter, the Citizens Awareness Network (CAN) formally submits written comment on the draft supplement1 Generic Environmental Impact Statement (GEIS) involving the decommissioning of nuclear reactors. CAN provided the Nuclear Regulatory Commission (NRC) with verbal comment at the draft supplemental GEIS scoping meeting held in Boston, MA on May 17, 2000 and written comments in July 15, 2000. CAN is a volunteer, grassroots organization with chapters in reactor communities in MA, CT, VT and NY. We have over 3,300 members and represent the views of many thousands more. We attempted to email these comments on 1/30/02, but were unable due to server problems.

CL-50/1 The regulations are in violation of the appellate court decision in CAN v NRC. The court ruled that decommissioning remained a "major federal action" requiring National Environmental Policy Act (NEPA) compliance. CAN strongly urges the NRC to enforce NEPA compliance and require decommissioning

CL-50/2 reactors to undertake site specific Environmental Impact Statements (EIS). In addition CAN requests the Commission withdraw the proposed draft and revise it so that it complies with the ruling of the court decision. Until such a time when site specific EIS's are done, CAN requests that paragraphs below be incorporated into the draft supplement 1 GEIS.

CL-50/3 The Appellate Court justices opined that your agency was in violation of its own regulations and Rulemaking process in approving the experimental decommissioning at the Rowe reactor without a decommissioning plan and an environmental assessment. In addition, the court has ruled that decommissioning is a major federal action and requires NEPA compliance. "An agency can not skirt NEPA or other statutory commands by exempting a licensee from compulsory compliance, and then simply labeling its decision "mere oversight" rather than a major federal action. To do so is manifestly arbitrary and capricious." We believe NEPA

compliance is mandatory for decommissioning. A Generic Environmental Impact Statement can not substitute for an individual EIS, as computer modeling can not substitute for actual testing

CL-50/4 CAN believes it is essential for NRC to continue to define decommissioning as a major federal action. As the Appellate Court opined "....., it is undisputed that decommissioning is an action which, even under the
CL-50/5 Commission's new policy, requires NEPA compliance 10C.F.R S 51.95(b.)" CAN believes that streamlining the process for nuclear corporations and setting aside NRC requirements abdicates the responsibility to protect the health and safety of the workers, the public, the environment, and violates citizen due process. Nuclear power generators should not be given broad discretionary powers to regulate themselves, which this Draft proposes. Protecting public and worker health and safety and the environment must remain the NRC' mission.

CL-50/6 Can requests the NRC restore distinct categories between reactor operations and cessation and that the Possession Only License should be reinstated. It affords citizens the possibility for a hearing prior to reactor decommissioning. The opportunity for a hearing must not be withdrawn by the Commission. The hearing is essential for communities to participate in matters that vitally effect them. To offer a hearing at the termination of the license rather than at the cessation of operations sets aside meaningful citizen participation.

CL-50/7 Major component removal should not be approved with the submission of a Post Shutdown Decommissioning Activities Report (PSDAR). A clear definition must be established to clarify what constitutes major and minor component removal. Approval of decommissioning plan should be required before major decommissioning activities begin The PSDAR does not afford the community effective input into the decommissioning
CL-50/8 process since this document is a skeletal outline of generalized activities planned by the licensee. The elimination of sub part M hearings coupled with the instituting of sub part L further inhibits public participation and is a violation of citizens constitutional rights guaranteed under section 189a of the Atomic Energy Act.

CL-50/9 The PSDAR skirts accountability and obstructs required public participation. The PSDAR does not require a clear description of the methodologies so that the public can understand what will be taking place during decommissioning Only with a sufficiently detailed plan, can the public meaningfully research, investigate, formulate comments and questions, and possible objections to the decommissioning activities. A meeting does not afford citizens the level of institutional accountability necessary given the dangers of enviro-toxic contamination inherent in the reactor cessation Informational meetings, as experienced at Yankee Rowe, CT Yankee, Maine Yankee, and Millstone Unit 1 obfuscated, confused, and ignored the concerns of local citizens. Both the Federal District Court and the Appellate Court chastised the agency for this approach. If the community has concerns, and there is no regulatory recourse save one "meeting" with NRC, the Commission will, in fact, create polarization between the community and regulator leading to erosion of public confidence in the NRC

Further Comments:

CL-50/10 1. Health problems in the community must be determined and taken into consideration when decommissioning plans are being established since continued exposure to radiation through routine decommissioning releases and the inadvertent release of hot particles can jeopardize the health and safety of the public.

CL-50/11 2. New environmental assessment documents must be required, as old assessments are outdated and have been found to be inaccurate both on and offsite.

CL-50/12 3. Although the NRC claims numerous successful decommissionings of nuclear sites, few large-scale reactors that operated for decades have completed successful decommissioning Decommissioning remains experimental. Resources and time required for decommissioning a site have been routinely underestimated. More importantly, worker doses have been repeatedly underestimated. Safe decommissioning is about radiological control and the need to limit exposures to the workers. Nuclear corporations have failed to do this because of inexperience and a lack of enforcement by the NRC. With over 100 nuclear reactors yet to be decommissioned in this country, cutting decommissioning exposures by 200-300 person-rem per reactor will reduce the nation's nuclear workforce exposures by 20,000-30,000 person-rem.

CL-50/13 4. Nuclear reactors, through planned and unplanned radioactive releases, can create plumes of contamination, which migrate offsite. Yankee Rowe currently has a plume, which reached springs, feeding into the Deerfield River where residents recreate. Connecticut Yankee has plumes of tritium and other radionuclides which have migrated into the aquifer and the Connecticut River for decades.
CL-50/14 Accountability (i e. remediation and/or long term monitoring) for plumes of contamination that have offsite consequences must be established. Furthermore, accountability must be established for routine NRC-regulated releases, which have accumulated in the discharge pathways Big Rock Point, Millstone Unit 3 and other reactors have identified contaminated sediment caused by such releases Remediation must capture such plumes both onsite and off.

CL-50/15 5. Methodology must be established to locate and collect for proper disposal contaminated tools, soils, concrete blocks, plywood and other building materials that may have been taken offsite by workers during reactor operation such as was the case at Connecticut Yankee and Yankee Rowe.

CL-50/16 6. In addition to onsite worker doses, decommissioning exposure calculations must capture and include doses incurred by workers involved in offsite reactor decommissioning activities i.e. shipping, decontamination, smelting, recycling etc. of all radioactive materials and components.

CL-50/17 7. Using an adult male as the average member of the critical population for dose calculations in site release criteria does not establish effective clean-up standards. The adult male assumptions address workers during reactor operation, however when reactor sites are released for unrestricted use the "average member" of the critical population requires the inclusion of children since they bear the greatest burden of the affects of ionizing radiation as described in the Biological Effects of Ionizing Radiation (BEIR) V report.

CL-50/18 8. The License Termination Plan (LTP) should be established, reviewed by the public and approved by the NRC before site remediation begins.

CL-50/19 9. Partial release of property for unrestricted use should not be allowed until the LTP has been established, reviewed by the public, approved by the NRC and implemented on the given piece of land. Furthermore, methodology should be established for preventing recontamination of the released

property through environmental migration e g. rain, wind, etc and future decommissioning activites i e excavating, tracking or relocating contaminated materials.

CL-50/20 11. Clear methodologies should be established for the clean up of transuranics and hot particles. Yankee Rowe failed to include transuranic measurements in its LTP and currently Connecticut Yankee intends to avoid doing direct alpha measurements (and beta measurements) through less expensive surrogate measurements of easier-to-detect radionuclides through less expensive surrogate measurements of easier-to-detect radionuclides. Surrogate measurements must not be allowed at sites where consistent ratios of radionuclides do not exist.

CL-50/21 12. The burial of radioactively contaminated material as a means of *site remediation* is unacceptable for property that is to be released for unrestricted use. Rubblization (the burial of contaminated rubble) must not be permitted under any circumstances. The permission to build nuclear reactors hinged upon the utilities' commitments to regulators and the community to restore the site to "green fields". Rubblization is a blatant default on cleanup commitments, is a gross injustice to reactor communities and is a regulatory cave-in to utilities' desires and financial needs. In response to rubblization CAN also incorporates by reference Contention's 5 2 and 5.3 submitted by the organizations to the Commission on March 12, 2001 regarding Haddam Neck Reactor's License Termination Plan (Docket No. 50-213-OLA).

CL-50/22 13. Given the repeated and serious exposure of workers during decommissioning of reactor sites, an onsite NRC inspector should be required throughout decommissioning to protect worker health and safety.

CL-50/23 14. Nuclear corporations should not be allowed to decommission reactors under an operating license through a series of amendments nor should they be allowed to create an Independent Spent Fuel Storage Installation (ISFSI) under an operating reactor license when they are decommissioning Decommissioning reactors installing ISFSI's should be required to go into a part 72 license to provide adequate regulatory oversight protect public health and safety. The part 72 general license provision for creating an ISFSI at an operating reactor was never intended to cover a decommissioning reactor when regulatory oversight is minimized.

CL-50/24 15. Public participation must be instituted for the creation of the ISFSI. At present, the creation of an ISFSI falls into a regulatory no man's land At the NRC pre-hearing on the Yankee Rowe LTP, the NRC administrative law judges were instructed by the commission not to address any contentions concerning the storage of high-level radioactive waste. The creation of the ISFSI has serious consequences for each reactor community that could last hundreds of years. That the public can not participate in the process - give comments, request hearings, intervene - is unreasonable and undemocratic.

CL-50/25 16. Given the recent experience with wild fires at the Los Alamos and Hanford Nuclear Reservation and now the potential for flooding and massive soil erosion, the NRC should re-evaluate risk assessments and dose calculations for decommissioning reactors.

CL-50/26 17. Methodology must be established to determine the extent of underground rad waste contamination and burial. The Multi-Agency Radiological Site Survey and Investigation Manual (MARSSIM) establishes measurement criteria for only 6 inches below the surface of soil. MARSSIM does not

address the serious problem of locating and remediating underground contamination. Before 1980, the NRC in fact allowed the burial of rad waste onsite. A General Accounting Office (GAO) investigation found that the routine burial of rad waste 4 feet deep at reactor sites before 1980 occurred without adequate documentation.

CL-50/27 19. Each reactor community should have representatives trained in MARSSIM and other protocols by the NRC so that they can effectively comment and express their concerns about the adequacy of the procedures being used.

CL-50/28 20 In the aftermath of September 11th, NRC and licensees must address earlier assumptions that decommissioning was less dangerous than operation and that security measures and insurance could be reduced because of it. Nuclear fuels pools as well as on site dry cask storage of high level waste are targets for terrorism. In fact decommissioned sites could be selected as targets because there is less security and oversight during decommissioning and the monitoring of the ISFSI. NRC must required increased security and the reinstatement of insurance provisions. Additionally, emergency preparedness drills and the EPZ should be reestablished. KI should be stockpiled in communities since the potential for off site consequences from a terrorist attack is possible.

Sincerely,

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1-31-2002 11:59PM FROM DREY 314 725 7676 P 1

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January 30, 2002

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(51)

Comments on the Draft Supplement to the 1988 "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities."

CL-51/1 The primary reason I am submitting the following comments is to urge the Nuclear Regulatory Commission to maintain its commitment to study the operating history and resulting contamination of each reactor on a site-specific, not generic basis — in its effort to design appropriate decontamination and decommissioning requirements for each site. Only in this way can there be any hope of achieving the requisite, long-term isolation of the contaminants from the human environment.

CL-51/2 1. Site specificity: Many questions regarding decommissioning require site-specific and reactor-specific analyses. The Callaway plant, for example, here in Missouri, is located about 5.5 miles away from the Missouri River, the source of the plant's cooling water and the depository for its liquid effluent. It would seem that testing would be needed of the unusually long effluent-discharge pipe in order to determine where leakage may have occurred during the plant's operation and where soil excavation may therefore be required as a part of the decommissioning.

Sediment samples would be needed where the discharge pipe releases the plant's effluent into the Missouri River. Without such site-specific analyses, a determination of the extent of the riverbed's contamination would not be possible. According to a series of reports published in 1970, 1974 and 1976, by the US Environmental Protection Agency's Office of Radiation Programs, radioactive fission and corrosion products traceable to Dresden-One, Haddam Neck, and Oyster Creek had accumulated in those reactors' discharge areas in the Kankakee River, the Connecticut River and Barnegat Bay, respectively. (BRH/DER 70-1; EPA-520/3-74-007; and EPA-520/5-76-003).

CL-51/3 Reactor contaminants in the sediments in the EPA studies included cesium-134 and –137, cobalt-58 and –60, manganese-54, and antimony-125. With evidence that these isotopes were able to bypass the liquid waste filters, it would seem probable that other fission, activation and corrosion products could have, too. And of course some reactor isotopes are extremely long-lived. I am reminded of the following discussion in a 1978 NRC publication on decommissioning:

> Based on the guidance put forth in [Atomic Energy Commission] Regulatory Guide 1.86 ["Termination of Operating Licenses for Nuclear Reactors," June 1974], entombment of a reactor facility requires the encasement of the radioactive materials in concrete or other structural material sufficiently strong and structurally long-lived to assure retention of the radioactivity until it has decayed to levels which permit unconditional release of the site. (In previous reactor decommissioning, it was assumed possible to entomb the reactor pressure vessel and its internal structures within the biological shield since the principle source of radiological dose was cobalt-60, which decays with a relatively short half-life (5.27 years) Thus, within about 100 years, the residual

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> radioactivity will have decayed to levels indistinguishable from normal background, well within the safe structural lifetime of the entombment structure. The presence of any niobium-94 was ignored. The amount of nickel-59 formed in the relatively brief operating life of these early plants was sufficiently small as to present no significant hazard. However, in large power reactors that have operated for 30-40 years, the induced niobium-94 and nickel-59 activities in the reactor vessel and its internal structures are well above unconditional release levels and, since nickel-59 has an 80,000 year half-life and niobium-94 has a 20,000 year half-life, the radioactivity will not decay to unconditional release levels within the foreseeable lifetime of any man-made surface structure. ("Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130; pp. 4-5, 4-6; emphasis added)

CL-51/4 Nickel-59, mentioned above, is produced when the nickel-58 in stainless steel captures electrons. Since the EPA found corrosion products in the sediment of several metals for which they tested, is it not possible that other metals subjected to the reactor's hostile environment (repeated cycles of temperature and pressure; high neutron fluxes, harsh chemicals, etc.) may also have degraded or dissolved, and migrated out of the plant? Could they be detected in the sediment if tested? Some of the corrosion products identified in the oxide layer ("crud") of various reactors include isotopes of iron, zinc, molybdenum, tungsten, titanium, and carbon. (I would be happy to send a copy of the comments I submitted to the NRC on July 16, 1980, regarding the Draft Environmental Statement on the proposed use of chelates to decontaminate Dresden One in Illinois. Information on chemical decontamination is cited from AEC, EPRI, GE reports, and more.)

2. Rubblization: This word is relatively new to me. But amazingly, the concept is not. I remember when our family first drove by the Elk River reactor in Minnesota on a brief, educational side trip with our children. This was some time before November 1974, when I first began reading and working fulltime against nuclear power. When we drove by Elk River again, four or five years later, the plant had completely disappeared.

Several years after that I learned from one of the former Elk River workers that they had used explosives to "dismantle" the plant. I was incredulous then; I still am. The list of explosives employed for the rubblization of this one small reactor is impressive, or more precisely, worrisome: PETN (pentaerythritol tetranitrate), 85% high velocity gelatin dynamite, cast TNT (high detonation pressure primers), binary energy system (liquid explosives) and water gel explosives. (From the revised "AEC-Elk River Reactor Final Program Report," November 1974, p 31). To quote further from that report:

> For obvious economic reasons, it was desirable to dispose of as much demolition debris as possible in local landfills. Because there were no burial facilities for radioactive materials in the State of Minnesota, and because of existing adverse public reaction to the nuclear industry from certain sectors, great pains were taken to insure that little, if any, radioactivity remained in the structures that were disposed of in Minnesota. For these reasons, the term 'detectable reactor originated radioactivity' or DROR was specified contractually and defined for this project. It should be emphasized that DROR as defined below is unique to the Elk River Reactor project, is a one-time requirement, and there is no intent to suggest a guideline for future decommissioning actions or to supercede guidelines issued by the [AEC] Director of Regulation. The term DROR was applicable only to demolition rubble that was to be left in the State of Minnesota and was defined procedurally by a special sampling and analytical method. (pp. F-4, -5)

Elk River was indeed a tiny reactor — its net electrical output was only 22.5 megawatts, compared with the Callaway plant which was designed and built to provide 1120 megawatts and was subsequently, somehow, allowed to be uprated to 1171 megawatts. To quote further from NUREG/CR-0130:

> [Elk River had operated] for the equivalent of only 2.5 EFPY [effective full power years] when it was dismantled. Thus, the concentrations of the longer-lived radionuclides in the Elk River reactor were quite small compared to the concentrations that will be present in a large PWR [pressurized water reactor] after 30 EFPY of operation. (p. 7-16; emphasis added)

CL-51/5 I understand that Elk River is the only US commercial reactor that has been completely dismantled down to its original greenfield state. It so completely disappeared, in fact, that it is not even mentioned in the "Draft Supplement," in the tables of "permanently shutdown plants" (for example, at pp 3-27, 4-44, and Table F-1). And speaking of Appendix F, by the way: please note

CL-51/6 in Table F-2 that the Callaway plant is located in Missouri, not in Montana.

CL-51/7 It is extremely important for the NRC to level with the public about the potential hazards of the concrete debris and related rubble from the dismantled plants. The porous concrete floors get radioactively contaminated during the operation of the plant. "Radioactive corrosion products and fission products from failed fuel, which are transported throughout the station by the reactor coolant streams, are the principal contributors to the more mobile radioactive contamination on piping, floors, and pool surfaces." (NUREG/CR-0130, June 1978, p.7-15.) Radioactive products can also enter the primary cooling water from pin-hole leaks in the fuel rod cladding; from the fissioning of "tramp uranium" left on the surface of the fuel rod during the fabrication of the fuel; and out of defective welds at the top and bottom of the fuel rod. The cooling water gets contaminated, and it can and does leak onto the plant floors during various routine and accidental activities.

Radioactive fission gases that escape out of the fuel rods can also escape out of the reactor vessel. Some dissolved and entrained noble gases are released to the environment in the plant's liquid wastes Some are vented or purged into the atmosphere. And some migrate into the porous walls, the base mat (floor) or other sub-grade concrete, or the dome or roof of the buildings Radon gas, for example, once in the interstices of the concrete, can decay or break down into radioactive solid daughter products, such as lead-210 that remains radioactive for more than 200 years. Xenon isotopes that permeate the concrete break down into cesium, including Cs-135 with a half-life of 2.3 million years. And krypton, also a fission gas, breaks down into rubidium, and then into strontium. As was admitted during the years of nuclear weapons testing and fallout, cesium and strontium are notoriously radiotoxic. As daughter products of the fission gases, they could remain entrapped in the rubblized concrete, releasing radioactive particles and rays into the air for at least ten half-lives, or they could leach into the groundwater. The rate of dispersal of the radioactive and hazardous contaminants in the rubble cannot be accurately predicted. Natural phenomena, for example, could affect the susceptibility of the radiation to be released. (Regulatory Guide 1.86, p 2)

CL-51/8 Because of the potential presence of highly radioactive "hot particles" in unexpected areas throughout the plant, particularly in the reactor containment building, the rubblized materials proposed for on-site disposal could be more than just "slightly" contaminated. Contrary to the Draft Supplement, at page 1-7, for example, I think it is important to note that the rubblization of concrete could have radiological impacts as well as non-radiological ones. This is of special significance if

CL-51/9 explosives are to be used for the demolition, which will generate radioactive fugitive dust.

CL-51/10 How could the NRC, with its limited surveillance staff, make certain that each licensee would search conscientiously for contamination on the interior as well as the exterior surfaces of pipes,

CL-51/11 drain lines and ductwork? To what extent will chemical decontaminants be used? Chelating agents not only dissolve radioactive isotopes (such as corrosion products), but they keep them in solution and thus subject to widespread dispersal in the environment. (I likened this phenomenon to burying radioactive wastes with roller skates on.) If chelates are used during decommissioning, will the discharge water containing the dissolved, chelated radioactive wastes be kept isolated from the environment until the chelates are broken down?

You will perhaps be interested in the following comment by Robert Bernero, who at the time was the NRC's assistant director of material safety studies. He was quoted in a June 18, 1974, Miami Herald article as saying that "the NRC staff currently favors a policy that would require decontamination and dismantling after a unit is retired from active service. 'It doesn't make any sense just to seal up a nuclear power plant and leave it,' he says. 'An orderly society should select burial grounds for its nuclear waste. It should not expect to use power plant sites for that purpose.' " (emphasis added)

CL-51/12 I find it hard to believe that the massive structures of concrete and steel reinforcing bars found in a typical commercial power plant could be rubblized. The complexity and size of the task seem overwhelming. What technologies could be used to dismantle the base mat of the Callaway reactor building, for example: 13,400 tons of concrete plus 1,470 tons of intertwined #18 reinforcing steel

CL-51/13 bars? Do most 1,000-megawatt pressurized water reactor containment buildings have similar base

CL-51/14 mats? How can the radioactive content of this structure be accurately estimated? If rubblization

CL-51/15 were technologically achievable, where on a plant site could the wastes be stored in perpetuity? Would that be above grade or below? Would a leachate collection system be required where the rubble is stored in order to monitor for potential impacts on the groundwater?

CL-51/16 Since the NRC would no longer have regulatory authority over the site, what governmental institution or corporation would be entrusted with the long-term collection, monitoring and analyses of the groundwater samples? Who would determine if remediation were needed; who would be

CL-51/17 liable for the costs of off-site contamination or other accidents? Who would be responsible to

CL-51/18 protect against the inadvertent recycling of radioactively contaminated building rubble and soil into new construction or as fill, a possibility mentioned but basically discounted in SECY-00-0041, a letter about rubblized concrete dismantlement, from William Travers, NRC Executive Director for Operations, to the Commissioners (February 14, 2000)?

CL-51/19 3. Costs: Because of current efforts to restructure and deregulate the electric power industry, decisions about decommissioning could be driven by economic considerations, not by safety — by efforts to cut costs in order to stay competitive. I believe the electric utilities should not be relieved of liability for their decommissioned reactors

CL-51/20 Because of deregulation, the US public must rely more than ever upon the NRC to maintain its authority and responsibility to identify, assess and regulate the full range of potential, high-risk impacts of every commercial reactor — before, during and following its decommissioning The NRC is our only option.

CL-51/21 4. The threat of terrorism: With terrorism now a legitimate concern in the United States, the potential of a suicide assault on a nuclear plant --- whether the plant is operable or decommissioned --- must be assessed plant by plant, not generically.

CL-51/22 No facility exists for the permanent disposal of the nation's high-level waste (irradiated reactor fuel), and only one burial site, in Barnwell, SC, is currently available to most reactors for the rest of their wastes (their so-called "low-level" wastes, which ultimately could include the rubble and dismantled components from decommissioned plants). That one "low-level" waste facility, however, that is serving most of the nation, is expected to be closed in the near future to non-Southeast-US reactors.

Because of the lack of off-site disposal facilities, it is understandable that the NRC staff would be promoting rubblization, and on-site burial and bunkering of the rubble after decommissioning. According to the Code of Federal Regulations, Title 10, 50.82; "Decommissioning will be completed within 60 years of permanent cessation of operations." That time frame takes in all reactors in operation today. Even if off-site disposal space were available to host all the nation's decommissioning rubble, the cross-country transporting of such large volumes of waste would probably be prohibitively expensive and would no doubt be protested by the residents of the corridor communities.

CL-51/23 The transformation of the nation's abandoned nuclear power plants into de facto waste facilities is worrisome from environmental, safety and national security standpoints. To quote from President George W. Bush's State of the Union address yesterday: "Our discoveries in Afghanistan confirmed our worst fears .... And the depth of their [our enemies'] hatred is equaled by the madness of the destruction they design. We have found diagrams of American nuclear power plants and public water facilities ...." (NYT, Jan. 30, p. A22; emphasis added)

Articles published for decades have predicted today's disturbing conundrum: The Wall Street Journal on October 12, 1977 --- "Scrapping the atom; U.S. is facing problem of how to dismantle used nuclear reactors; Agency hit for not having long-term burial plan; Tombs and mothballing; Can a big plant be cut up?" The Miami Herald on June 18, 1979 --- "Nuclear cleanup: Power plants generate a long-term dilemma." The Progressive in December 1977 --- "A Landscape of Nuclear Tombs: What will we do with deactivated reactors, and who will pay for doing it?" The Interdependent, of the United Nations Assn., September 1977 --- "How do you get rid of a dead nuclear plant?" Technology Review of MIT, June/July 1979 --- "Decommissioning Commercial Nuclear Reactors: Nuclear power plants do not last forever. In the United States some large commercial reactors are scheduled for decommissioning within the next 20 years and many others will follow. But the process and its costs are still subject to uncertainties."

The more I learn about nuclear power's radioactive waste, the more I wonder if and when its proponents will admit that no safe solution may ever be found.

5. Concerns --- from the past and into the future:

CL-51/24 Surely the most surprising and disturbing pronouncement in the "Draft Supplement" appears on page 1-7: "The decommissioning process continues until the licensee requests termination of the license and demonstrates that radioactive material has been removed to levels that permit termination of the NRC license. Once the NRC determines that the decommissioning is completed,

the license is terminated. At that point, the NRC no longer has regulatory authority over the site, and the owner of the site is no longer subject to NRC regulations." (p 1-7; emphasis added)

CL-51/25 The federal government (the US Atomic Energy Commission and its progeny) initiated and funded the promotion of nuclear power. How, then, can it walk away from the long-term surveillance of the plant sites, even though it will have declared the residual radioactive contamination to be at permissible levels? As happened here in St. Louis at the Mallinckrodt Chemical Works, buildings and land contaminated in the years 1942-1957 were cleaned up to contaminant levels declared to be safe for unrestricted use by the public. Not many years later, however, some of those same buildings and open spaces were found to require major additional remediation because radiation standards had became more stringent, reflecting a greater understanding of the health hazards of radiation. Monitoring equipment also had become somewhat more sophisticated.

CL-50126 Concerns and unknowns about the decommissioning of nuclear power plants started many years ago. In January 1975, for example, Sheldon Meyers, as director of the EPA's Office of Federal Activities, included the following observation about the Callaway plant's draft environmental statement: "The section in the draft statement regarding decommissioning of the plant indicates the plant site may require long term surveillance after being shut down. This section should be expanded to provide an estimate of the length of the surveillance time and the length of time the land must stand unproductive. It should also identify who will be responsible for the surveillance activity and who will incur the cost." (published by the NRC in March 1975; p. A12, emphasis added) Why has no one answered these concerns prior to now? Or are there no credible answers?

6. Some concluding comments:

CL-51/27 I guess one of the reasons I wanted to comment on this "Draft Supplement" is because it so dramatically reflects the backward world of Alice in Wonderland and of commercial nuclear power: "Sentence first --- verdict afterwards." **Make a permanent mess first --- try to figure it out afterwards.**

Because I have been studying and opposing nuclear power for 27 years, it should not surprise you that my dream would be for America's nuclear electric utilities to expedite the shutdown of all their reactors. The questions raised above --- and I have many more --- are not meant to be hostile and are certainly not meant to suggest that decommissioning a reactor should be made more burdensome, dangerous or costly than its continued operation. On the contrary.

The longer the reactor operates, the greater will be (1) the levels of radiation to which the demolition workers will be exposed, (2) the volumes of radioactive waste generated and stockpiled; and (3) the risk of a major radiological emergency. And now I guess we should add, the greater will be the potential for acts of radiological sabotage or terrorism (as per 10 CFR Part 73).

CL-51/28 The reactors must be decommissioned in a prudent manner that will seek to protect the health and safety of the workers and the public. In the United States we must rely on the Nuclear Regulatory Commission for its knowledge, guidance and surveillance. I hope that trust is warranted.

Sincerely,
Kay Drey

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RE: Draft Supplement 1 to the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586

Dear Madam or Sir:

CL-52/1 The following comments on Draft Supplement 1 to NUREG-0586 are submitted on behalf of the Pennsylvania-based Environmental Coalition on Nuclear Power (ECNP) We concur with and adopt by reference the comments of the Nuclear Information and Resource Service, submitted by Paul Gunter

In our state, decommissioning of the Shippingport reactor, Saxton and Waltz Mills experimental reactors, and the Quehanna industrial nuclear facility and former reactor have occurred. The old Molycorp thorium processing facility near Washington PA is currently in the early stages of decommissioning. The Peach Bottom Unit 1 and Three Mile Island Unit 2 reactors have been awaiting decommissioning for more than twenty years. The nine other operating commercial reactors will ultimately also require decommissioning upon expiration of their operating licenses, as will numerous other industrial and research nuclear facilities

CL-52/2 This Supplement to the Final GEIS fails to address decommissioning of nuclear facilities other than commercial reactors. It therefore fails to take into account the subject of NUREG-0586: the environmental impacts of decommissioning nuclear facilities -- all nuclear facilities
CL-52/3 Moreover, in order to assess the full environmental impacts of each facility's decommissioning, it is necessary to take into account its impacts in concert with the impacts of all other nuclear facilities that contribute additive radiological and other contamination to the biologic system.

Pennsylvania remains the Host State for "disposal" of the "low-level" radioactive wastes generated in the Appalachian States Regional Compact, despite failure of the contractor, Chem-Nuclear Systems, to site a LLRW disposal facility. The Department of Environmental Protection recently adopted expanded permissible disposal of radioactive materials at municipal landfills Pennsylvania has not yet obtained Agreement State status. Our law provides for regulation by the state of radioactive materials and wastes if NRC releases them from its regulatory control.

Moreover, the Pennsylvania Constitution provides that the people of the Commonwealth have the right to a clean, livable environment for themselves and for their descendants. Thus, for these several reasons, the decommissioning decisions of the NRC are of substantial concern to residents of this Commonwealth, where the nation's worst commercial nuclear power accident has not been forgotten.

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Page 2 (ECNP Comments on Supplement 1 to NUREG-0596)

CL-52/4 A fundamental obligation of the NRC is to protect the health and safety of the public and the quality of the environment – the general welfare – from radiation-related harm Failure of NRC regulatory control to require that the radioactively-contaminated materials and wastes remaining at a reactor site post-closure will not be released into the biosystem -- as described in this document and in NRC regulations – constitutes a serious violation of the provisions of the Atomic Energy Act, as amended, Chapter 1, and of the National Environmental Policy Act. Any such decisions by the NRC are therefore arbitrary and capricious, and contrary to both the AEA and NEPA.

CL-52/5 In practice, in the decommissioning of reactors the NRC's Decommissioning Rule has both allowed release into the environment of radioactive materials and wastes and disallowed members of the affected public from an opportunity for adjudicatory hearings in advance of
CL-52/6 decommissioning activities. These denials of access to the judicial system are currently being extended in the form of NRC's proposed Rule, "Change of Adjudicatory Process," compounding
CL-52/7 the illegalities inherent in this Supplement. Increasingly, no forum is available to citizens in which to exercise their rights under the Federal Administrative Procedure Act. This is yet another reason that this Supplement is unacceptable and should be withdrawn.

CL-52/8 Furthermore, a "generic" EIS cannot provide adequate assurance that the unique situation and condition of each nuclear facility have been fully analyzed and accounted for Each plant is unique; each plant's impacts must be examined in relationship with all other nuclear facilities that affect the condition of the environment. In the real world environment, radioactive and hazardous materials are not necessarily static, they move; they interact with other materials; they accumulate; they may have their adverse impacts at or near their site of origin or far away from it. The totality of those impacts, upon both human and non-human inhabitants of the biosphere, must be incorporated into an environmental analysis and accounted for fully also for adversely affected individuals in any cost-benefit analysis. All issues should be examined at each plant.

CL-52/9 Exclusion of licensee decisions and actions prior to certification that plant operations have permanently ceased means that the Supplement fails to consider factors that may have negative impacts on the quality of the decommissioning activities and on minimization of the quantity and condition of the wastes resultant from the handling and removal of radioactive
CL-52/10 materials from plant structures, systems, and components. Exclusion from consideration of the fate of contaminants post-license termination also renders this Supplement insufficient and not
CL-52/11 acceptable to account for the environmental impacts of decommissioning. In effect, the NRC plans to wash its hands of any responsibility for the long term damage that may result from reactor decommissioning (and that of all other nuclear licensees' facilities and activities. It is the state or municipality and community in which a plant is located and the residents that will be required to bear the burdens of injury and costs of further clean-up after the NRC has vanished

CL-52/12 Underlying these failures of the agency's responsibility for the facilities and activities that it had sanctioned by granting an operating license and through its regulatory actions and inactions is the failure of the NRC – and of EPA – to set radiation protection standards that recognize the

CL-52/13 great varieties of adverse effects of low-level radiation on human beings. Affected populations are composed of many individuals who are not close to being that "standard man" in whom the
CL-52/14 NRC places so much faith. The trans-solutional problem of complete site decontamination is here evident: the NRC does not require the return of a decommissioned facility and site to its pre-
CL-52/15 operational radiation level. Because the costs of sequestration ("disposal") of wastes is high, and deemed to be a "burden" for the licensee, the agency continues its endeavor to allow massive deregulation -- release, recycle, and re-use -- of radioactively-contaminated materials and wastes and their entry into the "free market" for resale and reuse in a host of consumer products

CL-52/16 Subsequent uses of these "slightly contaminated" materials and wastes -- in roadbeds, or construction, consumer products, or other objects individuals may contact -- will each add to the
CL-52/17 radiation doses received without knowledge or consent of the recipient. These exposures from multiple unmonitored, unlabeled, uncontrolled sources are in no way accounted for, but they are additive and cumulative for that individual. They violate the fundamental tenet of radiation protection. *viz.*, that the recipient of a radiation dose that is in addition to naturally-occurring background exposures should receive a benefit equal to or greater than the risk incurred. The
CL-52/18 NRC should not permit radioactive materials or wastes to be released into the environment. That is the basic message, the rightful demand of all those who will be affected negatively by releases.

CL-52/19 As techniques of research and analysis in complex biological systems improves, it is becoming more apparent to thoughtful, careful scientists and regulators that it is imperative to
CL-52/20 include the impacts of low-level radiation exposures on all forms of living beings, not merely on humans But it is also increasingly important to incorporate into radiation protection standards
CL-52/21 low-dose effects. An EIS must also consider the effects of the synergies between and among ionizing radiation and the multitude of hazardous materials also released into the environment.

CL-52/22 • Instead, the NRC has chosen to abandon its former regulatory philosophy (defense in depth and redundancy of safeguards) in favor of the far less restrictive and less protective
CL-52/23 approach (performance-based and risk-informed). The relaxation of regulatory control is also evident throughout this draft volume. Decommissioning is the final chapter for the agency in its relationship to a given site and license. For people, the community, municipality, and state, it is
CL-52/24 the beginning of an essentially endless association with a nuclear site that may continue to endanger their lives and environment. The NRC has a statutory obligation to do a better job

CL-52/25 These admonitions have been presented to the NRC repeatedly in many Commission and staff meetings, agency panels and workshops, public hearings, legal proceedings. Until they are heard, adopted, and adhered to, this Supplement, the Final GEIS on Decommissioning of Nuclear Facilities and the Decommissioning Rule and NRC's radiation protection standards will continue to be inadequate and in violation of the applicable laws, including but not limited to the AEA, NEPA, and APA cited above. All four should be withdrawn and entirely rewritten to provide true protection from radiological contaminations.

Sincerely,

Judith D. Johnsrud

11/9/01
66 FR 57721
(53)

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Comments of the San Luis Obispo Mothers for Peace
On the NRC Draft GEIS on Decommissioning
Nuclear Power Plants

The San Luis Obispo Mothers for Peace (SLOMFP) is aware that the comment period ended on January 30, 2002. Regardless, it is compelled to submit the following comments on the draft GEIS and observations from transcripts of NRC meetings.

Comments:

1. The SLOMFP echos the statement of Sara Barczak representing Georgians for Clean Energy at the Georgia meeting regarding the following:

CL-53/1 a. SLOMFP is troubled by the inability of the public to have adequate access to the NRC website. Prior to the censorship, the existence of the website had been viewed as a giant step forward in communication between the public and the Commission.

CL-53/2 b. A reduced security force at a decommissioned nuclear plant increases the threat of terrorism. A thorough amended review of necessary security measures during decommissioning of nuclear facilities [due to 9/11] must be compiled by the NRC and added to the supplement.

CL-53/3 c. Existing nuclear power plants are not generically designed and, therefore, a generic program for decommissioning is completely inadequate to protect public health and safety. New and site specific Environmental Impact Statements must be required to address how different power plants should be decommissioned (from the standpoint of historical operations, age-related degradation, salt water intrusionâ€¦) in the safest manner possible for each location. In the case of Diablo Canyon, new seismic information should be sought to assure the public that the process would not increase the dangers of an already dangerously sited nuclear plant.

CL-53/4 d. When California's nuclear plants received licenses for construction and operation, promises were made that high-level radioactive waste would be removed within a few years. Every deadline to open a safe and permanent repository for high-level radioactive waste has been missed. Therefore, the issue has grown; we are not accessing only the decommissioning of a power plant but dealing also with storage and transportation of lethal substances unforeseen when licenses were granted.

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Observations:

CL-53/5 SLOMFP reviewed the four transcripts from the four meetings held by the NRC on the draft GEIS and was appalled by the waste of taxpayer dollars. The NRC gave 10 individuals representing 10 different environmental groups only 5 minutes each to express their concerns. Furthermore, it is outrageous that the NRC located these proceedings hundreds of miles from the affected communities - and those who are most concerned about the decommissioning of nuclear plants. There is no doubt that the lack of public participation was due to the location of the meetings, not to lack of public concern. Mr. Cameron has heard this concern expressed in the past.

CL-53/6 Both the NRC and taxpayers would have been better served by sending the draft GEIS to all individuals and groups that have demonstrated interest in safety issues at nuclear plants over the last two decades, with a questionnaire, a comment section, and a self-addressed, stamped envelope.

Sincerely,

Rochelle Becker February 2, 2002
San Luis Obispo Mothers for Peace

Cc: Senator Dianne Feinstein
Senator Barbara Boxer

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9 SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U S Nuclear Regulatory Commission, and mailing address.)*

Same as 8 above

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This document is a final supplement to the NRC Generic Environmental Impact Sta tement on Decommissioning of Nuclear Facilities (GEIS), issued in 1988 as NUREG-0586. This supplement was prepared because of the technological advances in decommissioning operations, experience gained by licensees, and changes made to NRC regulations since the 1988 GEIS. It is intended to be used to evaluate environmental impacts during the decommissio ning of nuclear power reactors as residual radioactivity at the site is reduced to levels that allow for termination of th e NRC license. This supplement addresses only the decommissioning of nuclear power reactors licensed by the NRC. It updates the sections of the 1988 GEIS relating to pressurized water reactors, boiling water reactors, and multiple reactor statio ns. It goes beyond the 1988 GEIS to consider high-temperature gas-cooled reactors and the fast breeder reactors. This docum ent can be considered a stand-alone document and the environmental impacts described herein supercede those describ ed in the 1988 GEIS.

The scope of this supplement is based on the decommissioning activities perform ed to remove radioactive materials from structures, systems, and components from the time that the licensee certifies t hat they have permanently ceased power operations until the license is terminated. An evaluation process was develope d to determine environmental impacts from the specific activities that occur during reactor decommissioning, based on data fr om site visits and from licensees at reactor facilities being decommissioned. The data obtained from the sites were analyze d and then evaluated against a list of variables that defined the parameters for facilities that are currently operating but whi ch one day will be decommissioned. This evaluation resulted in a range of impacts for each environmental issue that may be used for comparison by licensees that are or will be decommissioning their facilities. The staff has considered public c omments received during scoping and on the draft in preparation of this final supplement.

12 KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

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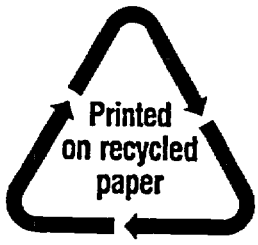

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August 12, 2016

Via U.S. Mail and Email

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Subject: Environmental Review Scoping Comments for the San Onofre Nuclear Generating Station Units 2 & 3 Post-Shutdown Decommissioning Project

Dear Ms. Herzog:

On behalf of the City of Laguna Beach ("City"), this letter provides preliminary scoping comments on the Notice of Preparation ("NOP") of a draft environmental impact report ("DEIR") for the San Onofre Nuclear Generating Station Units 2 & 3 Post-Shutdown Decommissioning Project ("Project).

A portion of the proposed Project is located within the jurisdiction of the California State Lands Commission ("SLC"), on land within the Marine Corps Base Camp Pendleton, three (3) miles south of the community of San Clemente, west of Interstate 5 (I-5) and adjacent to the Pacific Ocean in northern San Diego County. The Project consists of the following four phases:

- Phase 1 – Decontamination and Dismantlement (2017-2025);
- Phase 2 – Partial Site Restoration and Offshore Conduit Disposition (2020-2035);
- Phase 3 – ISFSI Operation and Maintenance (2035-2049); and
- Phase 4 – Phase 4: ISFSI Removal and Final Site Restoration (2049-2051).

According to the NOP, the Project has the potential to cause a number of significant short-term, long-term and cumulative environmental impacts. The SLC, as the lead agency under the California Environmental Quality Act ("CEQA"),[1] has correctly determined that an EIR is required. As a responsible agency under CEQA and a cooperating agency under the National Environmental Policy Act ("NEPA"),[2] the City respectfully submits the following scoping comments.

[1] Pub. Res. Code §§ 21000 *et seq.*; *see also* Cal. Code Regs., tit. 14, ch. 3, § 15000 et seq. ("CEQA Guidelines").

[2] 42 USC §§ 4341 et seq.; *see also* Council on Environmental Quality ("CEQ") NEPA Regulations, contained in 40 C.F.R. Parts 1500-1508.

1. Consultation with the City concerning this Project's traffic, recreation, and open space impacts is required.

On July 12, 2016, the City of Laguna Beach became aware of the Project when City staff received the NOP. Section 15083 of the CEQA Guidelines encourages lead agencies to consult with other interested parties early in the environmental review process. The NOP solicits input from such interested parties, including the City. The City hereby submits these comments within the period requested in the NOP.

Because the Project is one of regional and areawide significance, a scoping meeting is required pursuant to Public Resources Code, section 21083.9(a)(2). Further, because the City exercises authority over resources that may be affected by the Project, including transportation facilities within its jurisdiction that could be affected, the SLC is required to consult with the City concerning potential effects to those resources.[3] We hereby request consultation concerning the Project's impacts to all potentially impacted transportation facilities within the City and to the area's beaches, adjacent ocean resources, open space and wildlife habitat resources.

Pursuant to Public Resources Code, section 21092.2, we also request notice of all stages of environmental review for the Project and any and all actions that the SLC proposes to take on this Project. Please send any and all notices via email to the following persons:

a) Mike Phillips, Environmental Specialist, at mphillips@lagunabeachcity.net;
b) Christa Johnson, Assistant City Manager, cjohnson@lagunabeachcity.net; and
c) Jason Holder, outside legal counsel retained for this matter, jason@holderecolaw.com.

Additionally, please send paper copies of notice documents solely to the undersigned.

2. Because the Nuclear Regulatory Commission Must Ultimately Approve the Decommissioning Project, There is a Federal Nexus Triggering the Need for a Joint EIR/EIS.

The Project is subject to oversight and review by the U.S. Nuclear Regulatory Commission ("NRC") under Title 10 of the Code of Federal Regulation, Part 50, Section 50.59 (10 CFR 50.59), applying to design changes, tests and experiments carried out at licensed nuclear facilities. The Project involves design changes to SONGS that will ultimately require NRC approval. For example, the NRC will have to approve SCE's license termination plan. Arguably, the Project also requires a license amendment.[4] When it fulfills its statutory duties,

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[3] PRC, § 21092.4; CEQA Guidelines, § 15086(a).

[4] For example, the NRC has not approved the design of the Holtec UMAX system that SCE has proposed for the ISFSI, and that partially subterranean design may reduce radiation safety. The proposed changes and alterations to the SONGS facility's design associated with decommissioning, including the Spent Fuel Pool Island Project ("SFPI") and the expanded and modified Independent Spent Fuel Storage Installation ("ISFSI"), require a license amendment because these changes were never addressed in the SONGS Final Safety Analysis Report ("FSAR") or any of the updates to the FSAR. *See* 10 C.F.R. §§ 50.56, 50.59(c). In addition, the Updated FSAR also does not consider the effects of sea level rise caused by

NRC will be the federal lead agency for review of the Project pursuant to NEPA. To adequately address the environmental impacts of the whole of the Project, SLC and NRC should jointly prepare an EIR/EIS for the Project. (*See* CEQA Guidelines, §§ 15006(j), 15170, 15220, 15222.) The CEQA Guidelines are clear:

> If a Lead Agency finds that an [Environmental Impact Statement ("EIS")] or Finding of No Significant Impact for a project would not be prepared by the federal agency by the time when the Lead Agency will need to consider an EIR or Negative Declaration, the Lead Agency should try to prepare a combined EIR-EIS or Negative Declaration-Finding of No Significant Impact. To avoid the need for the federal agency to prepare a separate document for the same project, the Lead Agency must involve the federal agency in the preparation of the joint document.
>
> This involvement is necessary because federal law generally prohibits a federal agency from using an EIR prepared by a state agency unless the federal agency was involved in the preparation of the document.[5]

Similarly, the CEQA regulations for implementing NEPA encourage cooperation with state and local agencies in an effort to reduce duplication in the NEPA process.[6]

In the required Draft EIR/Environmental Impact Statement ("DEIR/S"), NRC should fully address the radiological safety concerns that are purportedly preempted by federal law.[7] This is the elephant in the room that can no longer be concealed or brushed aside under a blanket claim of federal preemption. The public's interests and legal rights to understand the full environmental impacts of the decommissioning process will be circumvented if radiological safety issues are not addressed in the DEIR/S analysis.

When conducting this analysis, NRC will have to analyze site-specific radiological safety concerns.[8] The NRC's past "generic" EIS documents do not satisfy the requirement for detailed impact analysis. These boilerplate analyses do not address the specific circumstances that make SONGS decommissioning particularly worrisome to neighboring stakeholders, including the City's residents, businesses, and visitors. In *Natural Resources Defense Council v. Morton*, the

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climate change and associated reductions of radiation safety at SONGS. *See* SONGS FSAR, Hydrologic Engineering Chapter, available at: http://www.nrc.gov/docs/ML1114/ML11145A032.pdf.

[5] CEQA Guidelines, § 15222; *see also id* at §§ 15226, 15228.

[6] 40 CFR § 1506.2.

[7] As discussed further below, when recently approving the ISFSI, the California Coastal Commission did not analyze the "radiological safety" impacts of spent fuel storage casks based on a claim of federal preemption. (*See* Addendum to CCC Staff Report, dated Oct. 5, 2015 (CCC ISFSI Addendum), pp. 10-11, available at: http://documents.coastal.ca.gov/reports/2015/10/Tu14a-10-2015.pdf.) Comments made to the Coastal Commission and included in the CCC ISFSI Addendum are hereby incorporated herein by reference.

[8] The 2002 Supplement to NRC's *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NUREG-0586 Supplement 1) (the "Supplement") does not address storing spent fuel in a seismically active marine environment such as that characterizing the Project site. *See generally* Supplement, available at: http://www.nrc.gov/docs/ML0234/ML023470304.pdf.

Bureau of Land Management attempted to grant individual licenses, relying solely on a program EIS for the entire licensing program.[9] The court found that the program EIS failed to provide the decisionmaker with information regarding the specific and particular consequences of the action.[10] A similar finding was made by the court in *Natural Resources Defense Council v. Administrator*: "As a general rule, the preparation of a [program EIS] does not obviate the necessity of preparing a particularized impact statement for individual major federal actions that are components of a subject program."[11] Several courts have confirmed that site-specific environmental analyses are required before a lead agency can dispense with environmental review.[12]

Here, the NRC's Supplement generically analyzing the impacts of decommissioning identified two categories of impacts to be site-specific: threatened and endangered species and environmental justice. These issues must be addressed in the DEIR/S for this Project. It also identified four categories of impacts that it termed "conditionally site-specific":

- Land use involving offsite areas to support decommissioning activities
- Aquatic ecology for activities beyond the operational area
- Terrestrial ecology for activities beyond the operational area
- Cultural and historic resources for activities beyond the operational area with no current cultural and historic resource survey.[13]

The Supplement also concluded that environmental justice impacts must be determined on a site-specific basis.[14] The DEIR/S required for this Project must also address each of these site-specific impact categories and any others implicated by the proposed actions.

The NRC's Supplement also acknowledged site-specific analysis would be required when circumstances for decommissioning are unusual. Additionally, the NRC's more recent *Generic EIS for Continued Storage of Spent Nuclear Fuel* acknowledged that prior studies did not consider seismic risks at western nuclear reactors including San Onofre.[15] Here, because the Project site is located in a seismically active area and is immediately adjacent to a sensitive

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[9] *Natural Resources Defense Council v. Morton* (1974) 388 F.Supp. 829.

[10] *Id.* at 838.

[11] *Natural Resources Defense Council v. Administrator* (1978) 451 F.Supp. 1245, 1258.

[12] The Ninth Circuit of the U.S. Court of Appeals, which includes California, adopted similar reasoning. (*See, Natural Resources Defense Council v. Hodel* (9th Cir. 1987) 819 F.2d 927, 928 (refers to *NRDC v. Morton, supra*, as "the leading case in this area"); *City of Tenakee Springs v. Block* (9th Cir. 1985) 778 F.2d 1402, 1407 ("[w]here there are large-scale plans for regional development, NEPA requires both a programmatic and a site-specific EIS"); *Oregon Environmental Council v. Kunzman* (9th Cir. 1983) 714 F.2d 901 (Oregon Department of Agriculture ordered to prepare site-specific EIS for herbicide spraying program and had erred in relying on earlier program EIS).

[13] Supplement, p. xvi.

[14] *Id.* at p. 4-65.

[15] *See NRC Generic EIS for Continued Storage of Spent Nuclear Fuel* (NUREG–2157), pp. xlii, F-10 fn. 5, available at: http://www.nrc.gov/docs/ML1419/ML14196A105.pdf.

marine ecosystem, the site-specific analysis must consider the associated risks of radiological contamination.

In September 2014, SCE submitted a post-shutdown decommissioning activities report ("PSDAR"), the licensee's required analysis of the extent to which the Project's impacts are covered by the analysis in NRC's Supplement.[16] In its PSDAR, SCE asserted that "[b]ased on current plans, no decommissioning activities unique to the site have been identified and no activities or environmental impacts outside the bounds considered in the GEIS have been identified."[17] The City strenuously disagrees with this conclusion and requests that the NRC conduct an independent assessment of the extent to which the environmental impacts of the Project require site-specific analysis in the DEIR/S, especially given the Project's unique environmental setting.

When engaging in further consultation with the City and other concerned stakeholders, please confirm that the SLC and NRC will prepare a joint DEIR/S that will address radiological safety issues and will support the analysis with substantial evidence.

3. The DEIR/S Must Analyze the Impacts of the Whole Project.

Both CEQA and NEPA require lead agencies to analyze the impacts of the "whole of the project."[18] Here, the whole of the project is the entire decommissioning process. The NRC defines "decommission" in 10 CFR 50.2 as a process "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license." This process necessarily includes each step following the decision to cease operations to the termination of the NRC license. Indeed, in its PSDAR, SCE admits that the decommissioning process necessarily includes Spent Nuclear Fuel Management Periods.[19]

Unfortunately, there has already been a pattern of piecemealed review and approval of various smaller "projects" that are in actuality inextricably connected to SONGS decommissioning. For example, the CPUC approved SCE's decommissioning cost estimate in December 2014. This decision was not preceded by any environmental impact analysis. Then,

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[16] *See* SCE's PSDAR for SONGS, available at: http://www.nrc.gov/docs/ML1426/ML14269A033.pdf.

[17] *See id.* at p. 8. The PSDAR is ostensibly supported by SCE's Environmental Impact Evaluation ("EIE"). *See* PSDAR for SONGS, p. 18. Like the PSDAR, the EIE concluded that "SCE's review confirmed that the anticipated or potential impacts are within the bounds of the generic impacts that the NRC described in the decommissioning GEIS." *See* EIE, p. ES-3, available at: https://www.songscommunity.com/docs/eieaug1.pdf. The EIE, however, provides only a cursory review of potential environmental impacts from the Project applicant's undeniable self-interested perspective, and that review relies on multiple unsupported assumptions. An independent review of Project impacts, conducted by state and federal agencies, is required.

[18] *See* CEQA Guidelines § 15378(a) [a "project" means the whole of an action that may cause either a direct or reasonably foreseeable indirect physical change in the environment]; *see also McQueen v. Board of Directors of the Midpeninsula Regional Open Space District* (1988) 202 Cal.App.3d 1136, 1143; *see also Thomas v. Peterson*, 753 F.2d 754 (9th Cit. 1985); *see also Save Yaak Comm. v. Block*, 840 F.2d 714 (9th Cir. 1988).

[19] *See* SCE's PSDAR for SONGS, p. 8.

in 2015, the Coastal Commission approved the SFPI and several months later approved the ISFSI for SONGS. These components of the overall decommissioning project should have been analyzed together in a single EIR/S. Instead, their individual effects have been minimized by chopping up the larger project into smaller pieces.

The DEIR/S must analyze the impacts of all phases of decommissioning, including the SFPI and the ISFSI. Again, the public's interests and legal rights to understand the full environmental impacts of the SONGS decommissioning process will be thwarted if the DEIR/S analysis does not consider all necessary aspects of decommissioning.

4. The SLC Has Broad Authority to Analyze Radiological Safety Issues and to Regulate Non-Radioactive Health and Safety Issues.

As noted above, the City recognizes that some of the issues identified above may be considered radiologic safety issues that could be preempted under federal law. The Coastal Commission did not analyze many safety issues raised by commenters based on a claim of federal preemption. Specifically, it asserted:

> Without assessing the validity of these concerns, the Commission staff notes that the consequences of any failure, malfunction, or defects in the proposed cooling system are related to radiological safety, which is under the exclusive jurisdiction of the federal [NRC]. [20]

While a state agency may be prevented from imposing restrictions on nuclear power plants based on federal preemption, nothing prevents the state agency from analyzing radiological safety issues and recommending restrictions (i.e., mitigation measures and alternatives) that the NRC can and should adopt.

Further, while both federal and state regulatory agencies have oversight over nuclear power facilities, it is well-settled that state regulators maintain their traditional authority to regulate non-radioactive health and safety issues, including land-use, environmental, and economic concerns associated with nuclear power generation.[21] SLC regulatory action for this Project is not preempted when motivated by non-preempted concerns and when it neither conflicts with nor frustrates the Congressional purpose of the Atomic Energy Act ("AEA").[22] Thus, even if the NRC does not presently assume its proper role as co-lead agency for this Project, for purposes of performing the analysis of radiological safety impacts, SCE must satisfy its duty to analyze non-radioactive health and safety issues.

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[20] CCC ISFSI Addendum, pp. 10-11.

[21] *Pacific Gas & Electric Co. v. State Energy Res. Conservation & Dev. Comm'n*, 461 U.S. 190, 205, 212 (1983) (*PG&E*).

[22] *Id.* at 220-223.

5. The DEIR/S must adequately analyze the Project's potentially significant impacts to marine life, air and water quality, City transportation and recreation facilities, and it must consider secondary impacts and analyze a reasonable range of Project alternatives.

The DEIR/S must include thorough analysis of the following potentially significant environmental impacts that could affect the City and its residents:

a) Demolition impacts – Impacts to air and ocean water quality during demolition of Units 2 & 3 reactor structures

b) Damage to roadways and other infrastructure caused by the transportation of structures, systems, and components ("SSCs"), hazardous materials, and any contaminated soils and water[23]

c) Impacts to groundwater supplies caused by potential radiation contamination and contamination that may have already occurred

d) Impacts associated with disposing of spent fuel pool water – Discussion of how contaminated water from the spent fuel cooling pool is disposed of after rods are removed

e) Impacts to special status species

The NOP acknowledges that four special-status reptiles have the potential to occur within the offshore Project area and that several other special-status species have the potential to occur within the onshore Project site.[24]

f) Impacts to marine life if cooling system intake and discharge conduits, and the fish return system conduit are left partially or completely in place

g) Seismic-related hazards associated with the storage of spent nuclear fuel storage casks for at least 20 years and quite possibly longer[25]

h) Impacts that may occur if the dry storage casks in the ISFSI crack and release radiological contamination

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[23] SCE's EIE states that decommissioning will involve the transportation of millions of cubic feet of radioactive and nonradioactive waste. *See* EIE, p. ES-16. It then explains that "SCE plans to ship the bulk of radiological waste by rail; however, there may be times when truck shipments will be required." *Ibid.*

[24] *See* NOP, Attachment, p. 19.

[25] In a June 2015 staff report, Coastal Commission staff noted that "Though SCE seeks temporary development authorization until 2051, there is no assurance that SCE will be able to transfer the spent fuel to DOE custody and decommission the proposed facility as planned by 2051, complicating the analysis of the project's exposure to geologic hazards and its potential to adversely affect coastal resources. The uncertain duration of the ISFSI's presence at the proposed location also has implications for SCE's alternatives analysis…." (CCC ISFSI Addendum, Staff Report, p. 20.)

i) Cumulative impacts – Please address the potential impacts to the surrounding environment (earth, land, sea, air) of short-term, long-term, and indefinite storage of spent nuclear fuel on the Project site.

j) Mitigation Measures – please include measures to reduce or eliminate all potentially significant Project impacts

If the SLC concludes that mitigation measures are within the responsibility and jurisdiction of another agency, such as the NRC, then it must recommend that those measures "can and should" be adopted by that agency.

k) Weekday and peak traffic impacts on all surrounding roads and intersections caused by transporting SSCs, spent nuclear fuel storage casks, and any contaminated soils and water

l) Weekend and off-peak traffic impacts on Highway 1 and SR 133 (Laguna Canyon Road)

m) Impacts on the City's recreation facilities including its beaches and shoreline caused by the Project[26]

n) Public service impacts to the City's residents, including any reduced police, fire, or ambulance services or increased response times caused by Project activities[27]

o) Secondary impacts caused by increased Project traffic, including air quality impacts and increased greenhouse gas (GHG) emissions

p) Consideration of a reasonable range of Project alternatives, including options for removal of the dry storage casks from the Project site and to either a Consolidated Interim Storage ("CIS") location or to a permanent spent nuclear fuel storage facility

Please include all technical support for the above analyses in appendices to the DEIR/S.

* * *

We request that the SLC and NRC provide a joint environmental impact analysis that considers the Project in its entirety. The requested DEIR/S must enable fulfillment of duties to protect communities and natural resources by considering and minimizing all potentially

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[26] The NOP indicates that SLC staff has concluded that the Project would not have any potentially significant impacts to recreation. (NOP, p. 18.) This conclusion is incorrect and is unsupported by substantial evidence. Because the Project is located adjacent to the Pacific Ocean and near several state beaches, it has the potential to impact these recreation facilities. Those impacts must be analyzed in the DEIR/S and mitigated to the extent feasible.

[27] Again, the NOP indicates that SLC staff has concluded that the Project would not have any potentially significant impacts to public services. (NOP, p. 18.) This conclusion is similarly incorrect and is also unsupported by substantial evidence.

significant impacts of the Project, including those that have heretofore been disregarded as the exclusive province of the federal government.

If you have any questions concerning these comments, please contact Michael Phillips at (949) 497-0390 and at mphillips@lagunabeachcity.net.

Sincerely,

John Pietig
City Manager

cc: (via email only)
City Council
Christa Johnson, Assistant City Manager
David Shissler, Director of Water Quality
Mike Phillips, Environmental Specialist
Jason Holder, outside legal counsel

EXHIBIT 37

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 5, 2018

Ms. Cynthia Herzog
Senior Environmental Scientist
California State Lands Commission
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825

SUBJECT: ADDITIONAL INFORMATION REGARDING THE CALIFORNIA STATE LANDS COMMISSION RESPONSE TO THE CITY OF LAGUNA BEACH ENVIRONMENTAL REVIEW PUBLIC SCOPING COMMENTS FOR THE SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3, DECOMMISSIONING PROJECT

Dear Ms. Herzog:

Thank you for the opportunity to review the Draft Environmental Impact Report (EIR) prepared by the California State Lands Commission (CSLC) in regard to the San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS), Decommissioning Project, which was released on June 27, 2018. The operator of SONGS, Southern California Edison (SCE), holds facility operating licenses from the U.S. Nuclear Regulatory Commission (NRC). As noted in your correspondence, the CSLC, as the lead agency under the California Environmental Quality Act (CEQA), has determined that an EIR is required for the SONGS decommissioning project, and is currently soliciting feedback on the Draft EIR. While I understand that the public comment period on the Draft EIR closed on August 28, 2018, I hope that this additional information from the NRC staff will be useful to the CSLC as you move forward with the CEQA process.

In Appendix C of the Draft EIR, the CSLC has dispositioned public scoping comments received as a result of the Notice of Preparation issued on June 12, 2016, regarding the scope and content of the EIR for the SONGS decommissioning project. One of the comment letters, dated August 12, 2016, was received from the City of Laguna Beach, California (the City) and addressed to both the CSLC and the NRC. This letter included numerous comments on the ongoing decommissioning activities at SONGS, and made several requests of the CSLC and the NRC with respect to environmental oversight during this process.

In order to facilitate your ongoing review and finalization of the Draft EIR for the SONGS decommissioning project, in the attachment to this letter, the NRC staff has provided some additional information in support of your disposition of the City's comments. The City's letter, as well as other publicly available documents referenced in the attachment, can be found in the NRC's document repository at Agencywide Documents Access and Management System (ADAMS). You may obtain publicly available documents online in the ADAMS Public Documents collection at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search."

If you have any additional questions or clarifications regarding the information provided in the attachment to this letter, please contact the SONGS decommissioning project manager, Marlayna Vaaler, at 301-415-3178, or via email at marlayna.vaaler@nrc.gov.

Sincerely,

/RA/

Bruce A. Watson, CHP, Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety and Safeguards

Docket Nos. 50-361 and 50-362

Attachment: Supplemental Information Regarding the CSLC Responses to the City of Laguna Beach's Comments on the Scope and Content of the EIR for the SONGS Decommissioning Project

cc: electronic Distribution via Listserv

Additional hard copies to:

Mr. Thomas J. Palmisano
Vice President, Chief Nuclear Officer
Southern California Edison Co.
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

Mr. John Pietig
City Manager
City of Laguna Beach
505 Forest Avenue
Laguna Beach, CA 92651

Supplemental Information Regarding the CSLC Responses to the City of Laguna Beach's Comments on the Scope and Content of the EIR for the SONGS Decommissioning Project

CSLC Responses to Comments from the City of Laguna Beach (City)

In Appendix C of the Draft EIR for the SONGS decommissioning project, the CSLC has identified the City's August 12, 2016, letter as "Comment Set 7" and has identified seven specific comments within the letter. The CSLC has designated these seven comments from the City's letter as #7-1 to #7-7. The NRC staff appreciates the CSLC's specific responses to comments #7-1 to #7-7 and concurs with them. In addition, the NRC staff recommends that the CLSC comment responses be further supplemented as follows:

1. Role of the NRC

The NRC's mission is set forth in its organic statutory authority, the Atomic Energy Act of 1954, as amended (AEA).[1] Under the AEA, the NRC is charged with regulating the civilian use of radioactive material. Thus, the NRC's regulatory program concerns protecting human health and property from the dangers of radioactivity that could potentially arise from such civilian use, and for ensuring the physical security of radioactive material under the ownership or control of its licensees. The NRC accomplishes its mission through a comprehensive radiation protection program for both members of the public and occupational workers (e.g., workers at a nuclear power plant). The NRC regulates its licensees through regulation, license terms and conditions, and through a robust inspection and enforcement program.[2] The NRC also provides extensive guidance documents to assist its licensees with regulatory compliance. The construction and operation of a nuclear power plant, and the associated use and possession of radioactive material at the plant requires a facility operating license from the NRC.[3]

Once licensed, the NRC is responsible for ensuring that a nuclear power plant licensee meets the applicable NRC radiation protection requirements, including those set forth in the NRC's 10 CFR Part 20 and 50 regulations, and maintains the required level of physical security and emergency preparedness for the licensed site and the radioactive material under its control. The NRC, however, is not responsible for operating the plant; nor does the NRC own or otherwise control the radioactive material on site. Likewise, the NRC does not hold any real property interest in the licensed site itself; nor does it have any land management authority over the site. In addition, the NRC has no role in the ultimate disposition or use of the site after the facility operating license is terminated.

The regulation of non-radioactive material or non-radioactive pollutants at a nuclear power plant is also outside the scope of the NRC's regulatory authority. Further, the NRC only has regulatory authority over those portions of a nuclear power plant that contain or process radioactive material or have a role in the nuclear fission (electricity generating) process, such as the buildings housing the reactor vessel, the spent fuel pool, and the control room. Other than

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1 42 [United States Code] U.S.C. §§ 2011 *et seq*.

2 The NRC's general radiation protection regulations, applicable to all licensees, are set in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation." The NRC's regulations concerning the licensing of nuclear power plants like SONGS, including decommissioning, are set forth in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

3 42 U.S.C. § 2133.

ensuring that the licensee meets the requisite physical security requirements for the facility, or those requirements concerning the transport of radioactive material into and out of the licensed facility, the NRC does not have regulatory authority over the licensee's visitor center, administrative office spaces, cafeteria, roads, parking lots, daycare centers, and other buildings and structures that have no role in either holding, storing, or processing radioactive material.

In this regard, the NRC is not the only regulator of a nuclear power plant facility; several other federal, state, and local agencies typically have regulatory or permitting roles. For example, the licensee must meet the requirements of the Clean Water Act, requiring the licensee to obtain a National Pollutant Discharge Elimination System (NPDES) permit from either the United States Environmental Protection Agency (EPA), or if delegated by the EPA, the appropriate state agency. To the extent there are wetlands on the licensed site, the licensee must obtain the appropriate permit from the United States Army Corps of Engineers. The licensee must satisfy the requirements of all applicable state and local health, safety, and environmental protection laws—those laws are implemented and enforced by the applicable state agencies. Finally, the licensee must satisfy all local or municipal zoning ordinances.

Role of the NRC During Decommissioning and License Termination

In terms of decommissioning, the nuclear power plant licensee must first certify to the NRC that it has permanently stopped operating (i.e., stopped generating electricity by nuclear fission) and that it has removed all nuclear fuel from the reactor vessel.[4] The decommissioning process usually lasts several years, possibly decades, and under the applicable NRC regulation, can take up to sixty years.[5] At the end of the decommissioning process, the licensee will seek to terminate its operating license. The NRC will terminate the license if the licensee demonstrates that it has reduced the residual radioactivity at the licensed site to acceptable levels, i.e., those set forth in Subpart E, "Radiological Criteria for License Termination," of 10 CFR Part 20, "Standards for Protection Against Radiation." SCE has informed the NRC that it intends to pursue license termination in accordance with 10 CFR 20.1402, "Radiological criteria for unrestricted use."[6] Section 20.1402 states, in part,

> A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a [total effective dose equivalent][7] to an average member of the critical group[8] that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater

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4 10 CFR 50.82(a)(1)(i)-(ii).

5 10 CFR 50.82(a)(3).

6 As explained in item 3 below, SCE will continue to operate one small portion of its current licensed site, the independent spent fuel storage installation (ISFSI), indefinitely. Thus, the SCE operating license will, in effect, be reduced to the area of the ISFSI upon successful completion of the decommissioning process for the remainder of the licensed site.

7 "Total effective dose equivalent" or TEDE, is defined as "the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures)." 10 CFR 20.1003. The terms "effective dose equivalent" and "committed effective dose equivalent" are also defined in 10 CFR 20.1003, which is the definitions section for 10 CFR Part 20.

8 "Critical group" is defined as "group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances." 10 CFR 20.1003.

> sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).[9]

Thus, whether the licensee has demonstrated to the NRC that it has reduced the site's level of residual radioactivity to the standard specified in 10 CFR 20.1402[10] *is the only factor* that the NRC considers in determining whether the license can be terminated.[11]

Ensuring that the licensee safely meets the regulatory level of residual radioactivity for license termination is the goal of decommissioning. In this regard, "decommissioning" itself is the process by which the licensee reduces the site's residual radioactivity to the regulatory level by removing or otherwise mitigating on-site radiological contamination.[12] Thus, the presence of non-radioactive contaminants on the site (e.g., PCBs, asbestos, lead-based paint), and the remediation or mitigation of such non-radiological hazards, are beyond the scope of the NRC's regulatory authority. Similarly, whether the licensee dismantles and demolishes the facility's buildings and structures, or chooses to leave them standing as part of the decommissioning process, is not within the NRC's purview. The NRC's regulatory objective is that the licensee meets all applicable NRC public and occupational radiological safety requirements throughout the decommissioning process, and that at the completion of that process the licensee is able to demonstrate the requisite level of residual radioactivity.

2. Environmental Impacts of Decommissioning have been Previously Analyzed and are Not Significant

In its August 12, 2016, letter, the City asserts that the NRC must analyze the site-specific radiological safety concerns associated with the SONGS decommissioning project in a site-specific NEPA document, and that the agency's generic NEPA decommissioning analyses are not sufficient. The analyses conducted by the NRC in support of the decommissioning of nuclear power reactors are set forth in the "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586 (1988), as supplemented and updated by the "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586, Supplement 1 (2002) (collectively, the Decommissioning GEIS).[13] As explained below, the NRC disagrees with these assertions.

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9 10 CFR 20.1402 (alteration added). The term ALARA is defined in 10 CFR 20.1003 and the NRC's ALARA requirements are generally defined in 10 CFR 20.1101, "Radiation protection programs."

10 The NRC defines "residual radioactivity" as "radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of 10 CFR part 20." 10 CFR 20.1402.

11 As explained in item 3 below, the SCE operating license will be reduced to the area of the ISFSI and will remain in effect, indefinitely, for the ISFSI only. The NRC will apply the 10 CFR 20.1402 residual radioactivity standard in determining whether the SONGS licensed site, except for the ISFSI, can be released for unrestricted use (i.e., released from the NRC license and hence, from NRC regulatory authority).

12 The NRC defines the term "decommission" as "to remove a facility or site safely from service and reduce residual radioactivity to a level that permits—(1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license." 10 CFR 50.2, "Definitions."

13 The "GEIS is considered 'generic' in that it evaluates impacts from decommissioning activities common to a number of nuclear power facilities." NUREG-0586, Supp. 1, at xi, n. (a); available at ADAMS Accession No. ML023500395.

1996 Decommissioning Rulemaking

In the preamble to the 1996 rulemaking that promulgated the NRC's current nuclear power plant decommissioning regulation (10 CFR 50.82, "Termination of license"), the NRC described its finding that nuclear power plants undergoing decommissioning present much lower radiological safety risks than operating nuclear power plants, primarily because nuclear fission is no longer occurring in the reactor vessel and all nuclear fuel assemblies have been permanently removed from the reactor vessel and placed into the facility's spent fuel pool.[14] Specifically, the NRC found that "the activities performed by the licensee during decommissioning do not have a significant potential to impact public health and safety and [therefore] require considerably less oversight by the NRC than during power operations."[15]

Additionally, the systems and processes required to safely maintain a decommissioning plant are much simpler than those required to run an operating plant.[16] For example, unlike an operating plant, a decommissioning plant will not draw in large quantities of cooling water, which after being run through the plant systems and processed as needed, is then released back into the environment. The gaseous and liquid radioactive effluents of a decommissioning plant, to the extent that there are any, will also be far more limited than those of an operating plant. The NRC determined that any environmental impacts were expected to be "minor" and that "[a]ny site impact should be bounded by the impacts evaluated by previous applicable GEISs as well as any site-specific [environmental impact statement (EIS)]."[17]

NRC's NEPA Compliance

The NRC fulfills its NEPA obligations with respect to the decommissioning of nuclear power plants through a combination of generic and site-specific environmental analyses. The NRC prepares a site-specific EIS to support construction and operation of the plant.[18] Subsequent to the issuance of the SONGS operating licenses in 1982, the NRC performed additional environmental reviews to support its decisions regarding the approval or disapproval of specific license amendment or exemption requests. The NRC documented these reviews in accordance with NEPA; specifically, the NRC staff would prepare an environmental assessment (EA) with a finding of no significant impact (FONSI).[19] In addition to the analyses set forth in these site-

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14 61 FR 39278, "Decommissioning of Nuclear Power Reactors," (July 29, 1996) at 39278-79. After several years in the spent fuel pool, spent fuel assemblies are typically removed from the pool and placed into "dry" storage in an ISFSI located on the site. SCE expects to transfer all spent fuel assemblies currently in the SONGS spent fuel pools to the onsite ISFSI by the end of 2018.

15 *Id*., at 39279 (alteration added).

16 *Id*.

17 *Id*., at 39283 (alteration added).

18 The results of the environmental reviews are typically provided as a "NUREG" document for each facility; NUREG-0490, "Final Environmental Statement related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3", dated April 1981 (ADAMS Accession No. ML18239A414), is the EIS supporting the NRC's decision to issue the operating licenses for the SONGS, Units 2 and 3, facilities.

19 *E.g.*, 61 FR 50513 (September 26, 1996) (EA/FONSI for amendments of operating licenses to allow an increase in fuel enrichment); 66 FR 32964 (June 19, 2001) (EA/FONSI for amendments of operating licenses to allow SCE to increase its maximum reactor core power level for both Units 2 and 3); 80 FR 21271 (April 17, 2015) (EA/FONSI for issuance of an exemption from emergency planning requirements due to SONGS being in a decommissioning status).

specific NEPA documents, some of which may remain applicable through the decommissioning process,[20] the decommissioning of SONGS is covered by the Decommissioning GEIS.

The Decommissioning GEIS is a comprehensive generic EIS that covers the potential environmental impacts likely to arise during decommissioning.[21] The NRC's prior operational experience served as the basis for the 1988 Decommissioning GEIS, and was supplemented with additional experience in conducting decommissioning during the 2002 update of the Decommissioning GEIS. The NRC has found that most potential environmental impacts resulting from decommissioning are common to all nuclear power plants and therefore, can be analyzed generically. Additionally, for all environmental impacts dispositioned generically, the NRC has found that decommissioning activities will have only "small" impacts (i.e., impacts that are not significant under NEPA). Therefore, decommissioning is not a "major Federal action" under NEPA.[22] In short, the NRC considers decommissioning activities to present such low safety and environmental risks that the only licensee decommissioning action triggering a required NRC decision (and as such, triggering a site-specific NEPA review) under 10 CFR 50.82 is the submission of a license termination plan (LTP), which the licensee is required to submit at least two years before the expected license termination date.[23] Thus, if a licensee does not submit any other license amendment or exemption requests during decommissioning, the only site-specific NRC NEPA review will be the one conducted for the LTP.

Since the Decommissioning GEIS was supplemented and updated in 2002, the NRC's operational experience has continued to show that the extensive, detailed analyses set forth in the Decommissioning GEIS will bound or account for most reasonably foreseeable, potential environmental impacts that may arise at any decommissioning plant, including SONGS.[24] As long as the licensee's decommissioning activities remain within the scope of the Decommissioning GEIS's analyses, or applicable site-specific NEPA analyses conducted in support of previous licensing actions, those activities will be "bounded" and the potential impacts will be considered to be previously analyzed and not significant for NEPA purposes.

The review of those potential site-specific decommissioning environmental impacts (i.e., those not dispositioned generically in the Decommissioning GEIS) are first addressed in the

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20 For example, the June 2001 EA/FONSI analyzed the increase to water temperature resulting from the proposed increase of the maximum reactor core power level. The temperature increase would impact the cooling water discharged into the Pacific Ocean. As the increase in water temperature was within the limit on differential temperature allowed by the California Regional Water Quality Control Board, the increase was not found to be a significant environmental impact. As a decommissioning plant does not need water to cool its reactor, this EA/FONSI bounds any impacts to water temperature (at least with respect to temperature increases) arising from the SONGS decommissioning process, and complements the findings in the Decommissioning GEIS.

21 In adjudicating a challenge to the NRC's use of generic NEPA analyses, the United States Supreme Court held that "[t]he generic method chosen by the agency is clearly an appropriate method of conducting the hard look required by NEPA." *Baltimore Gas and Electric Co., v. Natural Resources Defense Council*, 462 U.S. 87, 101 (1983).

22 Council on Environmental Quality (CEQ) regulations define the terms "Major Federal action" and "Significantly." 40 CFR 1508.18 and 1508.27. The NRC has adopted these CEQ definitions. 10 CFR 51.14(b).

23 10 CFR 50.82(a)(9) (LTP requirements); 10 CFR 50.82(a)(10) (NRC approval requirements). During its review of the LTP, the NRC will prepare a safety evaluation and an EA, and if approved, the NRC will incorporate the LTP into the operating license via a license amendment.

24 As of August 2018, the NRC has overseen the successful decommissioning of ten nuclear reactor units and is currently overseeing the decommissioning of twenty reactor units (several nuclear power plants, such as SONGS, have more than one reactor unit).

construction and operation EIS (in the case of SONGS, NUREG-0490, referenced above).[25] Additionally, such site-specific impacts would have been analyzed in the EA/FONSIs for license amendment or exemption requests during the plant's operation, such as those referenced above. Finally, during decommissioning, these site-specific impacts will be analyzed by the NRC staff in the appropriate NEPA document (most likely an EA but if necessary, an EIS) in the event the licensee submits a license amendment or exemption request, or after the licensee submits the license amendment request to approve the LTP.[26]

10 CFR 50.82

The NRC's NEPA compliance is supported by the requirements of 10 CFR 50.82. Section 50.82 prohibits a licensee from performing any decommissioning activity that would "result in significant environmental impacts not previously reviewed."[27] This provision was added by the 1996 rule "[t]o account for site-specific situations that may occur outside these environmental impact considerations;" the intent of this provision was to prohibit decommissioning activities that could result in significant environmental impacts not previously reviewed.[28]

The licensee is also required to submit to the NRC a post-shutdown decommissioning activities report (PSDAR), which is one of the regulatory prerequisites that must be satisfied before a licensee may begin decommissioning.[29] The NRC does not approve or disapprove the PSDAR; the submission of a PSDAR is a licensee reporting requirement. As such, the submission of the PSDAR does not result in an agency action. As there is no agency action, there is no requirement to perform a NEPA analysis on the licensee's PSDAR submission. The licensee, however, must include in the PSDAR "a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements."[30] Although not approved, the NRC staff will still review the PSDAR and to extent that the NRC has concerns with the PSDAR's environmental compliance discussion or other required portions of the PSDAR, the NRC staff may request additional information from the licensee. Further, 10 CFR 50.82 requires a licensee to inform the NRC and affected States, in writing, before "performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules described in the PSDAR."[31]

Thus, if the licensee wishes to perform a decommissioning activity that would result in a significant impact not previously reviewed, the licensee would be required to submit a license

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25 *E.g.*, NUREG-0490, § 5.2, "Impacts on Land Use," § 5.4.1, "Environmental Impacts/Terrestrial Environment," § 5.4.2, "Environmental Impacts/Impacts on the Aquatic Environment," § 5.5.2, "Radiological impacts on biota other than man," § 9.4, "Decommissioning," and Appendix D, "Cultural Resources."

26 Any site-specific NEPA analysis prepared during decommissioning will rely on the Decommissioning GEIS' analyses for the generically dispositioned issues. In this regard, the site-specific NEPA analysis "tiers" off the Decommissioning GEIS. 40 CFR 1502.20 and 1508.28 (CEQ regulations); 10 CFR Part 51, Appendix A, 1(b) (adopted by NRC).

27 10 CFR 50.82(a)(6)(ii).

28 61 FR, at 39283.

29 10 CFR 50.82(a)(4)(i). Prior to the 1996 rule, licensees were required to submit a decommissioning plan, which was subject to NRC approval. The 1996 rule replaced the decommissioning plan with the PSDAR. 61 FR at 39279 ("A major change from the current rule is that power reactor licensees would no longer be required to have an approved decommissioning plan before being permitted to perform major decommissioning activities").

30 10 CFR 50.82(a)(4)(i).

31 10 CFR 50.82(a)(7).

amendment request or an exemption request. The NRC would then analyze the proposed action and prepare the necessary site-specific NEPA analysis. If the licensee wishes to perform a decommissioning activity that is otherwise inconsistent with the PSDAR, the licensee would be required to notify the NRC and affected States in writing before taking any action. The NRC and affected States would then have the opportunity to review the proposed action and request additional information from the licensee before the action is taken.

Preparation of a Joint EIR/Environmental Impact Statement (EIS)

In its August 12, 2016, letter, the City asserts that the NRC and the CSLC should prepare a joint EIR. In response, the NRC staff does not agree that it should prepare a joint EIR/EIS with CSLC (nor does the NRC need to prepare a "stand-alone" EIS). According to the draft EIR, the jurisdiction of the CSLC is "seaward of the ordinary high-water mark."[32] The proposed CSLC action concerns the disposition of submerged lands leased to SCE and the City of Riverside, California,[33] and the improvements thereon, namely, the SONGS, Units 2 and 3, offshore intake and discharge conduits and associated appurtenances, navigational and environmental monitoring buoys, and riprap along shore seaward of the ordinary high-water mark.[34]

Whether these improvements should remain in place indefinitely or be partially or wholly removed is a question that is not within the NRC's regulatory authority. As with any part of the NRC-licensed SCE site, the NRC's regulatory objective is that SCE be able to demonstrate that it has met the 10 CFR 20.1402 level of residual radioactivity at the conclusion of the decommissioning process.

SONGS PSDAR

In its August 12, 2016, letter, the City states that it disagrees with the conclusion reached by SCE in its PSDAR, submitted in September 2014 (ADAMS Accession No. ML14269A033). In its PSDAR, SCE stated that "[b]ased on current plans, no decommissioning activities unique to the site have been identified and no activities or environmental impacts outside the bounds considered in the GEIS have been identified."[35]

By letter dated August 20, 2015 (ADAMS Accession No. ML15204A383), the NRC acknowledged receipt of SCE's PSDAR, documented the review, and summarized comments received during the PSDAR public meeting held near the SONGS site in October 2014. In its August 20, 2015, letter, the NRC staff stated:

> [SCE] compared the SONGS, Units 2 and 3, facility to the reference facility in NUREG-0586 and found that the SONGS, Units 2 and 3, environmental impacts were bounded by the analysis provided in NUREG-0586. After reviewing [SCE's] comparison, the NRC staff finds that the potential environmental impacts associated with SONGS, Units 2 and 3, decommissioning activities are bounded by the previously issued GEIS and its [supplement], are described consistent

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32 CSLC, "Draft Environmental Impact Report for the San Onofre Nuclear Generating Station (SONGS) Units 2 & 3 Decommissioning Project," State Clearinghouse No. 2016071025, CSLC EIR No. 784 (June 2018) at ES-3.

33 The City of Riverside is not an NRC licensee and the NRC has no regulatory authority over the City of Riverside.

34 *Id.*, at ES-1.

35 SCE, PSDAR (September 23, 2014) at 8.

with the guidance in RG 1.185,[36] and meet the requirements of 10 CFR 50.82(a)(4)(i).[37]

The City has provided no information that any of the potential environmental impacts that may result from the planned decommissioning activities, as described in SCE's September 2014 PSDAR, are beyond the scope of the Decommissioning GEIS and other previously prepared NRC site-specific NEPA documents or are, in any other way, significant. In response to the City's assertion that the NRC must analyze the site-specific radiological safety issues, presumably in an EIS, the analyses provided in the Decommissioning GEIS are sufficient and bound any reasonably foreseeable impact.

Major Decommissioning Activities; NRC Oversight During Decommissioning

The NRC makes a distinction between an environmental issue, which is analyzed under NEPA, and a safety issue, for which the NRC is responsible under the AEA. Safety issues are analyzed in NRC safety reports, such as a nuclear power plant's final safety analysis report or FSAR, which is part of the plant's licensing basis, and is updated on a regular basis. Any changes that may impact the safety of the plant are evaluated by the NRC staff as part of the safety evaluation reports that accompany licensee requests for the approval of a license amendment or exemption request, or are otherwise reviewed by the NRC staff as part of the licensee reporting and NRC inspection processes. As a "safety" agency, the NRC handles safety issues as they arise on an ongoing and operational basis.

A licensee is prohibited from engaging in "major decommissioning activities" until ninety days after the submission of the PSDAR, provided that the licensee has submitted its 10 CFR 50.82(a)(1)(i)-(ii) certifications that it has permanently ceased operations and has removed all fuel assemblies from the reactor vessel.[38] Once the post-PSDAR ninety day period has run and the requisite certifications have been submitted to the NRC, the licensee may begin major decommissioning activities. The licensee does not need prior NRC approval to conduct such major decommissioning activities, provided that the licensee's activities remain within a certain defined scope, as prescribed by 10 CFR 50.59, "Changes, tests and experiments."[39]

During the decommissioning process, the NRC maintains comprehensive regulatory oversight over the plant. The licensee remains subject to the terms and conditions of its license, and as such, remains subject to NRC inspection and enforcement. As described in Inspection Manual Chapter (IMC) 2561, "Decommissioning Power Reactor Inspection Program" (ADAMS Accession No. ML17348A400), the NRC staff will engage in regular on-site inspections that

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36 Regulatory Guide (RG) 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," Revision 1 (June 2013) (ADAMS Accession No. ML13140A038). RG 1.185 is an NRC guidance document developed to assist licensees in complying with the PSDAR requirements.

37 NRC, Letter to T.J. Palmisano, Vice President and Chief Nuclear Officer, SCE (August 20, 2015), at 5.

38 The term "major decommissioning activity" means, "for a nuclear power reactor facility, any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than class C waste in accordance with § 61.55 of this chapter." 10 CFR 50.2.

39 Section 50.59 provides parameters by which a licensee may make certain changes to the facility without prior NRC approval. If the licensee's intended action will exceed the 10 CFR 50.59 parameters, the licensee must seek NRC approval before taking the action, typically in the form of a license amendment or exemption request. The NRC will then conduct a site-specific safety and environmental analysis (NEPA) prior to approving or disapproving the licensee's proposed action.

emphasize radiological controls and management, procedure compliance, spent fuel pool operation, and the safety review program. Many activities that occur during decommissioning are routine and occur frequently in operating plants. These include decontamination of surfaces and components, surveys for radioactive contamination, waste packaging and disposal, and other activities. During active decommissioning periods, NRC inspectors may be at the facility 2 or 3 weeks of the month in order to observe ongoing activities. During a long-term storage period, inspectors would be present to conduct inspections at least once a year in accordance with the decommissioning reactor inspection program outlined in IMC 2561.

The NRC has also issued several regulatory guidance documents for nuclear power plant decommissioning, including Regulatory Guide (RG) 1.184, "Decommissioning of Nuclear Power Reactors," Revision 1 (October 2013; ADAMS Accession No. ML13144A840); RG 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," Revision 1 (June 2013; ADAMS Accession No. ML13140A038)); and RG 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning" (June 2008; ADAMS Accession No. ML080500187). The guidance is directed toward NRC licensees and provides suggested procedures and methodologies to meet the applicable NRC regulatory requirements during decommissioning. Although compliance with guidance is not required, licensees have an incentive to follow the procedures and methodologies set forth in the guidance documents as NRC practice is to presume that compliance with the guidance means that the licensee is in compliance with the applicable NRC regulation upon which the guidance is based (e.g., 10 CFR 50.82 and 10 CFR 20.1402).

Finally, the NRC's regular contact with the licensee during decommissioning, through its on-site inspection program and otherwise, allow the NRC and licensee to address, on a site-specific basis, any radiation related safety concern that may arise during the process. Based upon its operating experience, the NRC has determined that all expected and reasonably foreseeable safety issues for SONGS are bounded by the Decommissioning GEIS, the current SONGS licensing basis (e.g., the FSAR and NRC staff safety evaluations associated with various licensing actions), and can be appropriately controlled through the existing safety programs.

3. SONGS Independent Spent Fuel Storage Installation; Seismic Concerns

The City's August 12, 2016, letter raises concerns about the radiological safety impacts of spent fuel storage casks, specifically in regard to "storing spent fuel in a seismically active marine environment."[40] As explained below, the NRC staff has determined that the storage of spent fuel, in storage casks, at SONGS meets all applicable NRC safety criteria.

Reduction of SONGS License to the ISFSI

The NRC issued to SCE the SONGS operating licenses in accordance with its regulations in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." As a Part 50 license holder, SCE holds a general license to install and operate an "independent spent fuel

[40] City of Laguna Beach, Letter to C. Herzog, Senior Environmental Scientist, CSLC and M. Vaaler, Project Manager, NRC (August 12, 2016), at 3, n. 8.

storage installation" or ISFSI, on the SONGS site.[41] An ISFSI consists of a large concrete structure to safely store the spent fuel. The spent fuel assemblies are contained in the storage casks that are placed on or within the concrete structure of the ISFSI; the casks can consist of one or more cask designs, all of which must have been approved by the NRC.[42] The storage casks are passive systems; they are designed with one purpose, to safely store spent fuel. In addition to the concrete structure and storage casks, an ISFSI is typically fenced or otherwise secured as it is required to be located in a restricted access area.

The SONGS ISFSI is not included in the scope of the current SONGS decommissioning project and in all likelihood, will not be included in the LTP when submitted to the NRC. Thus, the aim of the current decommissioning process is to satisfy the requirements of 10 CFR 20.1402 for all areas of SONGS except the ISFSI. After the NRC approves the SONGS LTP, and SCE has completed the current decommissioning process and demonstrated its compliance with 10 CFR 20.1402, the NRC will amend SCE's Part 50 facility operating license such that the license will be reduced to an area that only encompasses the ISFSI facility. At that point, the only remaining licensee activities that are permitted and regulated by the NRC are those related to spent fuel storage and the eventual decommissioning of the ISFSI itself, once the spent fuel has been permanently removed from the ISFSI.[43]

ISFSI Design and Operation

During the period of ISFSI operation, the SONGS ISFSI will continue to be governed by the NRC's general license regulations for ISFSIs in Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites," of 10 CFR Part 72, ""Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste." The NRC's regulations in 10 CFR Part 72 provide requirements for the safe design and operation of ISFSIs. Any operational conditions, required actions, monitoring or surveillance requirements, or other technical specifications that are needed for safe operation of the casks located at a general license ISFSI are included in the certificate of compliance that the NRC issues to the cask manufacturer. Section 72.212 requires licensees to comply with the terms, conditions, and specifications of the cask certificate.[44] In particular, the licensee must perform written evaluations before use of a given cask system that demonstrate that

> [c]ask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion.[45]

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41 Under the applicable NRC regulations in 10 CFR Part 72, ""Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," the general ISFSI license is incident to the Part 50 license. The applicable regulation, 10 CFR 72.210, "General license issued," states that "[a] general license is hereby issued for the storage of spent fuel in an independent spent fuel storage installation at power reactor sites to persons authorized to possess or operate nuclear power reactors under 10 CFR part 50 or 10 CFR part 52." The conditions of the general ISFSI license are set forth in 10 CFR 72.212, "Conditions of general license issued under § 72.210."

42 10 CFR 72.212(b)(2)-(3); 10 CFR 72.214, "List of approved spent fuel storage casks."

43 As a general license ISFSI, the SONGS ISFSI will be decommissioned in accordance with 10 CFR 50.82.

44 10 CFR 72.212(b)(3).

45 10 CFR 72.212(b)(5)(ii) (alteration added).

Such written evaluations are subject to NRC inspection.

NRC regulations also require general ISFSI licensees to conduct radiation monitoring to ensure compliance with the NRC requirements for radiation dose limits for the public and ISFSI workers.[46] The NRC maintains oversight of ISFSIs, and the agency staff routinely inspects the site operations to ensure continued compliance with all applicable regulatory requirements, including the conditions and specifications of the applicable cask certificates.

In addition, the NRC requires aging management programs for spent fuel storage casks as storage operations continue into a renewed storage term.[47] Aging management programs include monitoring and inspections of both the ISFSI support structure and storage casks to detect any degradation, and corrective actions (such as further inspections, repairs or replacement of components, and other mitigation measures) to ensure that the ISFSI continues to meet the NRC's requirements for safe spent fuel storage. Licensees assess the effectiveness of these programs on an ongoing basis to determine if they need to be adjusted to address unexpected degradation, or degradation that may be occurring at a greater rate than was initially assumed. The NRC's oversight of ISFSIs includes inspection of a licensee's aging management activities.

Operating experience from the ISFSIs currently in operation is continually assessed by the licensees and the NRC to determine if new information, knowledge, and experience warrant any changes to licensed spent fuel storage operations. If a potential environmental impact (e.g., increased seismic activity) that could adversely affect the safe operation of the ISFSI is identified, the NRC will determine if the licensee will need to reevaluate its analyses and associated spent fuel storage operations to address the identified change.

Seismic Issues

In its development of the 2002 update to the Decommissioning GEIS, the NRC staff considered various site-specific issues at SONGS, including seismic risks. A draft was made available for public comment and one SONGS-specific comment was received. The comment stated,

> SONGS is located in a highly active seismic zone, where seismic activity is speculated by some geological experts to generate quakes up to 7.6 Magnitude on the Richter Scale (by new evidence of local off-shore blind thrust faults, which cause a greater extent of groundshaking and acceleration than the manner in which quakes are traditionally studied). SONGS was only designed and constructed to withstand a maximum quake of 7.0 Magnitude. SONGS is located in an area immediately on the southern California coastline, with most facilities elevated only to a level of 20 ft. above mean sea level. These facilities are highly exposed and vulnerable to effects of rising sea levels, and tsunamis, and are insufficiently protected.[48]

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46 10 CFR 72.104, "Criteria for radioactive materials in effluents and direct radiation from an ISFSI or [monitored retrieval storage] MRS;" 10 CFR 72.106, "Controlled area of an ISFSI or MRS." Both sections 72.104 and 72.106 are made applicable to general ISFSI licenses by operation of paragraph (c) of 10 CFR 72.13, "Applicability."

47 10 CFR 72.240, "Conditions for spent fuel storage cask renewal."

48 Decommissioning GEIS, NUREG-0586, App. O (2002) at O-124.

In response, the NRC replied,

> NRC staff recognizes that there is wide variability among nuclear power plants. However, based on the results of our analysis, the impacts resulting from decommissioning are similar regardless of plant characteristics, including site-specific information from San Onofre. The NRC established an envelope of environmental impacts resulting from decommissioning activities, identified those activities that can be bounded by a generic evaluation, and identified those that require a site-specific analysis. The NRC concentrated the environmental analysis on those activities with the greatest likelihood of having an environmental impact. Even for those impacts that have been determined to be generic, a licensee is required to do a site-specific analysis [in the PSDAR] to determine whether the impacts fall within the generic envelope. If they are outside of the bounds of the generic envelope, the licensee must seek approval from the NRC.[49]

The NRC is aware of no information, and the City has not provided any, that would invalidate the NRC's environmental and safety analyses, as set forth in the Decommissioning GEIS with respect to seismic activity or any other issue.

[49] *Id.*, at O-124 to O-125.

SUBJECT: ADDITIONAL INFORMATION REGARDING THE CALIFORNIA STATE LANDS COMMISSION RESPONSE TO THE CITY OF LAGUNA BEACH ENVIRONMENTAL REVIEW PUBLIC SCOPING COMMENTS FOR THE SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3, DECOMMISSIONING PROJECT dated September 5, 2018

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EXHIBIT 38

AUDIT REPORT

Audit of NRC's Compliance With 10 CFR Part 51 Relative to Environmental Impact Statements

OIG-13-A-20 August 20, 2013

All publicly available OIG reports (including this report) are accessible through NRC's Web site at:
http:/www.nrc.gov/reading-rm/doc-collections/insp-gen/

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

OFFICE OF THE
INSPECTOR GENERAL

August 20, 2013

MEMORANDUM TO: R. William Borchardt
Executive Director for Operations

FROM: Stephen D. Dingbaum **/RA/**
Assistant Inspector General for Audits

SUBJECT: AUDIT OF NRC'S COMPLIANCE WITH 10 CFR PART 51 RELATIVE TO ENVIRONMENTAL IMPACT STATEMENTS (OIG-13-A-20)

Attached is the Office of the Inspector General's (OIG) audit report titled, *Audit of NRC's Compliance With 10 CFR Part 51 Relative to Environmental Impact Statements.*

The report presents the results of the subject audit. The agency provided comments to the report on July 22, 2013. The agency's comments have been incorporated into the report at Appendix D.

Please provide information on actions taken or planned on each of the recommendations within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG followup as stated in Management Directive 6.1.

We appreciate the cooperation extended to us by members of your staff during the audit. If you have any questions or comments about our report, please contact me at 415-5915 or Sherri Miotla, Team Leader, Nuclear Materials & Waste Safety Audit Team, at 415-5914.

Attachment: As stated

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EXECUTIVE SUMMARY

BACKGROUND

The National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) established a national policy to encourage productive and enjoyable harmony between man and his environment, promote efforts that will prevent or eliminate damage to the environment, and enrich the understanding of ecological systems and natural resources important to the United States. To implement NEPA, Federal agencies must undertake an assessment of the environmental effects of their proposed actions prior to making a decision. The two major purposes of the NEPA process are better informed decisions and citizen involvement.

NEPA requires that Federal agencies prepare a detailed statement on the environmental impacts and effects, alternatives to the action, and irreversible commitments of resources involved in the action. This detailed statement is called an Environmental Impact Statement (EIS).

NRC's NEPA Role

The Nuclear Regulatory Commission's (NRC) regulations to implement NEPA are found in Title 10, Code of Federal Regulations, Part 51 (10 CFR Part 51). NRC's process for preparing an EIS begins when the agency receives an application for a proposed action that requires an EIS. A typical NRC environmental review includes analyses of impacts to specific resource areas, including air, water, animal life, natural resources, and property of historic, archeological, or architectural significance. In its NEPA review, NRC also evaluates cumulative, economic, social, cultural, and environmental justice impacts.

NRC's Commitments to the Public

The purposes of NEPA and its implementation dovetail with NRC's organizational values of openness and transparency, as expressed in the Principles of Good Regulation and the Strategic Plan. NRC activities generate a great deal of public interest. For their participation to be meaningful, stakeholders must have access to clear and understandable information about NRC's role, process, activities, and decisionmaking.

OBJECTIVE

The audit objective was to determine whether NRC complies with the regulations in 10 CFR Part 51 relative to the preparation of environmental impact statements.

RESULTS IN BRIEF

Areas of Current Noncompliance

In recent years, NRC has taken steps to enhance its NEPA reviews and procedures. These initiatives have generated important discussions and provide a context for long-term progress. However, the Office of the Inspector General (OIG) has identified areas of noncompliance with 10 CFR Part 51 relative to disclosure and public involvement. In order to clearly communicate the results of and involve the public in its environmental reviews, NRC management should strengthen its EIS preparation process by:

- Publishing a Record of Decision (ROD) that complies with 10 CFR 51.102 and 51.103.
- Publishing an EIS that complies with the format provided in 10 CFR Part 51, Appendix A.
- Performing all regulatory requirements for scoping for EISs that tier off of a generic EIS.

RECOMMENDATIONS

This report makes six recommendations to bring the agency into compliance with 10 CFR Part 51 relative to the preparation of EISs.

AGENCY COMMENTS

On July 22, 2013, NRC provided comments to the draft report. The agency stated its belief that its NEPA implementation activities have been fully compliant with the relevant regulations in 10 CFR Part 51. OIG's central message in the report is that through lack of compliance with NRC's NEPA-implementing regulations, the agency has made it difficult for stakeholders to access information developed in environmental reviews and may have omitted opportunities for public participation in certain environmental reviews. Appendix D contains NRC's comments

and Appendix E contains OIG's analysis of the agency's comments. The agency said it will consider OIG's recommendations as part of the agency's continuous improvement efforts because the recommendations could help enhance effectiveness, efficiency, and consistency across NRC programs in implementing NEPA.

ABBREVIATIONS AND ACRONYMS

ASLB	Atomic Safety and Licensing Board
ASLBP	Atomic Safety and Licensing Board Panel
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
FSME	Office of Federal and State Materials and Environmental Management Programs
NEPA	The National Environmental Policy Act of 1969
NMSS	Office of Nuclear Material Safety and Safeguards
NRO	Office of New Reactors
NRR	Office of Nuclear Reactor Regulation
NRC	Nuclear Regulatory Commission
OIG	Office of the Inspector General
ROD	Record of Decision

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I. BACKGROUND

The National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) established a national policy to encourage productive and enjoyable harmony between man and his environment, promote efforts that will prevent or eliminate damage to the environment, and enrich the understanding of ecological systems and natural resources important to the United States. To implement NEPA, Federal agencies must undertake an assessment of the environmental effects of their proposed actions prior to making a decision. The two major purposes of the NEPA process are better informed decisions and citizen involvement.

NEPA requires that for a major Federal action significantly affecting the quality of the human environment, Federal agencies must prepare a detailed statement on the environmental impacts and effects, alternatives to the action, and irreversible commitments of resources involved in the action. This detailed statement is called an Environmental Impact Statement (EIS).

NEPA also established the White House Council on Environmental Quality to monitor and foster Federal agency compliance with NEPA. The Council on Environmental Quality promulgated regulations to ensure that agency procedures produce high quality environmental information, make that information available to the public and to agency decisionmakers, and ultimately to make "better decisions" as stated in NEPA. The Council on Environmental Quality regulations require Federal agencies to develop their own implementing procedures.[1]

NRC's NEPA Role

The Nuclear Regulatory Commission's (NRC) regulations to implement NEPA are found in Title 10, Code of Federal Regulations, Part 51 (10 CFR Part 51), "Environmental Protection Regulations for Domestic Licensing

[1] NRC revised its environmental regulations to meet the Council on Environmental Quality requirement to develop NEPA implementing procedures.

and Related Regulatory Functions." Part 51 identifies licensing actions that require the preparation of an EIS, including issuance of:

- An early site permit for a nuclear power reactor.
- A combined license to construct and operate a nuclear power reactor.
- A license renewal for an operating nuclear power reactor.
- A license to possess and use special nuclear material for processing and fuel fabrication or conversion of uranium hexafluoride.
- A license to possess and use source material for uranium milling or production of uranium hexafluoride.
- A license for a uranium enrichment facility.

NRC's process begins when the agency receives an application for a proposed action that requires an EIS. Once NRC considers the application complete and "accepts" it for review, an environmental review to comply with 10 CFR Part 51 and NEPA begins, paralleling the separate agency review for compliance with its technical or "safety" regulations. A typical NRC environmental review includes analyses of impacts to specific resource areas, including air, water, animal life, natural resources, and property of historic, archeological, or architectural significance. In its NEPA review, NRC also evaluates cumulative, economic, social, cultural, and environmental justice impacts.

The major steps in NRC's process for conducting this review and preparing the EIS are outlined in Appendix A of this report. Several steps provide opportunities for public involvement throughout preparation of the EIS. The Record of Decision (ROD) ties together the results of the environmental review and serves as an important vehicle for informing the public of the agency's conclusions and decision.

NRC's Commitments to the Public

The purposes of NEPA and its implementation dovetail with NRC's organizational values of openness and transparency, as expressed in the Principles of Good Regulation and the Strategic Plan.

Principles of Good Regulation

NRC has a longstanding goal of conducting its regulatory responsibilities in an open manner, and keeping the public informed of the agency's regulatory, licensing, and oversight activities. In pursuing its mission to protect public health and safety and the environment, NRC strives to adhere to the Principles of Good Regulation – independence, openness, efficiency, clarity, and reliability. More specifically, in the Principles, NRC says nuclear regulation is the public's business, and it must be transacted publicly and candidly. Furthermore, NRC commits that the public must be informed about and have the opportunity to participate in the regulatory process as required by law. Additionally, NRC states that open channels of communication must be maintained with Congress, other government agencies, licensees, and the public.

NRC's Strategic Plan 2008-2013

Ensuring appropriate openness explicitly recognizes that the public must be informed about, and have a reasonable opportunity to participate meaningfully in NRC's regulatory processes. NRC activities generate a great deal of public interest. For their participation to be meaningful, stakeholders must have access to clear and understandable information about NRC's role, processes, activities, and decisionmaking. In the Strategic Plan published in 2008, NRC adopted strategies to achieve openness goals, including:

- Communicating about NRC's role, processes, activities, and decisions in plain language that is clear and understandable to the public.

- Initiating early communication with stakeholders on issues of substantial interest.

When NRC updated its 2008-2013 Strategic Plan in 2012, the agency affirmed the importance of openness strategies to its effectiveness. The revised plan notes that "public stakeholders must have timely access to clear and understandable information." Further, the plan states that "participation allows members of the public to contribute ideas and expertise so that the NRC can make regulatory decisions with the benefit of information from a wide range of stakeholders."

II. OBJECTIVE

The audit objective was to determine whether NRC complies with the regulations in 10 CFR Part 51 relative to the preparation of environmental impact statements. Appendix B to this report contains information on the audit scope and methodology.

III. FINDINGS

In recent years, NRC has taken steps to enhance its NEPA reviews and procedures. For example, NRC has contracted to bring courses from the Duke University Environmental Leadership Program to NRC to develop a cadre of NEPA professionals in the agency. In addition, the agency's NEPA Executive Steering Committee was formed to identify common issues for NEPA implementation across NRC's program offices, including best practices and areas needing guidance. These initiatives have generated important discussions and provide a context for long-term progress. However, the Office of the Inspector General (OIG) has identified areas of noncompliance with 10 CFR Part 51 relative to disclosure and public involvement. In order to clearly communicate the results of and involve the public in its environmental reviews, NRC management should strengthen its EIS preparation process by:

- Publishing a ROD that complies with 10 CFR 51.102 and 51.103.

- Publishing an EIS that complies with the format provided in 10 CFR Part 51, Appendix A.

- Performing all regulatory requirements for scoping for EISs that tier off of a generic EIS.

A. Records of Decision Not in Full Compliance With Regulations

NRC offices with EIS preparation responsibilities do not publish a ROD that complies with the requirements in 10 CFR Part 51. NRC regulations provide specific criteria for the publication of a ROD and what must be included in a ROD. NRC does not publish a ROD that complies with its regulations because within the agency there are incorrect and varying interpretations of what the regulations require. Thus, NRC is not in compliance with its regulations. As a result, NRC (1) does not adequately notify the public, including Congress, Federal agencies, government partners and other stakeholders,[2] of its decision and the basis of that decision and (2) undermines its extensive efforts to be clear, open, and transparent.

NRC Regulations Require a Concise Public ROD

Any Commission decision for which an EIS is prepared must include or be accompanied by a ROD. A ROD is a document that explains NRC's decision, describes the alternatives considered, discusses potential environmental effects, and summarizes license conditions and monitoring programs adopted in connection with mitigation of environmental impacts. The ROD closes the NEPA process. 10 CFR 51.102 and 51.103 are the NRC regulations that require publication of a ROD and state what it must contain.

10 CFR 51.102

Section 51.102 specifies that for any action for which an EIS has been prepared, the EIS must include or be accompanied by a concise public ROD. If a hearing is held on the proposed action, the initial decision of the presiding officer will constitute the ROD. If the proposed action can only be taken by the Commissioners acting as a collegial body, the final

[2] Government partners include tribal governments, State governments, and local or municipal governments. Other stakeholders include public interest groups and any other interested member of the public.

decision of the Commission will constitute the ROD. The designated NRC staff director[3] is responsible for preparation of the ROD, except for instances when a hearing is held on the proposed action or the action is concluded as a result of a Commission decision.

10 CFR 51.103

Section 51.103 prescribes what all RODs must include, regardless of whether a hearing is held. Table 1 depicts these specifications.

Table 1. Requirements for a ROD

51.103(a): The ROD must be clearly identified and must:	
(1)	State the decision.
(2)	Identify all alternatives considered by the Commission in reaching the decision, state that these alternatives were included in the range of alternatives discussed in the EIS, and specify the alternative(s) which were considered to be environmentally preferable.
(3)	Discuss preferences among alternatives based on relevant factors, including economic and technical considerations where appropriate, NRC's statutory mission, and any other essential considerations of national policy, which were balanced by the Commission in making the decision and state how these considerations entered into the decision.
(4)	State whether the Commission has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected, and if not, to explain why those measures were not adopted. Summarize any license conditions and monitoring programs adopted in connection with mitigation measures.
(5)	In making a final decision on a license renewal action pursuant to Part 54 of this chapter, the Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

Source: 10 CFR 51.103(a)

[3] Section 51.4 defines the NRC staff director as the, (1) Executive Director for Operations, (2) Office of Nuclear Reactor Regulation (NRR) Director, (3) Office of New Reactors (NRO) Director, (4) Office of Nuclear Material Safety and Safeguards (NMSS) Director, (5) Office of Federal and State Materials and Environmental Management Programs (FSME) Director, (6) Office of Nuclear Regulatory Research Director, (7) Office of Governmental and Public Affairs Director, and (8) the designee of any NRC staff director.

51.103(b) and (c)

Additionally, a ROD meeting these requirements may be integrated into any other record prepared by NRC in connection with the action or may incorporate by reference material contained in the final EIS.

NRC Does Not Publish a ROD that Complies With the Regulations

For the sample of RODs provided by NRC and reviewed by OIG, NRC offices that prepare and publish EISs do not publish a ROD that complies with 10 CFR 51.102 and 51.103. OIG requested that NRC provide the RODs for 10 specific licensing actions. NRC responded to this request, providing documents that the offices asserted to be the ROD. See Appendix C for the specific licensing actions and OIG's methodology in selecting those actions.

The Documents Provided Are Not Concise

The documents provided by NRC are not concise as required by 10 CFR 51.102. For 4 of the 10 licensing actions, NRC provided multiple documents for each ROD. For example,

- For a fuel cycle facility, NRC provided (1) the 6-page materials license, (2) a 91-page decision from the Atomic Safety and Licensing Board (ASLB),[4] and (3) a 116-page decision from ASLB.[5]

- For another fuel cycle facility, NRC provided (1) the materials license, (2) the Federal Register Notice for the publication of the EIS, and (3) the Federal Register Notice for the publication of the Safety Evaluation Report.

- For each of the two Early Site Permits, NRC provided two documents: (1) a 100+ page ASLB decision and (2) a Commission Order.

[4] Decision Title: "First Partial Initial Decision (Uncontested/Mandatory Hearing on Safety Matters)" dated April 8, 2011.

[5] Decision Title: "Second and Final Partial Initial Decision (Uncontested/Mandatory Hearing on Environmental Matters)" dated October 7, 2011.

For an additional 4 of the 10 licensing actions, NRC provided a Federal Register Notice notifying the public that NRC had issued a license. The Federal Register Notices fail to state the required information, although they refer the reader to the EIS for "further information." However EISs are not concise. They are lengthy and complex documents, as depicted in Table 2.

Table 2. Length of EIS by Responsible Office

Responsible NRC Office	Range of Page Length of EIS
FSME	570 to 749 pages
NMSS	493 to 537 pages
NRO	504 to 919 pages
NRR	309 to 751 pages

Source: OIG analysis of NRC EISs in sample (See Appendix C)

Generally, the Documents Did Not Meet Regulatory Requirements for a ROD

Generally, the documents provided by NRC did not comply with the requirements of section 51.103(a), as depicted in Table 3. Table 3 represents OIG's analysis of the documents provided by NRC in response to OIG's request.

Table 3. Compliance With 51.103(a) Requirements by Office

Office	State the decision *51.103(a)(1)*	Identify alternatives *51.103(a)(2)*	Specify the environmentally preferred alternative *51.103(a)(2)*	Discuss preferences among alternatives *51.103(a)(3)*	State whether all practicable measures were taken to avoid environmental harm *51.103(a)(4)*	Summarize license conditions and monitoring programs *51.103(a)(4)*	Commission determination for license renewal[6] *51.103(a)(5)*
FSME	YES	YES[7]	NO	NO	NO	NO	N/A
NMSS	YES	NO	NO	NO	NO	NO	N/A
NRR	YES	YES[7]	NO	NO	NO	NO	NO
NRO	YES	NO[7]	NO	NO	NO	NO	N/A

Source: OIG analysis of documents provided by NRC for the sample of licensing actions (See Appendix C)

[6] 51.103(a)(5) states, "In making a final decision on a license renewal action pursuant to Part 54 of this Chapter, the Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable."

[7] 51.103(c) allows NRC to incorporate by reference material contained in the final EIS. Among documents sent to OIG in response to the request were Federal Register Notices from different offices. For two offices, FSME and NRR, the Federal Register Notices identified alternatives considered and refer to the EISs for further discussion. However, the NRO Federal Register Notices do not mention alternatives but only state where to locate documents associated with the licensing action, including the EIS.

NRC Offices Are Incorrectly Interpreting Regulations

NRC is not in compliance with 10 CFR 51.102 and 51.103 because the offices that publish EISs have varying and incorrect interpretations of the regulatory requirements. NRC managers gave varying responses as to what constitutes a ROD. For example, a senior manager advised OIG that "there is no such thing as a ROD in this [NRC] environment." Another senior manager said the ROD issue is an ongoing debate. Another senior manager said that the license, Safety Evaluation Report, and EIS constitute the ROD.

NRC staff also gave varying responses to what constitutes a ROD. For example, some FSME staff said that the Federal Register Notice is the ROD and others said the licenses or licensing documents are the ROD. An NRR staff member advised that the Federal Register Notice constitutes the ROD. Generally, NRO staff advised that the hearing or hearing decision constitutes the ROD. However, it is not clear, from staff responses, which document in the hearing record they consider to be the ROD. Additionally, another NRO staff member advised that the license is the ROD.

NRC Is Not in Compliance With Its Regulations

NRC is not in compliance with the requirements for publishing a ROD in sections 51.102 and 51.103. As a result, NRC does not adequately notify the public, including Congress, Federal agencies, government partners, and other stakeholders, of its decision and the basis for its decision.

A senior official from another Federal agency noted he looked for RODs in order to be more informed of the final decisions made by NRC, but found none. Another staff member of the same agency advised she could not find the information, for a specific licensing action, that should have been in a ROD.

Some members of the public were unable to identify NRC RODs and had difficulty with the information provided by NRC in lieu of a ROD. One stakeholder stated that NRC makes NEPA information available to the public by putting it on NRC's Web site. However, according to the stakeholder, the problem is there are voluminous amounts of data and it is

overwhelming to the average person. The information is not clear and concise, as required of a ROD. Another stakeholder opined that for a specific NRC licensing action that the stakeholder's group commented on, there was no ROD. This stakeholder informed OIG of reminding NRC that a ROD is required according to NRC's regulations. Another stakeholder said that NRC should summarize and simplify NEPA data so the average person can understand it. This stakeholder was experienced with NRC's Web site and understands environmental documents; however, this stakeholder opined, without a ROD the general public would have a difficult time understanding the data.

NRC does not publish a ROD that complies with its own regulations, and therefore does not adequately close the NEPA process. This fosters public skepticism that undermines the agency's extensive efforts to be clear, open, and transparent.

Recommendations

OIG recommends that the Executive Director for Operations:

1. Develop agencywide guidance for NRC staff to prepare and publish a concise public document that meets the requirements of 10 CFR 51.102 and 51.103.

2. Implement the agencywide guidance to ensure that all offices will consistently prepare and publish a concise public document that meets the requirements of 10 CFR 51.102 and 51.103.

B. NRC EISs Do Not Follow the Required Format

NRC's EISs do not follow the format described by 10 CFR Part 51, Appendix A. Appendix A to 10 CFR Part 51 identifies the format elements that must be included. NRC's EISs do not follow the Appendix A format because controls are not in place to assure use of that format. Thus, NRC is not in compliance with its regulations. As a result, NRC (1) does not clearly present, in an accessible way, the proposed action, alternatives, and conclusions to stakeholders and (2) undermines its extensive efforts to be clear, open, and transparent.

NRC Regulations Require a Specific Format

Appendix A to 10 CFR Part 51 prescribes a format that EISs "should" follow. The stated purpose of the standard format is to encourage good analysis and clear presentation of the alternatives, including the proposed action. The Appendix A format requires each EIS to have the following elements:

- *Summary*. The regulations require a summary that adequately and accurately summarizes the EIS. The purpose of a summary is to stress the major issues, discuss the areas of controversy, identify any remaining issues to be resolved, and present the major conclusions and recommendation.

- *Index.* The regulations require each EIS to have an index.

- *Cover Sheet*. The regulations require each EIS to have a cover sheet that includes the name, address, and telephone number of an individual at NRC who can provide further information. The cover sheet must also list the State, county, or municipality where the facility is located. Lastly, the cover sheet is not to exceed one page.

Appendix A allows a different format to be used, if there is a compelling reason to do so. However, if a different format is used, it "shall" include a summary, index, and cover sheet.

EIS Format Does Not Meet Regulatory Requirements

Based on OIG's sample, NRC's EISs do not follow the format required by 10 CFR Part 51, Appendix A, regarding a summary, index, and cover sheet. OIG reviewed a sample of 10 EISs prepared by NRC for 10 licensing actions. A list of those licensing actions and the methodology for OIG's sample selection is in Appendix C of this report. None of the 10 EISs reviewed fully met the Appendix A requirements for a summary or cover sheet. Only one of the EISs reviewed contained an index.

Summary

Each EIS contained an executive summary; however, none of the executive summaries adequately summarized the EIS or fully complied with the Appendix A requirements for a summary.

- For one office, the summaries did not stress the major issues considered, discuss areas of controversy, or identify any remaining issues to be considered.

- For another office, it is not clear whether the summaries stress the major issues considered,[8] and the summaries did not discuss the areas of controversy or identify any remaining issues to be considered.

- For another office, both summaries reviewed stressed major issues considered and one identified remaining issues to be considered. However, neither summary discussed areas of controversy.

Index

Of the 10 EISs reviewed, 9 lacked an index. The sole EIS that contained an index included key NEPA terms such as "alternatives," "mitigation," and "scoping" as well as a reference to Federal agencies such as the

[8] It is not clear whether these summaries stressed the major issues considered because the summaries included a summary of the environmental impacts for each resource area analyzed in the EIS. It is not apparent that each resource area is a major issue. Each resource area is required to be assessed in each EIS the office publishes.

Department of Energy and the Environmental Protection Agency and to State agencies.

Cover Sheet

While all of the EISs reviewed did have a cover sheet, none of the 10 EISs fully met the Appendix A requirements. Specifically:

- None of the cover sheets contained the name, address, and telephone number of an individual who could be contacted for further information.
- Four of the cover sheets did not contain the State, county, or municipality where the facility is located.
- None of the cover sheets contained the required information on a single page; instead, the information spanned three to five separate pages.

Controls Not in Place To Assure Proper Format

NRC EISs are not in compliance with the formatting requirements set forth in 10 CFR Part 51, Appendix A. Although NRC managers said they expect staff to follow the format prescribed in Appendix A, these managers are allowing EISs to be issued that are not properly formatted. The EISs are missing key components prescribed in Appendix A because controls assuring proper formatting are not in place. Although each NRC office that publishes an EIS has guidance that staff must follow to standardize environmental reviews, the "environmental standard review plans" instruct staff only to follow the Appendix A format. There is no clear, agencywide guidance to implement the requirements and thereby assure that EISs contain the key components.

Figure 1: NRC's most recent final EIS, published in four volumes. **Source:** OIG

NRC Is Not in Compliance With Its Regulations

NRC is not in compliance with the format requirements for an EIS prescribed in 10 CFR Part 51, Appendix A. As a result, NRC is not presenting, in an accessible way, the proposed action, alternatives, major issues, controversies, remaining issues, and conclusions and recommendations to the public, including Congress, Federal agencies, government partners, and other stakeholders.

OIG interviewed stakeholders who provided public comments on EISs published by NRC. Generally, the stakeholders opined that information provided is not clear. One stakeholder, a former Federal Government employee familiar with looking at documents, stated that NRC's NEPA information is not clear or concise. This stakeholder further commented that reading and digesting the data provided by NRC is very difficult because the data is so voluminous. NRC ought to break down the information "in a common sense approach so the average person can do a quick read and learn how they may be impacted by the action," this stakeholder explained. Another stakeholder opined that some of NRC's EISs were long and complex and it was difficult for the stakeholder's organization to understand everything. As a result, this stakeholder's organization felt compelled to consult with other organizations to help them understand NRC's information. Another stakeholder opined that the way NRC reports information is difficult to understand. NRC provides a lot of technical information, but the meaning of the information is not obvious, added this stakeholder.

By not following the Appendix A format, NRC does not adequately present to the EIS reader the proposed action and alternatives considered by NRC. This inadequate presentation fosters public skepticism that undermines the agency's extensive efforts to be clear, open, and transparent.

Recommendations

OIG recommends that the Executive Director for Operations:

3. Develop agencywide guidance for NRC staff to comply with 10 CFR Part 51, Appendix A.

4. Implement the agencywide guidance to ensure that all EISs include all cover sheet information, a consistent summary format, and an index in compliance with 10 CFR Part 51, Appendix A.

C. NRC Not in Full Compliance With Scoping Regulations

NRC did not fully comply with scoping regulations for in-situ uranium recovery EISs that tier off of a generic EIS. NRC regulations require scoping when preparing an EIS and specify actions the agency must take during the scoping process. NRC did not fully comply with the scoping regulations because there is an incorrect understanding of the regulations related to scoping for EISs that tier off of a generic EIS. Thus, NRC is not in compliance with its regulations. By not fully complying with the regulations, NRC may exclude some interested persons who wish to participate in the process. Additionally, NRC undermines its extensive efforts to be clear, open, and transparent.

NRC Regulations Require Scoping

Scoping Requirements

NRC is required to conduct an appropriate scoping process and publish a Notice of Intent when preparing an EIS, and NRC regulations specify actions the agency must take during the scoping process. Regulations for scoping enumerated in 10 CFR Part 51 describe a formal process initiated by the publication of a Notice of Intent to prepare the EIS. During the scoping process, the agency shall define the proposed action and receive input from stakeholders about the significant issues on which the EIS analysis should focus. A public meeting is one way to receive input, but is not required. The formal scoping process must be open to anyone who expresses an interest in participating. The formal scoping process concludes with the publication of a scoping summary report. This report characterizes and responds to all the input received during the formal scoping process and communicates to all participants what the agency learned in scoping and how scoping results will shape the environmental review.

NRC's regulations governing scoping for an EIS are summarized in Table 4.

Table 4: NRC Scoping Regulations

NRC Scoping Regulations in 10 CFR Part 51	
51.26(a)	When an EIS will be prepared, requires preparation of a Notice of Intent and conduct an appropriate scoping process
51.26(d)	Scoping not required for a supplement as defined in 10 CFR 51.92
51.27	Defines content of a Notice of Intent, including description of proposed scoping process; address and deadline for written comments; and whether, where, and when a public meeting will be held
51.28	Defines scoping participants
51.29	Defines scoping for an EIS and its objectives
51.29(b)	Requires preparation of a scoping summary report

Source: OIG analysis of 10 CFR Part 51

Exception for Supplements

The regulations carve out certain exceptions to the requirement to conduct a formal scoping process when preparing an EIS. One exception is when a supplement to a final EIS is prepared when the proposed action considered in the final EIS has not been taken. A supplement to the final EIS will be prepared if:

- "There are substantial changes in the proposed action that are relevant to environmental concerns; or,

- There are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."[9]

The scope of the supplemental EIS must be limited to the new information or change in the proposed action. A formal scoping process need not be conducted.

Tiering

NRC regulations provide for a practice known as tiering. In 10 CFR Part 51, Appendix A, tiering is defined by referring directly to and quoting the Council on Environmental Quality definition. As a result, the Council on Environmental Quality regulation[10] applies directly to NRC. Council on Environmental Quality regulations define tiering as the development of a broad or programmatic EIS that assesses the scope and impact of the environmental effects that would be associated with an action at numerous sites. Tiering is encouraged by Council on Environmental Quality regulations and guidance and is intended to reduce repetitive analyses and increase meaning for the public in EISs for similar actions. When conducting subsequent environmental reviews of individual sites within the program, the agency can concentrate on the unique, site-specific features and impacts. If review of site-specific conditions shows that the programmatic conclusions are applicable, relevant parts of the broader, programmatic EIS can be incorporated by reference into the site-specific document. According to the Council on Environmental Quality, scoping should be performed whenever an EIS is prepared, including for the subsequent, site-specific EISs that tier off of the programmatic EIS.

[9] A supplement to an EIS is defined in NRC regulations at 10 CFR 51.92.

[10] The Council on Environmental Quality regulations regarding tiering are found at 40 CFR 1502.20 and 40 CFR 1508.28.

Additionally,

> "[s]coping may or may not include meetings, but the process should involve interested parties at all levels of government, and all interested private citizens and organizations. [11]

NRC refers to a programmatic EIS as a generic EIS.

NRC Did Not Fully Comply With Scoping Regulations

NRC did not fully comply with scoping regulations for in-situ uranium recovery EISs that tier off of a generic EIS. Two NRC program offices currently use a generic EIS and tiering in environmental reviews:

- NRR published a generic EIS for the renewal of operating reactor licenses.
- FSME published a generic EIS for in-situ uranium recovery facilities.

Tiering by NRR

When NRR prepares an EIS for renewal of an operating reactor license, the review includes a formal scoping process. The following steps are included:

- The Notice of Intent is published to meet the requirements of 10 CFR 51.27.
- A public meeting is held.
- Written comments are received through e-mail or in hard copy.

[11]Bear, Dinah, "NEPA at 19: A Primer on an 'Old' Law with Solutions to New Problems," Environmental Law Reporter, 1989, available on Council on Environmental Quality's guidance Web page at http://ceq.hss.doe.gov/nepa/regs/iii-11.pdf. Bear was the General Counsel for the Council on Environmental Quality, and her article outlines NEPA's purposes, scope, and implementation procedures.

- A scoping summary report is prepared, distributed to scoping participants, and included as an appendix to the draft and final EISs.

NRC's 1996 rule that codified the findings of the generic EIS for operating reactor license renewal specifically required a formal scoping process be conducted when preparing the EIS for a license renewal application.

Tiering by FSME

By contrast, when NRC prepares site-specific EISs for applications for new in-situ uranium recovery operations, the agency does not seek broad public comment and specifically does not open a formal scoping period. Notices of Intent to prepare EISs were published for six applications received since publication of the generic EIS for in-situ uranium recovery. Although one application has since been put on hold, NRC has published final or draft EISs for five projects. Final EISs have been published for three in-situ uranium recovery projects, and draft EISs have been published for two proposed projects. Table 5 summarizes the information regarding early public input as described in the six published Notices of Intent.

Table 5: Notices of Intent to Prepare EISs for New In-Situ Uranium Recovery Applications

Notices of Intent for New In-Situ Uranium Recovery Applications			
Facility	**Date Published**	**Information Provided by NRC**	**Actions Omitted**
Nichols Ranch (complete)	August 5, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.
Antelope-Jab (on hold)	August 14, 2009	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action; also planned to "meet with and gather information from" local agencies and public interest groups during a visit to the proposed site. "No public scoping meetings" would be held.	• No formal scoping process opened. • No invitation for broad public comment.
Moore Ranch (complete)	August 21, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.
Lost Creek (complete)	September 3, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.
Dewey-Burdock (draft)	January 20, 2010	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action. Also staff were "consulting" with various Federal and State agencies, tribal entities, and potentially interested public interest groups.	• No formal scoping process opened. • No invitation for broad public comment.
Ross (draft)	November 16, 2011	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action. Also "met with and gathered information from" local agencies and public interest groups during a visit to the proposed site.	• No formal scoping process opened. • No invitation for broad public comment.

Source: OIG analysis of NRC Notices of Intent

The Notices of Intent depict a range of approaches for seeking input for site-specific environmental reviews. In four cases, NRC staff met with State and local governments and other stakeholders before the Notice of Intent was published. In the other two cases, however, the Notice of Intent indicates that NRC staff planned to conduct such meetings. NRC staff referred to these meetings with agencies, known tribes, and previously-identified public interest groups as "targeted information gathering."

Beyond the meetings that were part of "targeted information gathering," for three projects – Nichols Ranch, Moore Ranch, and Lost Creek – no additional public comment was sought to develop the scope of the site-specific EIS. Notices of Intent for three other projects state that staff planned to place advertisements in local media seeking public comment, although no address or deadline for submitting comments was included in any of the Notices of Intent. Two of the environmental reviews for which advertisements were placed received some public comments. In one draft EIS, these comments were referred to as "scoping" comments, although neither a formal opening nor closing date of the scoping process was included in the Notice of Intent.

Figure 2: Public comments at a scoping meeting.
Source: NRC

In several of the Notices of Intent, NRC asserted that "NRC regulations do not require scoping," but then described activities normally conducted by staff as part of the scoping process. These activities were conducted without the opening of a formal scoping process, which would have included in the Notice of Intent an invitation for broad public comment and the publication of an address and deadline for submission of comments.

In practice, the site-specific review and assessment of impacts occurred without a complete site-specific scoping process. The three completed EISs reviewed by OIG and one of the drafts state that NRC staff considers "the scope of the generic EIS to be sufficient for the purposes of defining the scope" of the EIS for the specific site. The most recent draft EIS

states that "NRC conducted scoping activities for the purposes of defining the scope of the GEIS [generic EIS] and any future" EISs for specific sites that tier off of the generic EIS. Thus, for the in-situ uranium recovery EISs that have tiered off of the generic EIS to-date, NRC has determined the scope of the site-specific EIS by using the generic EIS and has omitted some opportunities for broad public comment.

Further, in the absence of a formal scoping process, NRC did not publish a scoping summary report to characterize and respond to the comments received from stakeholders. Also, there was no summary characterization of or response to comments received during "targeted information gathering" in face-to-face meetings, teleconferences, or as a result of advertisements in local media.

Incorrect Understanding of Scoping Regulations

NRC did not fully comply with the scoping regulations because of incorrect understanding of the regulations related to scoping for EISs that tier off of a generic EIS. Specifically, NRC staff refer to the tiered site-specific EIS as a "supplement" to the generic EIS, leading to the belief that the exception in 10 CFR 51.26(d) applies to tiered EISs. Some NRC managers assert that the public scoping process for the generic EIS for in-situ uranium recovery suffices for subsequent, site-specific uranium recovery applications.

However, during that generic EIS scoping process in 2007, NRC staff emphasized in response to public comments that all applications would receive a site-specific review. Staff also emphasized that there would be a request for public input on scoping through a "scoping meeting" on site-specific issues if an EIS were prepared for a future application. In this way, NRC did not give public notice that the public scoping for the generic EIS would serve as the scoping process for later EISs. The public, defined broadly, was not able to comment on issues of significance for specific sites because specific applications were not yet under consideration during the scoping process for the generic EIS.

Limiting Scoping Undermines NRC Transparency

NRC is not in compliance with its regulations for scoping in 10 CFR 51.26-29. Public comment at an early stage in the environmental review enables NRC to determine the scope of the issues to be addressed in the EIS, as required by the regulations. By not seeking broad public comment, NRC may not fully develop the scope of the issues to be addressed in the EIS. Also, less opportunity for involvement and input may exclude some interested persons who wish to participate in the process. As one NRC staff member noted, "There are different issues that people really need for the NEPA process to address and it is up to those in NRC responsible for NEPA to report what they see and respond to what they are presented with."

For future EISs that tier off of an already-finalized generic EIS, the scoping conducted during the generic EIS may become out-of-date. The scoping conducted for the generic EIS for in-situ uranium recovery is more than 5 years old. Over time, methods of analysis and human communities change. As a result, generic scoping becomes less meaningful.

Failure to conduct scoping and enhance public participation undermines the agency's extensive efforts to be clear, open, and transparent. Although the level of public interest in proposed actions under NRC review may vary, opening a formal scoping process to written comments and preparing a scoping summary report remain important steps in the NEPA process that are compatible with NRC's objectives of providing opportunities for meaningful public involvement. For members of the public with an interest in or concerns about NRC-licensed projects, such opportunities are valuable. When the opportunities are not available, public skepticism is heightened. For example, one public commenter about the generic EIS for in-situ uranium recovery reported feeling "a little dubious" about the generic EIS because it appeared to be "a way to streamline a process, and to keep the public out."

Moreover, without ensuring correct understanding of scoping requirements for EISs that tier off of a generic EIS, NRC might not conduct scoping for site-specific EISs that tier off of a future generic EIS, based on the precedent set.

Recommendations

OIG recommends that the Executive Director for Operations:

5. Develop agencywide guidance for all offices that prepare EISs to ensure that scoping is performed for all EISs that tier off of a generic EIS.

6. Implement the agencywide guidance to ensure that scoping is performed for all EISs that tier off of a generic EIS.

Summary and Conclusion

The two major purposes of the NEPA process are better informed decisions and citizen involvement. In recent years, NRC has taken steps to enhance its NEPA reviews and procedures. However, through lack of compliance with 10 CFR Part 51, the agency has made it difficult for stakeholders to access information developed in environmental reviews and may have omitted opportunities for public participation in certain environmental reviews. This lack of compliance fosters public skepticism and undermines the agency's extensive efforts to be clear, open, and transparent.

IV. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations:

1. Develop agencywide guidance for NRC staff to prepare and publish a concise public document that meets the requirements of 10 CFR 51.102 and 51.103.

2. Implement the agencywide guidance to ensure that all offices will consistently prepare and publish a concise public document that meets the requirements of 10 CFR 51.102 and 51.103.

3. Develop agencywide guidance for NRC staff to comply with 10 CFR Part 51, Appendix A.

4. Implement the agencywide guidance to ensure that all EISs include all cover sheet information, a consistent summary format, and an index in compliance with 10 CFR Part 51, Appendix A.

5. Develop agencywide guidance for all offices that prepare EISs to ensure that scoping is performed for all EISs that tier off of a generic EIS.

6. Implement the agencywide guidance to ensure that scoping is performed for all EISs that tier off of a generic EIS.

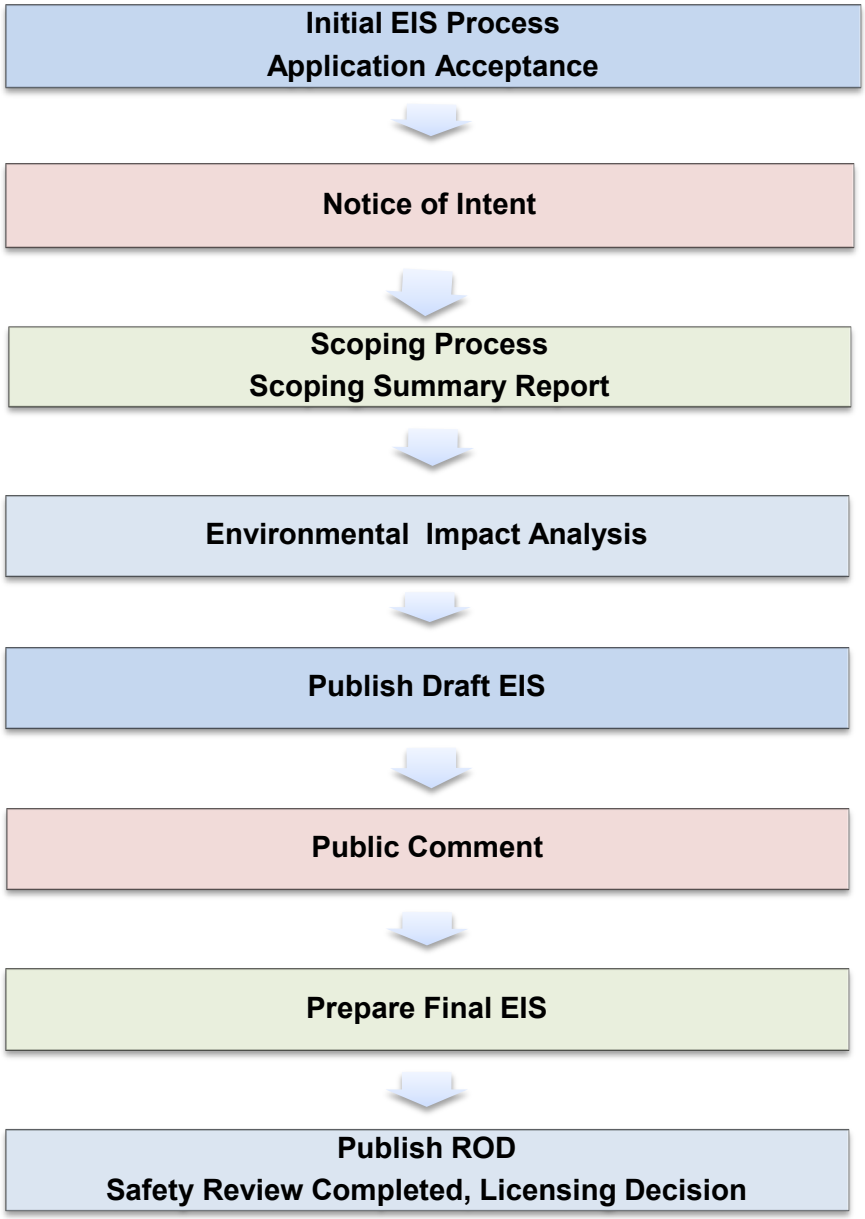
V. AGENCY COMMENTS

On July 22, 2013, NRC provided comments to the draft report. The agency stated its belief that its NEPA implementation activities have been fully compliant with the relevant regulations in 10 CFR Part 51. OIG's central message in the report is that through lack of compliance with NRC's NEPA-implementing regulations, the agency has made it difficult for stakeholders to access information developed in environmental reviews and may have omitted opportunities for public participation in certain environmental reviews. Appendix D contains NRC's comments and Appendix E contains OIG's analysis of the agency's comments. OIG made no changes to the body of the report based upon the agency's comments. The agency said it will consider OIG's recommendations as part of the agency's continuous improvement efforts because the recommendations could help enhance effectiveness, efficiency, and consistency across NRC programs in implementing NEPA.

Appendix A

MAJOR STEPS IN EIS PROCESS

Source: OIG analysis of NRC regulations and guidance.



Appendix B

OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

The audit objective was to determine whether NRC complies with the regulations in 10 CFR Part 51 relative to the preparation of environmental impact statements. This audit is a spinoff audit — an offshoot from the Audit of NRC's Implementation of Its NEPA Responsibilities.

SCOPE

This audit focused on reviewing the preparation of EISs published during the last 6 fiscal years. We conducted this performance audit at NRC headquarters (Rockville, Maryland) from January 2013 through April 2013. Internal controls related to the audit objective were reviewed and analyzed. Throughout the audit, auditors were aware of the possibility or existence of fraud, waste, or misuse in the program.

METHODOLOGY

Document Reviews

The OIG audit team reviewed relevant criteria, including the National Environmental Policy Act of 1969, as amended, 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and 40 CFR 1500, "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act." Auditors received training in the implementation of the National Environmental Policy Act.

OIG reviewed EISs and associated documents for 10 specific licensing actions from fiscal years 2007 through 2012. The sampling methodology used to select the EISs is described in Appendix C.

The OIG team reviewed guidance and documents pertaining to the preparation of EISs by NRC. Key documents reviewed included:

- NRC Commission Papers.
- NRC Staff Requirements Memoranda.
- NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants, and NUREG-1555, Supplement 1, Operating License Renewal.
- NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs.
- NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants.
- NUREG-1910, Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities.
- Agency and office-level guidance.
- Draft and final environmental impact statements.
- Federal Register Notices.
- Transcripts of public meetings.
- Communications plans.
- Hearing decisions.
- Council on Environmental Quality guidance.
- NRC correspondence with Federal agencies and tribal, State, and local governments related to environmental reviews.

Interviews

At NRC headquarters, auditors interviewed staff and management from the Office of Federal and State Materials and Environmental Management Programs, the Office of Nuclear Reactor Regulation, the Office of New Reactors, the Office of Nuclear Material Safety and Safeguards, the Office of the General Counsel, and the Atomic Safety Licensing Board Panel to gain an understanding of their roles and responsibilities related to the preparation of EISs. Auditors interviewed representatives of the Council on Environmental Quality and the Government Accountability Office. Auditors also conducted telephone interviews with representatives of stakeholder organizations that had provided comments during NRC environmental reviews.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

The audit work was conducted by Sherri Miotla, Team Leader; Levar Cole, Audit Manager; Kristen Lipuma, Senior Analyst; Kevin Nietmann, Senior Technical Advisor; and Amy Hardin, Auditor.

Appendix C

SAMPLING METHODOLOGY

The OIG audit team identified five types of NRC licensing actions issued in the past 6 fiscal years that required preparation of an EIS:

- Operating reactor license renewals issued by the Office of Nuclear Reactor Regulation.
- Early site permits for new reactor facilities issued by the Office of New Reactors.
- Combined licenses for new reactor facilities issued by the Office of New Reactors.
- Licenses for uranium recovery facilities issued by the Office of Federal and State Materials and Environmental Management Programs.
- Licenses for fuel cycle facilities issued by the Office of Nuclear Material Safety and Safeguards.

OIG then identified 32 licensing actions during the last 6 fiscal years, including 20 license renewals,[12] 4 early site permits, 2 combined licenses, 3 uranium recovery facilities, and 3 fuel cycle facilities. For document review, OIG elected to randomly select from each of the five types of licensing actions issued by the NRC in the past 6 years. The licensing actions were placed in chronological order within each group and numbered sequentially. Using the random number selection function in Microsoft Excel, the following licensing actions were randomly selected:

- Reactor License Renewal: (1) License Renewal for Pilgrim Nuclear Power Station and (2) License Renewal for Columbia Generating Station.
-

[12] License renewals for Salem and Hope Creek were treated as a single licensing action because the environmental reviews were combined in a single EIS.

- Early Site Permit for New Reactor: (1) Early site permit for the Grand Gulf site and (2) Early site permit for the North Anna site.

- Combined License for New Reactor: (1) Combined license for Vogtle Electric Generating Plant Units 3 and 4 and (2) Combined license for Virgil C. Summer Nuclear Station Units 2 and 3.

- Uranium Recovery: (1) Materials license for Moore Ranch in-situ recovery project and (2) Materials license for Nichols Ranch in-situ recovery project.

- Fuel Cycle Facility: (1) Materials license for AREVA Eagle Rock Enrichment Facility and (2) Materials license for International Isotopes Fluorine Products, Inc., Uranium Deconversion Plant.

These are the 10 licensing actions for which OIG requested that the agency provide the RODs and for which OIG reviewed the EIS for format requirements.

Appendix D

AGENCY COMMENTS

July 19, 2013

MEMORANDUM TO: Hubert T. Bell
Inspector General

FROM: R. W. Borchardt */RA M. Weber for/*
Executive Director for Operations

SUBJECT: FORMAL COMMENTS ON OFFICE OF THE INSPECTOR GENERAL DRAFT REPORT "AUDIT OF NRC's COMPLIANCE WITH 10 CFR PART 51 RELATIVE TO ENVIRONMENTAL IMPACT STATEMENTS"

I am responding to Stephen Dingbaum's July 1, 2013, e-mail transmitting the Office of the Inspector General's (OIG) Draft Report, "Audit of NRC's Compliance with 10 CFR Part 51 Relative to Environmental Impact Statements." Enclosure 1 includes the staff's comments and Enclosure 2 includes the Atomic Safety and Licensing Board Panel's (ASLBP's) comments. The U.S. Nuclear Regulatory Commission (NRC) staff suggested this audit topic to examine if the agency has conducted its environmental reviews in an effective and efficient manner consistent with available resources to accomplish its mission and goals.

Based on a thorough review of the draft report and an extensive interaction between our staffs, the NRC staff concludes that we are fully compliant with the NRC regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," relative to Environmental Impact Statements (EISs). As discussed more fully below, the NRC does not agree with OIG's findings that the NRC's EISs and Supplemental EISs (SEISs) do not fully comply with 10 CFR Part 51 regulations. The OIG's findings rely on observations and legal interpretations that are inaccurate.

First, the NRC complies with 10 CFR § 51.103 as reflected by 10 CFR §§ 51.103(b) and (c), which state that the record of decision may be integrated into any other record prepared by the Commission in connection with the action and incorporate by reference material contained in a final EIS. Second, the regulations do not require a separate record of decision when a hearing is held. Specifically, the NRC regulations in 10 CFR § 51.102(c) state that a presiding officer's initial decision following a hearing or the Commission's final decision following an appeal will "constitute the record of decision." Third, the format for an EIS described in 10 CFR Part 51

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H. Bell 2

Subpart A, Appendix A is not binding on the staff. The regulations governing the issuance of a draft or final EIS, 10 CFR §§ 51.70 and 51.90, respectively, use the permissive language "should" in reference to describing the format set forth in 10 CFR Part 51 Subpart A, Appendix A. Fourth, the OIG draft audit report incorrectly describes the site-specific uranium recovery SEISs as stand-alone EISs; one example is the incorrect characterization of the SEISs listed in Table 5 as "EISs." Further, Table 5 incorrectly implies that for the six applications reviewed, there was no opportunity for broad public comment. In fact, the public had significant opportunities to provide comments on each draft SEIS, as well as on the Generic EIS that provides the analytical foundation for each of the SEISs. Finally, there is no requirement in 10 CFR Part 51 to conduct a scoping process for a SEIS; specifically, 10 CFR § 51.92(d) provides that the NRC staff need not conduct scoping when a supplement to an EIS is prepared.

Although the NRC does not agree with OIG's findings in the draft report, we will consider the OIG's recommendations as part of the agency's continuous improvement efforts because they could help enhance effectiveness, efficiency, and consistency across NRC programs in implementing the National Environmental Policy Act of 1969, as amended, (NEPA) and the NRC's public outreach efforts. The NRC's NEPA Executive Steering Committee (ESC) was established several years ago to review, discuss, and guide resolution of complex or cross-cutting NEPA issues to ensure consistency among NRC programs. Based on the information contained in the draft audit report, the NEPA ESC will review the OIG's recommendations and develop, as appropriate, the paths forward, while balancing the potential benefits with available resources.

The NRC is committed to conduct its regulatory and licensing activities in an open and transparent manner, keep the public informed, and foster meaningful stakeholder involvement in the environmental review process. I appreciate the OIG audit of NRC's compliance with 10 CFR Part 51. In addition, and as specifically requested, the staff's review concluded that the draft audit report does not contain any sensitive unclassified information.

Enclosures:
1. Staff's Comments on Draft Audit Report
2. ASLBP's Comments

cc: Chairman Macfarlane
Commissioner Svinicki
Commissioner Apostolakis
Commission Magwood
Commissioner Ostendorff
SECY

STAFF'S COMMENTS ON OFFICE OF THE INSPECTOR GENERAL DRAFT REPORT: *AUDIT OF NRC'S COMPLIANCE WITH 10 CFR PART 51 RELATIVE TO ENVIRONMENTAL IMPACT STATEMENTS*

Office of the Inspector General Finding A: Records of Decision Not in Full Compliance with Regulations

The U.S. Nuclear Regulatory Commission (NRC) complies with regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," when preparing its Records of Decision (RODs). The regulations in 10 CFR Part 51 do not require preparation of a separate ROD. The regulations in 10 CFR § 51.103(b) and (c) state, respectively, that the ROD may be integrated into any other record prepared by the Commission in connection with the action and incorporate by reference material contained in a final Environmental Impact Statement (EIS). The Office of the Inspector General (OIG) finding that the NRC RODs are not in compliance with the regulations relies on an over-emphasis of the requirement that RODs be concise, and the OIG draft audit report does not identify any Commission or judicial precedent that supports such an extreme application of the regulations. The NRC RODs that are integrated in other documents or that incorporate by reference material from an EIS, as allowed by the regulations, do not violate the requirement to be concise. The conflicting interpretation of the regulations used in the OIG draft audit report is impermissible because it would render Section 51.103(b) and (c) meaningless. The NRC RODs reference EISs and supplemental EISs (SEISs) for the detailed information the OIG draft audit report claims is missing. However, the OIG draft audit report concludes that because they reference lengthy EISs, the RODs are not concise, and therefore, are not in compliance with the regulations. Because the regulations specifically allow RODs to be integrated in other documents or to reference EISs, the length of those documents is not the test for determining whether or not a ROD is concise.

In addition, when there is a hearing on an application, 10 CFR 51.102(c) states that a presiding officer's initial decision following a hearing or the Commission's final decision following an appeal will "constitute the record of decision." The NRC is unique in providing adjudicatory hearings on National Environmental Policy Act of 1969, as amended (NEPA) reviews. When there is a hearing that has environmental matters discussed (whether in addressing proposed contentions or in taking testimony and evidence on admitted contentions) the ROD would be incomplete if it only relied on the record up to the time of issuance of the final EIS. Thus, in the context of the NRC practice, 10 CFR § 51.102(c) is appropriately intended to ensure that the ROD will reflect the entire record of the environmental review the NRC conducted, including matters considered in the hearing process following the issuance of the final EIS. However, the staff recognizes there might be some value in having a summary similar to a formal ROD accompanying the EIS even in cases where there is a hearing that will subsequently complete the environmental record. It is also worth noting that the NEPA Executive Steering Committee (ESC) addressed, and documented in a memorandum to the NRC NEPA-implementing program offices, the content of RODs to enhance the transparency with which the agency documents its regulatory decisions. While the regulations clearly do not require such a ROD under the terms of 10 CFR § 51.102(c), the NRC NEPA ESC will consider options, as appropriate, to address the OIG recommendations.

Enclosure 1

OIG Finding B: NRC EISs Do Not Follow the Required Format

Contrary to the OIG draft audit report Finding B, the format for an EIS set forth in 10 CFR Part 51 Subpart A Appendix A (hereafter "Appendix A") cannot support a conclusion of non-compliance because the format is not a regulatory requirement. The two regulations governing the issuance of a draft or final EIS, 10 CFR §§ 51.70 and 51.90, respectively, use the permissive language "should" in reference to following the format set forth in Appendix A. Because the OIG draft audit report conclusion of non-compliance relies on the misinterpretation that Appendix A is mandatory, the conclusion on regulatory compliance is invalid. Further, even the language of Appendix A, with one exception, indicates that its described format is not mandatory. Appendix A indicates that when its format for an EIS is not followed, only some of its elements "shall" be used (as numbered in Appendix A):

(1) Cover sheet;
(2) Summary;
(3) Table of Contents;
(8) List of Preparers;
(9) List of Agencies, Organizations and Persons to Whom Copies of the Statement are Sent;
(10) Substantive Comments Received and NRC Staff Responses; and
(11) Index

However, to the extent that Appendix A's use of the prescriptive language ("shall") conflicts with the permissive language of sections 51.70 and 51.90, those regulations control how the Appendix A format applies to EISs issued pursuant to them. Also, for its prescribed elements, Appendix A even provides that the detailed format it presents for these elements is "guidance." Because neither the content nor the format of an EIS issued under sections 51.70 or 51.90 are required to conform to the structure described in Appendix A, any deviation from that structure cannot form the basis for a finding of non-compliance.

Although the EISs and SEISs may not strictly conform to the format suggested almost 3 decades ago in Appendix A, NRC's EISs and SEISs use a format that encourages good analysis and clear presentation of the alternatives including the proposed action. The criticisms raised in the OIG draft audit report such as cover sheets that exceed one page or the lack of an index do not support a conclusion that the EISs foster public skepticism or undermine the agency's efforts to be clear, open, and transparent. The NRC staff develops its documents to achieve these agency goals while also presenting complex detailed information in an understandable format, including issuing documents in an electronic format that supports full text searches, a method of effective public access that was not specifically contemplated or in routine use at the time the guidance in Appendix A was developed. While the format for an EIS set forth in Appendix A is not a regulatory requirement, the NEPA ESC will consider options, as appropriate, to address the OIG recommendations.

OIG Finding C: NRC Not in Full Compliance with Scoping Regulations

Relying on an incorrect interpretation of the regulations in 10 CFR Part 51, the OIG determines that the NRC is not in compliance with scoping requirements. The OIG determination hinges on the incorrect conclusion that SEISs for new In-Situ Uranium Recovery (ISR) facilities are not

SEISs under the regulations. The OIG draft audit report suggests that ISR SEISs are EISs that simply tier off of a final programmatic EIS.

The OIG draft audit report identifies the pertinent regulations describing scoping requirements, but incorrectly describes 10 CFR § 51.92 as defining what is a supplement to an EIS. Rather than provide a limiting definition of SEIS, Section 51.92 along with Section 51.95, identify appropriate circumstances in which to use a supplement to an EIS. The regulations provide broad discretion for using a SEIS when, in the NRC staff's opinion, preparation of a supplement will further the purposes of NEPA. Title 10 CFR § 51.92(d) provides that the NRC staff need not conduct scoping when a supplement to an EIS is prepared. Thus, at its core, the OIG draft audit report conclusion that the NRC staff failed to conduct scoping for ISR SEISs is actually a disagreement with the regulations. The OIG draft audit report alludes to the ISR Generic EIS (GEIS) as being final and therefore being precluded from being supplemented by the staff for site specific reviews. The OIG draft audit report does not identify any legal authority to support its conclusion that the ISR SEISs are impermissibly characterized as supplements. The Office of the General Counsel has been unable to locate any judicial precedent for overturning an agency's designation of an environmental review as a "supplemental" EIS or that even discusses the definition of a "supplement" that would provide any supporting authority for the OIG theory that the SEISs for ISRs are not properly characterized as SEISs.

The OIG draft audit report attempts to establish that the use of tiering off of a GEIS precludes the use of a supplement, although the regulations in 10 CFR Part 51 do not provide such a preclusion. Under the NRC NEPA implementing regulations in 10 CFR Part 51, any subsequent NEPA document can use tiering to avoid duplication of analysis. As described in the OIG draft audit report, tiering promotes efficiency by avoiding duplication. Subsequent NEPA documents that may use tiering do not exclude SEISs, and the OIG draft audit report provides no legal support for a contrary conclusion. Appendix A describes tiering as appropriate when going from a statement of broader scope to one of lesser scope, or when going from a statement at an early stage to a supplement or statement or analyses at a later stage. Appendix A quotes the Council on Environmental Quality (CEQ) regulations that encourage agencies to use tiering in subsequent statements, which includes the preparation of an SEIS. In CEQ regulations at 40 CFR § 1508.28(b) there is an explicit reference in defining tiering to an analysis of specific actions at an early stage of the development of specific proposals that proceeds "to a supplement" [emphasis added] at a later stage. This use is characterized by CEQ in 40 CFR § 1508.28 as addressing those issues that are "ripe" for decision earlier in the process and leaving for the supplement those issues that will not be ripe until later in the process. Given that the CEQ regulations specifically allow the use of tiering in an SEIS, the NRC regulations do not preclude using supplements as part of a tiering process, and the OIG draft audit report lacks legal support for its novel restriction on SEIS use, the staff cannot agree with OIG that the current process for ISR SEISs is incorrect in characterizing those documents as supplements. In addition, on page 18 of the draft audit report under "Tiering" the OIG states that "According to the Council on Environmental Quality, scoping should be performed whenever an EIS is prepared, including for the subsequent, site-specific EISs that tier off of the programmatic EIS." The OIG supports this statement, in part, by a reference to an article from the *Environmental Law Reporter* written by the CEQ General Counsel at that time. However, this article does not conclude that scoping should be performed for subsequent, site-specific EISs that tier off a

GEIS. Having been correctly characterized as supplements, there is no basis for the OIG determination of noncompliance with scoping requirements in development of these documents.

The ISR GEIS is a generic analysis of the potential impacts of individual ISR facilities in a specified geographic area. The GEIS for ISR facilities serves as the starting point for environmental reviews of site-specific ISR license applications. The NRC tiers the SEISs from the GEIS by incorporating applicable GEIS discussions by reference and adopting relevant GEIS environmental impact conclusions. It is important to note that NRC conducted scoping in developing the ISR GEIS. Scoping provides a means by which the scope of issues to be addressed in the environmental review related to the proposed action are identified. The scoping process for the ISR GEIS identified local conditions and potential impacts that could be considered generically and those that need to be analyzed using site-specific information in a SEIS. The NRC provided opportunities for the public to comment during the scoping period for the GEIS, which included three public scoping meetings. The NRC then issued the draft GEIS for public comment as required by 10 CFR Part 51. Eight additional public meetings were held during the 103 day comment period near locations where NRC anticipated future ISR license applications. Approximately 1,350 individuals submitted nearly 2,200 individual comments on the GEIS.

The GEIS scoping process sufficiently accomplished the goals of scoping set forth in 10 CFR § 51.29, such that additional scoping is unnecessary for ISRs that meet the parameters of the GEIS absent any special circumstances (indeed, as mentioned above, scoping is not required for SEISs per 10 §§ CFR 51.26(d) and 51.92(d)). Further, during the development of each SEIS for an ISR facility, the NRC staff contacted specific external stakeholders through targeted information gathering meetings and by placing advertisements in local newspapers to inform the public of NRC's intent to prepare an SEIS.

In addition, the NRC has discretion on whether to conduct scoping for SEISs. Different offices in the NRC have made individual decisions on whether to incorporate a scoping process when preparing an SEIS. The discussion of the scoping process in the OIG draft audit report does not distinguish between the purpose of the scoping process and the opportunity for public involvement when the NRC publishes draft EISs and SEISs in the *Federal Register* with a solicitation for public comment. The Table 5 of the OIG draft audit report incorrectly implies that for the six ISRs reviewed, there was no opportunity for broad public comment. The public had the opportunity to provide comments on each draft SEIS as shown in the annotated table below. Specifically, the NRC received more than 1,800 comments from external stakeholders, including the public, after the Moore Ranch, Nichols Ranch, and Lost Creek ISR draft SEISs were issued for public comment. All of the comments were considered in the NRC staff's preparation of the final SEISs, during which changes to the draft SEISs were made to reflect those comments where necessary. The NRC is currently in the process of addressing more than 1,800 comments received after the Dewey-Burdock and Ross ISR draft SEISs were issued for public comment and reflecting those comments in the final SEISs. These public outreach efforts confirm NRC's commitment to ensure meaningful participation of external stakeholders, including the public.

The OIG draft audit report focuses its emphasis on whether or not the NRC sought broad public comment through a scoping process for the ISR SEIS development and concludes that limited

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scoping during the SEIS development undermines NRC transparency. In this regard, the OIG draft audit report conflates scoping with public participation in the NEPA process—the two are not the same. The purpose of scoping is to define the parameters of the NEPA analysis; in effect, to focus the NEPA analysis on those aspects of the proposed action that may have a potential significant impact, while eliminating from detailed consideration those issues which are not environmentally significant. The specific objectives of scoping are set forth in 10 CFR § 51.29(a) which includes: defining the proposed action; identifying significant issues to be analyzed in depth; identifying and eliminating from detailed study peripheral issues; identifying related environmental reviews; identifying related environmental review and consultation requirements; indicating the relationship between the timing of the analysis and the agency action; identifying cooperating agencies; and describing the means by which the SEIS will be prepared. The scoping process for the ISR GEIS adequately addressed these issues. Further, the NRC's intent to use SEISs for addressing specific applications in the four geographic areas addressed in the GEIS was openly discussed in developing the final GEIS. Nor do the regulations in 10 CFR Part 51 require broad public input during the scoping process to the same extent that draft EISs are circulated for public comment. The regulations in 10 CFR § 51.28 identify the scoping participants, and although the NRC often uses public comment periods and public meetings to enhance some scoping processes, such broad public input may not be beneficial in all circumstances and is not required by the regulations.

While the OIG draft audit report questions the validity of the scoping process for the ISR GEIS after the passage of time, the report does not provide any information to indicate that the information in the ISR GEIS had significantly changed so that additional scoping for any particular SEIS would be justified. Because the use of additional scoping for the ISR SEISs was discretionary, and scoping does not require broad public involvement, the lack of scoping conducted for ISR SEISs cannot form the basis for a determination of noncompliance.

Because the OIG conclusions of noncompliance are based on factual inaccuracies or novel and unprecedented interpretations of regulations which the staff concludes are in error, the staff does not agree in any respect with the OIG characterization of the NRC practice as not being in compliance with the NRC regulations. The OIG recommendations have some merit independent of regulatory requirements for potential enhancements in our communications with the public. The NEPA ESC will consider, as appropriate, options to address the OIG recommendations such as those suggesting that the staff should estimate when it will periodically review the ISR GEIS for updating.

OIG Draft Audit Report – Table 5 – Annotated

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Notices of Intent to Prepare [S]EISs[*] for New In-Situ Recovery Applications				Staff Annotation
Facility	Date Published	Information Provided by NRC	Actions Omitted	Public Comment on Draft SEIS
Nichols Ranch (complete)	August 5, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.	Comment Period: December 11, 2009 – March 3, 2010 *Federal Register* notice: 74 FR 65808 and 75 FR 6066
Antelope-Jab (on hold)	August 14, 2009	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action; also planned to "meet with and gather information from" local agencies and public interest groups during a visit to the proposed site. "No public scoping meetings" would be held.	• No formal scoping process opened. • No invitation for broad public comment.	N/A
Moore Ranch (complete)	August 21, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.	Comment Period: December 11, 2009 – March 3, 2010 *Federal Register* notice: 74 FR 65806 and 75 FR 6065

Lost Creek (complete)	September 3, 2009	NRC staff met with Federal, State, and local government agencies and public organizations in January 2009 as part of a site visit to gather site-specific information. Staff also "contacted potentially interested tribes and local public interest groups via email and telephone."	• No formal scoping process opened. • No invitation for broad public comment.	Comment Period: December 11, 2009 – March 3, 2010 *Federal Register* notice: 74 FR 65804 and 75 FR 6068
Dewey-Burdock (draft)	January 20, 2010	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action. Also staff were "consulting" with various Federal and State agencies, tribal entities, and potentially interested public interest groups.	• No formal scoping process opened. • No invitation for broad public comment.	Comment Period: November 26, 2012 – January 10, 2013 *Federal Register* notice: 77 FR 7048
Ross (draft)	November 16, 2011	NRC staff planned to place ads in newspapers requesting information and comments from the public regarding the proposed action. Also "met with and gathered information from" local agencies and public interest groups during a visit to the proposed site.	• No formal scoping process opened. • No invitation for broad public comment.	Comment Period: March 29, 2013 – May 12, 2013 *Federal Register* notice: 78 FR 19330

*10 CFR § 51.92(d) states that "the supplement to a final environmental impact statement will be prepared in the same manner as the final environmental impact statement except that a scoping process need not be used."

DATE: July 8, 2013

FROM: E. Roy Hawkens, Chief Judge /RA/
Atomic Safety and Licensing Board Panel

SUBJECT: ASLBP COMMENTS ON OFFICE OF THE INSPECTOR GENERAL'S FINAL DRAFT REPORT "AUDIT OF NRC's COMPLIANCE WITH 10 CFR PART 51 RELATIVE TO ENVIRONMENTAL IMPACT STATEMENTS"

This memorandum is in response to the July 1, 2013 e-mail transmitting the Office of the Inspector General's (OIG) Draft Audit Report, "Audit of NRC's Compliance with 10 CFR Part 51 Relative to Environmental Impact Statements." More specifically, this memorandum focuses on the OIG Draft Audit Report, Section III, Finding A, Recommendation 1. That recommendation states that the Atomic Safety and Licensing Board Panel (ASLBP) should:

> "Develop guidance for staff to comply with the requirements of 10 CFR 51.102 and 51.103 when a hearing is held on the proposed action under the regulations in 10 CFR Part 2."

This recommendation is inappropriately directed to the ASLBP. The ASLBP is an independent adjudicatory body. The NRC Staff often appears as a party before our licensing boards, but we do not direct or supervise the Staff, and the Commission has expressly prohibited us from doing so. "The licensing boards' sole, but very important, job is to consider safety, environmental, or legal issues raised by license applications. Licensing boards simply have no jurisdiction over nonadjudicatory activities of the Staff that the Commission has clearly assigned to other offices unless the Commission itself grants that jurisdiction to the board."[1] "As [the Commission has] stated repeatedly over the last quarter-century, boards lack the authority to supervise the NRC Staff in the performance of its regulatory duties."[2] In the absence of specific direction from the Commission, the ASLBP has no authority to develop guidance for the Staff concerning NEPA compliance. That is the role of the NRC program offices and the NRC Office of General Counsel.

The jurisdiction of ASLBP licensing boards in contested hearings is strictly limited by the Commission to the subject matter of intervenors' admitted contentions, which typically involve only specific, narrow safety and environmental issues.[3] If no environmental contentions are present in a contested hearing, licensing boards have no authority to address NEPA at all. To the extent that 10 C.F.R. §§ 51.102 and 51.103 suggest otherwise (i.e., to the extent they indicate that a licensing board's initial decision will constitute a Record of Decision), they should be changed.

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[1] Duke Energy Corp. (Catawba Nuclear Station, Units 1 and 2), CLI-04-6, 59 NRC 62, 74 (2004).

[2] Dominion Nuclear Conn., Inc. (Millstone Nuclear Power Station, Units 2 and 3), CLI-05-24, 62 NRC 551, 570 (2005).

[3] "As the Commission repeatedly has made clear, our contention rule is 'strict by design.' It thus insists upon 'some reasonably specific factual or legal basis' for a petitioner's allegations. Contention requirements seek to ensure that NRC hearings 'serve the purpose for which they are intended: to adjudicate genuine, substantive safety and environmental issues placed in contention by qualified intervenors.'" Dominion Nuclear Conn., Inc. (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 213 (2003) (internal citations omitted).

Enclosure 2

Appendix E

OIG ANALYSIS OF AGENCY COMMENTS

Where the agency commented that OIG is incorrect, OIG disagrees and reaffirms the accuracy of its statements.

OIG's central message in the report is that, through lack of compliance with NRC's NEPA-implementing regulations, the agency has made it difficult for stakeholders to access the information developed in environmental reviews and may have omitted opportunities for public participation in certain environmental reviews.

A finding by finding analysis of the agency's formal comments follows.

Finding A: Records of Decision Not in Full Compliance With Regulations

The agency asserts that OIG relies on an over-emphasis of the requirement that RODs be concise and that the ROD can incorporate by reference material from the EIS. Additionally, the agency asserts that NRC's unique adjudicatory process preempts the need for a ROD that meets the requirements of 10 CFR 51.103. Finally, the agency asserts that the NEPA Executive Steering Committee addressed the content of RODs and produced a memorandum for the NEPA-implementing program offices.

OIG Response:

Concise and Incorporation by Reference

The OIG report does not rely on an over-emphasis of the requirement that a ROD be concise. 10 CFR 51.102(a) states "A Commission decision on any action for which a final environmental impact statement has been prepared **shall** be accompanied by or include a **concise** public record of decision." **[emphasis added]**

Regarding incorporation by reference, the OIG report does not use an impermissible conflicting interpretation of the regulations. 10 CFR 51.103(b) allows a ROD to be integrated into any other record prepared by the Commission in connection with the action and 10 CFR 51.103(c) allows a ROD to incorporate by reference material contained in a final EIS. However, 51.103(b) and (c) do not trump

the language in 51.102. Therefore, the agency's assertion that "[b]ecause the regulations specifically allow RODs to be integrated in other documents or to reference EISs, the length of those documents is not the test for determining whether or not a ROD is concise" is misplaced. The **mandatory regulatory requirement** that a ROD be concise is as important as the permissible regulatory authority for the agency to integrate the ROD into another document or incorporate it by reference. OIG disagrees with the agency's assertion that OIG's conclusions "render Section 51.103(b) and (c) meaningless."

Adjudicatory Process

The agency asserts that in the context of NRC practice, its regulations are appropriately intended to ensure that the ROD will reflect the entire record of the environmental review, including matters considered in the adjudicatory process following the issuance of an EIS. However, this argument does not address the issue raised by the OIG report. The mandatory regulatory requirement of 51.102 is that the initial decision of the presiding officer is the ROD. The plain reading of 51.102(c) and 51.103(a) is that an initial decision of a presiding officer is a ROD **and** must meet ROD content requirements in 51.103(a).

Additionally, the Atomic Safety and Licensing Board Panel (ASLBP) provided comments on the OIG Report. The ASLBP asserts that the one recommendation directed to it, is inappropriately directed to it and that "[i]n the absence of specific direction from the Commission, the ASLBP has no authority to develop guidance for the Staff concerning NEPA compliance." OIG acknowledges the position of the ASLBP and agrees to remove the recommendation addressed to ASLBP.

ASLBP's comments bring to light an inconsistency with the adjudicatory process and NRC's regulations. ASLBP's jurisdiction is strictly limited to the subject matter of intervenors' admitted contentions, which typically involve only specific, narrow safety and environmental issues. ASLBP asserts that because its jurisdiction is limited, it lacks the authority to enumerate the required ROD elements set forth in 51.103.

Thus, ASLBP concludes that if 10 CFR 51.102 and 103 indicate that a licensing board's initial decision will constitute a ROD, the regulations should be changed. Section 51.103 says that when a hearing is held on the proposed action, the initial decision of ASLBP **will** constitute the ROD.[13]

This inconsistency highlights the need for NRC to consistently prepare a ROD that meets the requirements of 51.102 and 51.103.

ROD Memo from the NEPA Executive Steering Committee

OIG reviewed this memorandum and disagrees with the assertion it addressed "the content of the ROD to enhance transparency with which the agency documents its regulatory decisions." Instead, the memorandum restated the regulations and emphasized that a hearing pre-empts the requirement to prepare a ROD. Further, the memorandum proposed to merely add the words "Record of Decision" to Federal Register Notices to create an identifiable document that could refer a reader to an EIS.

Finding B: NRC EISs Do Not Follow the Required Format

The agency asserts that the OIG report cannot support a conclusion of non-compliance because the format in 10 CFR Part 51, Appendix A is a not a regulatory requirement.

OIG Response:

Appendix A to 10 CFR Part 51 prescribes a format that EISs "should" follow. The stated purpose of the standard format is to encourage good

[13] Full Text of 10 CFR 51.102(c): "When a hearing is held on the proposed action under the regulations in part 2 of this chapter or when the action can only be taken by the Commissioners acting as a collegial body, the initial decision of the presiding officer or the final decision of the Commissioners acting as a collegial body **will constitute the record of decision.** An initial or final decision constituting the record of decision will be distributed as provided in § 51.93." **[emphasis added]**

analysis and clear presentation of the alternatives, including the proposed action. The Appendix A format requires each EIS to have a summary, index, and cover sheet.

Appendix A allows a different format to be used, if there is a compelling reason to do so. However, if a different format is used, it **shall** include a, summary, index, and cover sheet.

Finding C: NRC Not in Full Compliance With Scoping Regulations

The agency asserts that the use of tiering is the same as a supplement to an EIS. Additionally, the agency asserts that the scoping conducted for the generic EIS for in-situ uranium recovery suffices for all site-specific EISs for in-situ recovery projects. Finally, by adding annotations to Table 5 of the report, the agency confounds public participation during scoping with public comments on a draft EIS.

OIG Response:

Tiering and Use of a Supplement Are Not the Same

Both NRC and the Council on Environmental Quality regulations for implementing NEPA distinguish the concepts of tiering and supplementation. The agency asserts that OIG believes that the finality of the generic EIS precludes supplementation, a misstatement of OIG's argument that demonstrates the conflation of two distinct concepts.

It is not the generic EIS's **finality** that precludes supplementation. Rather, it is its **generic nature** that precludes supplementation **as the agency interprets** a "supplement" to the generic EIS. The purpose of supplementation is to update the understanding of environmental impacts. The generic EIS analyzed in-situ uranium recovery in four broad geographic regions. The tiered site-specific EISs do not update the generic EIS analysis. Therefore, the subsequent site-specific EISs cannot be "supplements" to the generic EIS.

A supplemental analysis **supports the original analysis** in a site-specific EIS. In tiering, the generic EIS **supports the site-specific analysis** that takes place once a specific application is received by the agency. The

supplemental EIS reviews only the impacts of the new information or change to the proposed action. The tiered EIS must review all the impacts of the proposed action for a specific site, drawing on and incorporating by reference relevant portions of the generic EIS.

The agency also asserts that the Council on Environmental Quality definition of tiering characterizes the tiered site-specific EIS as a supplement. The full text of the definition of the term tiering reads:

> Tiering is appropriate when the sequence of statements or analyses is: (a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis. (b) From an environmental impact statement on **a specific action at an early stage** (such as need and site selection) **to a supplement** (which is preferred) **or a subsequent statement or analysis at a later stage** (such as environmental mitigation). Tiering in such cases is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe. **[emphasis added]**

The use of supplement in this definition is limited. An example from NRC practice is the preparation of a supplemental EIS for a combined license for a power reactor, when a final EIS has been prepared and published for an early site permit. The early and late stages are considering the same specific site. By contrast, the generic EIS for in-situ uranium recovery includes no discussion of matters at an early stage of a particular site. Therefore, the site-specific EIS for an in-situ uranium recovery application cannot be considered a "supplement" using the Council on Environmental Quality definition of tiering.

NRC Commitments to the Public During Generic EIS Scoping

OIG disagrees that scoping for the generic EIS adequately fulfills the scoping requirement for tiered site-specific EISs. Not only is site-specific scoping required, but NRC also represented to the public that scoping would be conducted for site-specific EISs for in-situ uranium recovery projects.

At the public meetings and in written comments, members of the public asked questions and expressed concern about how specific sites for in-situ uranium recovery would be considered after the generic EIS. In response, NRC assured the public that if a site-specific EIS were prepared, the agency would then conduct a site-specific scoping process. Specifically, the draft generic EIS stated:

> If the NRC staff concludes that it needs to prepare a site-specific EIS, a notice of intent will be published in the Federal Register. Then, the NRC staff will follow the public participation procedures outlined in 10 CFR Part 51, which include **requests for public input on the scope of the EIS** and for public comment on the draft EIS for ISL [in-situ recovery] applications. **[emphasis added]**

However, after the public comment period on the draft generic EIS closed, the NRC approach changed. When the final generic EIS was published, the agency stated that it would prepare a site-specific EIS which would be called a "supplement" and scoping would optional.

Comments on a Draft EIS Are Not the Same as Scoping Participation

The purposes of public participation during scoping and public comment on a draft EIS are different. Public comment during scoping provides an opportunity to shape the environmental review before it begins, but public comment on a draft EIS relates to the results of the environmental review.

The agency added a column to Table 5 of the report. The added column shows the dates of the comment periods for the draft site-specific EISs. However, Table 5 relates to the scoping process. Because the purposes of the two public participation opportunities are different, the agency's annotations to Table 5 are irrelevant.

TAB 5

EXHIBIT 5

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW

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UNITED STATES NUCLEAR REGULATORY COMMISSION

PUBLIC WATCHDOGS, a California 501(c)(3) corporation, Petitioner, v. SOUTHERN CALIFORNIA EDISON COMPANY AND SAN DIEGO GAS & ELECTRIC COMPANY, Licensees.	**PUBLIC WATCHDOGS SUPPLEMENT TO 10 C.F.R. § 2.206 PETITION TO IMMEDIATELY SUSPEND DECOMMISSIONING OPERATIONS AT SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3**

Pursuant to 10 C.F.R. § 2.206 and the Nuclear Regulatory Commission's ("NRC")

Management Directive 8.11, Petitioner Public Watchdogs hereby submits this Supplement to its Petition to Immediately Suspend Decommissioning Operations at San Onofre Nuclear Generating Station ("SONGS") Units 2 and 3, which was submitted to the NRC on September 24, 2019. The purpose of this Supplement is to clarify the issues raised in the Public Watchdogs' Petition and to provide the Petition Review Board ("PRB") with supplemental information relevant to the Petition, some of which was not available to Public Watchdogs at the time the Petition was filed nor to the PRB at the time it made the initial decision not to accept the Petition for review.

PRELIMINARY STATEMENT

1. Spent nuclear fuel "poses a dangerous, long-term health and environmental risk. It will remain dangerous for time spans seemingly beyond human comprehension." *New York v. NRC*, 681 F.3d 471, 474 (D.C. Cir. 2012) (internal quotations omitted). Unfortunately, long-term storage and management of spent nuclear fuel has proven to be an intractable Sisyphean task in the United States. Despite repeated efforts by Congress, federal agencies, and numerous stakeholders to construct a centralized deep geological permanent repository for the country's ever-growing stockpile of lethal, radioactive spent nuclear fuel, no viable plan currently exists for a permanent storage solution.

2. Due to the lack of a permanent repository, the majority of the country's spent nuclear fuel is stored on site at nuclear power plants. Although there is currently no permanent storage solution or even a viable plan to create one, the NRC routinely permits licensees to implement decommissioning plans and store fuel on-site, in densely populated areas, based on the false assumption that spent nuclear fuel will be removed from on-site storage facilities and transferred to a permanent repository in the relatively near future. *See* **Exhibit 1**. By permitting licensees to implement these falsely predicated decommissioning and nuclear waste burial plans, the NRC is effectively authorizing licensees to store spent nuclear fuel indefinitely without any plan or strategy for managing or funding such indefinite storage operations. The NRC's general policy of willful ignorance not only violates its own regulations and policies, but it also equates to a

complete abdication of the NRC's paramount statutory obligation to protect public health and safety.

3. As explained in Public Watchdogs' Petition, the NRC's policy of willful ignorance has created unique and particularly acute public health and safety risks at SONGS. Licensees are burying spent nuclear fuel in the SONGS Independent Spent Fuel Storage Installation ("ISFSI") pursuant to a decommissioning plan that is predicated on the arbitrary and erroneous assumption that all spent nuclear fuel being stored at SONGS will be accepted by the Department of Energy and transferred to an offsite permanent repository by 2049. Situated a mere 108 feet from one of California's most populated public beaches, only inches above the median high tide level, within an officially designated tsunami inundation zone, and surrounded by active fault lines, the SONGS ISFSI is in the most perilous location possible. To make matters worse, Licensees are burying spent nuclear fuel at SONGS in defective and damaged canisters that are only warranted to last 25 years. By Licensees' own public admissions, technology does not currently exist that would enable Licensees to retrieve these canisters and safely repackage the tons of radioactive spent nuclear fuel contained therein if and when a canister fails or even if routine replacement of the canisters becomes necessary. Furthermore, Licensees have been unable to design or develop an underground monitoring system or Aging Management Plan as required by the "Special Conditions" imposed by the California Coastal Commision nuclear waste burial permit granted October 6, 2015. Thus, the NRC, by its own negligent enforcement, is allowing Licensees to bury one of the most dangerous substances known to human kind, in one of the most dangerous places imaginable, in defective and damaged canisters that cannot be monitored, retrieved, or repaired, all pursuant to a decommissioning plan that is predicated on the knowingly false assumption that all spent nuclear fuel will be removed from SONGS and transferred to a centralized permanent repository in the relatively near future. Despite the grave public health and safety hazards posed by this reckless course of action, Licensees have made clear that they intend to bury all spent nuclear fuel at SONGS as quickly as possible. What's more, the

NRC has also made clear that it will neglect to regulate Licensees' violations of federal law, thereby using its regulatory authority to facilitate the hasty and unsafe burial of all spent nuclear fuel at SONGS.

4. Since Public Watchdogs filed its Petition, Licensees have publicly admitted that continued storage of spent nuclear fuel at SONGS is not feasible, and that there is currently no viable alternative. In addition, state regulators recently delayed the release of more than $400 million in decommissioning trust funds, imperiling Licensees' ability to continue its decommissioning operations at all, much less safely. Based on these troubling recent developments, as well as the various public health, safety, and environmental concerns identified in the Petition, Public Watchdogs respectfully requests that the NRC issue an order immediately suspending all decommissioning operations at SONGS, including all spent fuel transfer operations, and requiring Licensees to submit an amended decommissioning plan that properly accounts for the reality that spent nuclear fuel will likely remain buried at SONGS indefinitely.

CLARIFICATION AND SUPPLEMENTATION OF GROUNDS FOR IMMEDIATELY SUSPENDING DECOMMISSIONING OPERATIONS

I. RECENT EVENTS CONFIRM THAT LICENSEES CANNOT ENSURE THEIR FINANCIAL ABILITY TO PAY FOR THE TOTAL COST OF DECOMMISSIONING AND LONG TERM SPENT FUEL MANAGEMENT.

5. Although the NRC's Generic Environmental Impact Statement ("GEIS") for the long term storage of spent nuclear fuel finds that spent nuclear fuel can be stored on-site for an indefinite period without significant environmental impact, the GEIS does not authorize, license, or otherwise permit licensees to store spent fuel for any length of time. *See* NUREG-2157. Moreover, the GEIS validates that indefinite on-site storage of spent nuclear fuel will require periodic repackaging of spent nuclear fuel and replacement of spent nuclear fuel canisters, as well as long term security to protect the stored spent nuclear fuel from terrorist attack or other radiological sabotage. *Id.*

6. NRC regulations require licensees to provide assurance that they will have sufficient financial resources to pay for the total cost of decommissioning a nuclear power plant and managing spent nuclear fuel. *See* 10 C.F.R. 50.75, 50.82, and 72.30. As NRC Chairwoman Allison Macfarlane stated in her comments to the Final Rule for the Continued Storage of Spent Nuclear Fuel, there are "significant uncertainties" associated with the indefinite and risky on-site storage of spent nuclear fuel, including "the lack of experience in repeatedly repackaging spent fuel into new storage devices over time," "the lack of a guarantee that responsible parties would pay for the costs of repackaging over time," and "unforeseen events in our natural environment and society." *See* **Exhibit 2**. Indeed, Chairwoman Macfarlane presciently predicted that "[d]ecommissioned licensees will likely not have sufficient revenue to pay for the reoccurring expenses such as repackaging of spent fuel, construction of dry transfer facilities, and increased security needs assumed in the GEIS." *Id.*

7. At a SONGS Community Engagement Panel on November 21, 2019, Licensees implicitly conceded that indefinite storage of spent nuclear fuel at SONGS is not feasible and they acknowledged that they are working to develop a strategy to relocate the SONGS spent fuel to an offsite storage or disposal facility. *See* **Exhibit 3**. Although Licensees' entire decommissioning plan, including their decommissioning cost estimate and irradiated fuel management plan, is predicated on the assumption that spent nuclear fuel will be removed from SONGS by 2049, Licensees acknowledged at the Community Engagement Panel that they have not even identified a receiving site, much less established a viable plan to remove all spent nuclear fuel from SONGS by 2049. *Id.* In other words, Licensees publicly admitted that the fundamental predicate for their entire decommissioning plan is false.

8. On December 4, 2019, Licensees sought authorization from the Public Utilities Commission of the State of California ("CPUC") to disburse more than $400 million from the SONGS decommissioning trust fund to pay for various 2020 decommissioning costs, including fuel transfer operations. *See* **Exhibit 4**. This

represented a nearly threefold increase in the amount of funds Licensees' previously estimated would be necessary to perform 2020 decommissioning and spent nuclear fuel transfer operations. *Id.* On January 6, 2020, following Public Watchdogs' objection, the CPUC suspended the disbursement of these funds for up to 120 days, finding that Licensees' request requires further staff review. *Id.* The CPUC decision also includes options to extend the suspension beyond the 120-day period, if necessary.

9. As discussed in Public Watchdogs' Petition, Licensees' entire decommissioning plan is predicated on the false assumption that all spent nuclear fuel will be removed from SONGS by 2049. Based on this assumption, Licensees have only assured the NRC that they will have enough funds to pay for decommissioning and spent fuel management through 2049. Given Licensees' recent public acknowledgement that they have not identified a receiving site for SONGS' spent nuclear fuel, much less developed a viable plan to remove all spent nuclear from SONGS by 2049, Licensees' assurances regarding their ability to pay the full cost of decommissioning and spent fuel management are not credible. Moreover, CPUC's recent decision to suspend disbursements from the SONGS decommissioning trust fund further undermines Licensees' assurances that they have sufficient funds available to them to pay the full cost of decommissioning and spent fuel management. Because Licensees are unable to provide the financial assurances required by NRC regulations, the NRC should immediately suspend all decommissioning activities at SONGS and require Licensees to submit a new decommissioning plan that accounts for the reality that Licensees will have to bear the cost of spent fuel management indefinitely. At minimum, the NRC should suspend all decommissioning activities until such time as the CPUC approves the disbursement of SONGS decommissioning funds for 2020. Without such funds, Licensees will have a perverse incentive to cut corners and ignore safety requirements, which will significantly increase the already prodigious risks to public health and safety associated with Licensees' continued decommissioning and fuel transfer operations.

II. LICENSEES ARE VIOLATING NRC REGULATIONS BY BURYING SPENT NUCLEAR FUEL AT SONGS IN A STORAGE SYSTEM THAT DOES NOT ALLOW FOR READY RETRIEVAL OF THE FUEL.

10. Under NRC regulations, "[s]torage systems must be designed to allow ready retrieval of spent fuel, high-level radioactive waste, and reactor-related GTCC waste for further processing or disposal." *See* 10 C.F.R. 72.122(l). As discussed in Public Watchdogs' Petition, Licensees have publicly acknowledged that technology does not currently exist that would enable Licensees to retrieve the canisters being buried at SONGS and repackage the tons of spent nuclear fuel contained therein if and when a critical failure of the canisters occurs or even if routine replacement of a canister becomes necessary. *See* Public Watchdogs' Petition at Exhibit 18. Moreover, Licensees have publicly acknowledged that any technology for unloading a canister that might be developed in the future would require a spent fuel pool or a dry transfer facility. *Id.* Significantly, Licensees have recently confirmed that they intend to demolish the spent fuel pools and the fuel handling building at SONGS as soon as all spent nuclear fuel is transferred from the spent fuel pools to the ISFSI, which is imminent since the Licensee projects the burial will be completed prior to July 15, 2020. *See* **Exhibit 3**; *see also* **Exhibit 5** at p. 11-12. Thus, Public Watchdogs respectfully submits that the spent nuclear fuel being buried at SONGS is currently unretrievable in violation of NRC regulations, and that Licensees' own admissions confirm that the spent nuclear fuel will be completely unretrievable by this summer, when the spent fuel pools are demolished. For this additional reason, the NRC should suspend all decommissioning activities at SONGS, including all spent fuel transfer operations, and require Licensees to submit a decommissioning plan that complies with NRC regulations.

III. THE SONGS ISFSI IS OPERATING IN AN UNANALYZED CONDITION.

11. As discussed at length in Public Watchdogs' Petition, the precarious location of the SONGS ISFSI—only feet from the Pacific Ocean, in a tsunami inundation zone, and between active fault lines—makes it uniquely susceptible flooding. The potential

consequences of a flooding event would be disastrous, including, but not limited to, canister deformation or rupture and the simultaneous release of radioactive "geysers" from the ISFSI. Although the Holtec Final Safety Analysis Report and Certificates of Compliance clearly contemplate a potential flooding event and state that a site specific analysis will be submitted by Licensees, Public Watchdogs is not aware that any such analysis has been performed or submitted. Accordingly, the SONGS ISFSI is operating in an unanalyzed condition, and all decommissioning operations, including all spent fuel transfer operations, should be suspended until such an analysis is performed.

CONCLUSION

12. For the reasons set forth in this supplement, and for the reasons set forth in Public Watchdogs' Petition, Public Watchdogs respectfully requests that the NRC enter an order immediately suspending all decommissioning operations at SONGS, including all spent fuel transfer operations, and requiring Licensees to submit an amended decommissioning plan that properly accounts for the reality that the spent nuclear fuel being buried at SONGS will likely remain there indefinitely.

Dated: January 21, 2019

BARNES & THORNBURG LLP

By: /s/ Charles G. La Bella
Charles G. La Bella
Attorneys for Plaintiff
Public Watchdogs

EXHIBIT 1

Entergy

Entergy Nuclear Operations, Inc.
1340 Echelon Parkway
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Tel: (601)368-5000

Mandy K. Halter
Director, Nuclear Licensing

10 CFR 50.54

November 16, 2018

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Update to Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb)
Pilgrim Nuclear Power Station

Docket No. 50-293
Renewed License No. DPR-35

LETTER NUMBER: 2.18.071

REFERENCES:

1. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Spent Fuel Management Plan Submittal in accordance with 10 CFR 50.54(bb)," 2.07.055, dated June 7, 2007 (ML071700121)

2. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Response to NRC Request for Additional Information (RAI) Regarding Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb)," 2.08.018, dated April 9, 2008 (ML081060520)

3. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Response to Request for Additional Information to Support the Review of the Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb) and the Preliminary Decommissioning Cost Estimate Pursuant to 10 CFR 50.75(f)(3)," 2.08.052, dated October 14, 2008 (ML082910039)

4. Letter, USNRC to Entergy Nuclear Operations, Inc., Pilgrim Nuclear Power Station - Safety Evaluation Re: Spent Fuel Management Program and Preliminary Decommissioning Cost Estimate (TAC Nos. MD8036 and MD9416), 1.09.001, dated January 7, 2009 (ML083190292)

5. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Notification of Permanent Cessation of Power Operations," 2.15.080, dated November 10, 2015 (ML15328A053)

Dear Sir or Madam:

In accordance with 10 CFR 50.54(bb), Entergy Nuclear Operations, Inc. (ENOI) is hereby notifying the NRC of significant changes to the Pilgrim Nuclear Power Station (PNPS) Spent Fuel Management Plan.

Pursuant to 10 CFR 50.54(bb), ENOI initially submitted a Spent Fuel Management Plan on June 7, 2007 (Reference 1), as supplemented by its responses to the NRC staff's Requests for Additional Information, which ENOI submitted on April 9, 2008 (Reference 2) and October 14, 2008 (Reference 3). On January 7, 2009, the NRC staff approved the PNPS Spent Fuel Management Plan on a preliminary basis (Reference 4).

By letter dated November 10, 2015, ENOI notified the NRC of its intent to permanently cease power operations at PNPS no later than June 1, 2019 (Reference 5). As a result of its decision to permanently cease operations at PNPS and related changes to the anticipated schedule of decommissioning activities, spent fuel management activities, and decommissioning funding assumptions, ENOI is modifying the PNPS Spent Fuel Management Plan. This submittal provides the required Section 50.54(bb) notification. Attachment 1 provides the Updated Spent Fuel Management Plan (SFMP), which supersedes all prior versions of the SFMP.

There are no new regulatory commitments contained in this letter.

Should you have any questions concerning this letter or require additional information, please contact Mr. Peter J. Miner at (508) 830-7127.

Sincerely,

Mandy K Halter

MKH/shr

Attachment: 1. Pilgrim Nuclear Power Station Updated Spent Fuel Management Plan

cc:

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NRC Resident Inspector
Pilgrim Nuclear Power Station

Attachment 1

Letter 2.18.071

Pilgrim Nuclear Power Station

Updated Spent Fuel Management Plan

Pilgrim Nuclear Power Station
Updated Spent Fuel Management Plan

I. Background and Introduction

Entergy Nuclear Operations, Inc. (ENOI) submitted a Spent Fuel Management Plan on June 7, 2007 (Reference 1), as supplemented by its responses to the NRC staff's Requests for Additional Information, which ENOI submitted on April 9, 2008 (Reference 2) and October 14, 2008 (Reference 3). ENOI submitted its plan pursuant to 10 CFR 50.54(bb), which requires power reactor licensees to submit a spent fuel management and funding program for NRC review five years prior to the expiration of a reactor operating license. At the time, the PNPS operating license was set to expire on June 8, 2012. On January 7, 2009, the NRC staff approved the PNPS Spent Fuel Management Plan on a preliminary basis (Reference 4).

By letter dated November 10, 2015, ENOI notified the NRC of its intent to permanently cease power operations at PNPS no later than June 1, 2019 (Reference 5).

Pursuant to 10 CFR 50.54(bb), licensees are required to notify the NRC of any significant changes to their proposed spent fuel management plans. As a result of its decision to permanently cease operations at PNPS and related changes to the anticipated schedule of decommissioning activities, irradiated fuel management activities, and decommissioning funding assumptions, ENOI is modifying the PNPS Spent Fuel Management Plan (SFMP). This submittal provides the required Section 50.54(bb) notification, and this Updated SFMP supersedes all prior versions of the SFMP.

Pursuant to 10 CFR 50.82(a)(4)(i), on November 16, 2018, ENOI submitted a Post Shutdown Decommissioning Activities Report (PSDAR) for PNPS that included a site-specific decommissioning cost estimate (DCE) as an attachment (Reference 6). The DCE describes the bases for the assumptions regarding the U.S. Department of Energy's (DOE) acceptance of spent fuel from the industry and from PNPS. As discussed in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), the SFMP is based on the assumption that DOE will commence acceptance of PNPS's spent fuel in 2030 and complete removal of all spent fuel from the site in 2062, consistent with the current DOE spent fuel management and acceptance strategy.[1] The DCE identifies the details, schedules, and costs of spent fuel management activities associated with the SFMP, along with license termination and site restoration activities and costs.

[1] As noted in the DCE, DOE's repository program assumes that spent fuel is accepted for disposal from the nation's commercial nuclear plants in the order in which it was removed from service ("oldest fuel first"). The contracts that U.S. generators have with the DOE provide a number of mechanisms for altering the oldest fuel first allocation scheme, including emergency deliveries, exchanges of allocations amongst generators, and the option of providing priority acceptance from permanently shut down nuclear reactors. PNPS will seek the most expeditious means of removing fuel from the site when DOE commences performance. Given DOE's failure to accept fuel under its contracts, however, it is unclear how these mechanisms will operate once DOE begins accepting spent fuel from commercial reactors. Accordingly, for planning purposes only, this SFMP conservatively assumes that DOE will accept spent fuel in an oldest fuel first order.

II. Spent Fuel Management Strategy

At the time of shutdown, there will be a total of 4,114 spent fuel assemblies at the PNPS site, including 580 fuel assemblies residing in the reactor as part of the current operating cycle, 2,378 spent fuel assemblies stored in the spent fuel pool, and 1,156 assemblies stored in 17 dry storage casks on an independent spent fuel storage installation (ISFSI) facility. In 2014, construction of the ISFSI pad was completed, which PNPS operates under the General License in 10 CFR 72.210. PNPS uses the Holtec HI-STORM 100 dry cask storage system for the spent fuel that is currently stored on the ISFSI. The system consists of a multipurpose canister (MPC) with a nominal capacity of 68 fuel assemblies and a concrete storage overpack. The existing ISFSI pad was constructed with a capacity of 40 dry storage casks, which is administratively limited to a capacity of 38 casks to allow for cask movement and access. PNPS completed fuel loading campaigns to the ISFSI in 2015, 2016, and 2018.

As indicated in the PNPS PSDAR (Reference 6), PNPS owner Entergy Nuclear Generation Company (ENGC) has selected the SAFSTOR decommissioning option. The SFMP assumes that radiological decommissioning is completed within 60 years of permanent plant shutdown (i.e., by June 1, 2079). Following shutdown, the reactor building will be operated as an interim wet fuel storage facility for approximately three years after operations cease. During this time period, the spent fuel residing in the storage pool will be transferred to dry storage. The ISFSI will remain operational until DOE is able to complete the transfer of the fuel to a repository or interim storage facility.

The PSDAR and DCE describe three major phases related to spent fuel management at PNPS, which are summarized below.[2]

Table 1 - Spent Fuel Management Plan: Summary Schedule and Costs

Decommissioning Period	Start	End	Approximate Duration (Years)	Estimated Cost (thousands of 2018 dollars)
Periods 0 and 1: Planning and Preparations for Dormancy	2018	March 2020	1.84	$93,869
Period 2a: Dormancy with Wet Fuel Storage	March 2020	2022	2.8	$134,770
Period 2b: Dormancy with Dry Fuel Storage	2022	2062	40	$191,611
TOTAL			**44.64**	**$420,250**

[2] Appendix C to the DCE (Reference 6, Attachment 1) includes a detailed cost analysis of all decommissioning activities, including spent fuel management activities, by period.

1. Pre-Shutdown Planning and Preparations for SAFSTOR Dormancy

   Pre-shutdown spent fuel management planning activities include designing a consolidated ISFSI facility that will include a single storage pad that will have space to accommodate a total of 61 casks, which will allow for dry storage of all spent fuel assemblies generated during the plant's operational history. The planned location for the consolidated ISFSI facility is in an area of the site that is southwest of the power block.

   The estimated spent fuel management costs associated with ISFSI design, and other expenses during this initial phase, such as emergency planning and preparations for dormancy, total approximately $93.9 million.

2. Dormancy with Wet Fuel Storage

   The initial decommissioning activities to be performed after plant shutdown will focus primarily on preparing the plant for a period of safe-storage (also referred to as dormancy) and constructing the consolidated ISFSI facility. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. PNPS expects to begin construction of the consolidated ISFSI pad in 2019, assuming the timely receipt of required permits.

   PNPS expects to begin transferring the remaining spent fuel from the spent fuel pool to dry storage in 2020 and to complete the transfer of all fuel to the consolidated ISFSI by mid-2022. In addition, the 17 casks that are currently stored on the existing ISFSI pad will be relocated to the consolidated ISFSI facility. In total, 4,114 spent fuel assemblies will be stored in 61 dry cask systems on the new consolidated ISFSI pad. After the fuel transfer is completed, the pool will be drained and supporting systems will be de-energized for the remainder of the dormancy period.

   Costs in this phase total approximately $134.8 million and include: construction of the consolidated ISFSI facility (including the new storage pad, other ISFSI infrastructure, and related security modifications), 44 additional dry cask systems, and transferring fuel from the spent fuel pool to the ISFSI.

3. Dormancy with Dry Fuel Storage

   During this phase, the spent fuel will remain stored on the ISFSI until DOE accepts the fuel and removes it from the site. As discussed above and in the DCE (Reference 6, Attachment 1), for planning purposes, the SFMP assumes that DOE will begin removing fuel from PNPS in 2030 and will complete the removal of all spent fuel from the site in 2062, according to the schedule set forth in Table 2 below.

   During this phase, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Equipment maintenance, monitoring, and inspection will be performed as necessary. PNPS will also maintain a 24-hour security force, which will safeguard the spent fuel for as long as it remains on site. A security barrier, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the spent fuel. The estimated average annual cost to operate the ISFSI during this phase is

approximately $5 million, which reflects the portion of the total site caretaking costs that is allocated to the Spent Fuel Management cost category.

Late in the dormancy period, additional activities will include transferring the spent fuel from the ISFSI to the DOE. The estimated cost for the eventual transfer of the MPCs to a DOE-provided transport vehicle for off-site disposal is approximately $10.5 million.[3]

The total estimated spent fuel management cost associated with this phase is approximately $191.6 million.

Table 2 - Spent Fuel Management Schedule
(Fuel Assembly Totals by Location)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2018	2,378	1,156	
2019	2,958	1,156	
2020	2,958	1,156	
2021	2,958	1,156	
2022	0	4,114	
2023		4,114	
2024		4,114	
2025		4,114	
2026		4,114	
2027		4,114	
2028		4,114	
2029		4,114	
2030		4,094	20
2031		3,962	132
2032		3,534	428
2033		3,534	0
2034		3,442	92

[3] As noted in the DCE (Reference 6, Attachment 1), DOE has breached its obligations to remove fuel from reactor sites on the contracted schedule, and has also failed to provide plant owners with information about how it will ultimately perform and fulfill its obligation. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to the Standard Contract, but DOE has not explained what costs any such amendment would involve. Consequently, the plant owner has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will specifically deal with already-canistered fuel, and for purposes of the DCE only, the PNPS DCE assumes that there will be no additional costs associated with DOE's acceptance of such fuel, as such fuel will be contained in MPCs developed to be suitable for storage, transport and permanent disposal. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers, and to dispose of existing containers.

Table 2 - Spent Fuel Management Schedule (continued)
(Fuel Assembly Totals by Location)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2035		3,210	232
2036		2,986	224
2037		2,986	0
2038		2,794	192
2039		2,794	0
2040		2,794	0
2041		2,626	168
2042		2,486	140
2043		2,350	136
2044		2,350	0
2045		2,144	206
2046		2,128	16
2047		1,984	144
2048		1,840	144
2049		1,676	164
2050		1,676	0
2051		1,516	160
2052		1,356	160
2053		1,356	0
2054		1,200	156
2055		1,048	152
2056		1,048	0
2057		896	152
2058		896	0
2059		752	144
2060		580	172
2061		580	0
2062		0	580
Total			**4,114**

III. ISFSI Decommissioning

The ISFSI pads and facilities will be decommissioned at the time of plant decommissioning or after DOE has removed all spent fuel from the site. The bases and assumptions used to formulate the cost estimate are discussed in the DCE (Reference 6, Attachment 1). As detailed in Appendix D to the DCE, the estimated cost to decommission the ISFSI is approximately $9.4 million (assuming a 25% contingency).

IV. Funding Demonstration for License Termination and Spent Fuel Management Operations Costs

As shown in the DCE (Reference 6, Attachment 1), the projected total cost to decommission PNPS, after an extended period of safe storage, is estimated at $1.66 billion (in 2018 dollars). This amount includes estimated costs associated with license termination ($1.19 billion), spent fuel management ($420.25 million), and site restoration ($53.01 million) activities.

As of October 31, 2018, the PNPS decommissioning trust fund balance was $1,051,722,466. Tables 3.2a and 3.2b of the DCE (Reference 6, Attachment 1) set forth the estimated annual expenditures for license termination and spent fuel management, respectively. For convenience, those tables are reproduced below as Tables 3 and 4. This annual expenditure information is used in the cash flow analysis in Table 5 below.[4] The cash flow analysis demonstrates that the PNPS trust fund is sufficiently funded for all license termination, spent fuel management, and site restoration activities.

Thus, considering the fund balance of $1.05 billion (as of October 31, 2018) and projected fund earnings during the SAFSTOR period (assuming an annual 2% growth rate), the trust fund is expected to have an excess of approximately $152.87 million over the estimated license termination, spent fuel management costs, and site restoration costs.

[4] The same cash flow analysis table is reproduced as Table 4 of ENOI's November 16, 2018 Request for Exemption from 10 CFR 50.82(a)(8)(i)(A) (Reference 7).

Table 3 - License Termination Expenditures
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2018	0	0	0	0	19,142	19,142
2019	45,256	1,040	1,409	276	52,043	100,024
2020	22,178	1,040	1,572	539	36,245	61,574
2021	13,526	454	1,157	323	30,572	46,032
2022	13,526	454	1,157	323	28,339	43,799
2023	2,276	130	524	7	11,579	14,516
2024	2,282	130	525	7	3,953	6,897
2025	2,276	130	524	7	3,322	6,259
2026	2,276	130	524	7	2,947	5,884
2027	2,276	130	524	7	2,947	5,884
2028	2,282	130	525	7	2,953	5,897
2029	2,276	130	524	7	2,947	5,884
2030	2,276	130	524	7	2,947	5,884
2031	2,276	130	524	7	2,947	5,884
2032	2,282	130	525	7	2,953	5,897
2033	2,276	130	524	7	2,947	5,884
2034	2,276	130	524	7	2,947	5,884
2035	2,276	130	524	7	2,947	5,884
2036	2,282	130	525	7	2,953	5,897
2037	2,276	130	524	7	2,947	5,884
2038	2,276	130	524	7	2,947	5,884
2039	2,276	130	524	7	2,947	5,884
2040	2,282	130	525	7	2,953	5,897
2041	2,276	130	524	7	2,947	5,884
2042	2,276	130	524	7	2,947	5,884
2043	2,276	130	524	7	2,947	5,884
2044	2,282	130	525	7	2,953	5,897
2045	2,276	130	524	7	2,947	5,884
2046	2,276	130	524	7	2,947	5,884
2047	2,276	130	524	7	2,947	5,884
2048	2,282	130	525	7	2,953	5,897
2049	2,276	130	524	7	2,947	5,884
2050	2,276	130	524	7	2,947	5,884
2051	2,276	130	524	7	2,947	5,884
2052	2,282	130	525	7	2,953	5,897
2053	2,276	130	524	7	2,947	5,884
2054	2,276	130	524	7	2,947	5,884
2055	2,276	130	524	7	2,947	5,884
2056	2,282	130	525	7	2,953	5,897
2057	2,276	130	524	7	2,947	5,884
2058	2,276	130	524	7	2,947	5,884

Table 3 - License Termination Expenditures (continued)
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2059	2,276	130	524	7	2,947	5,884
2060	2,282	130	525	7	2,953	5,897
2061	2,276	130	524	7	2,947	5,884
2062	2,276	130	524	7	2,947	5,884
2063	1,663	298	216	6	2,514	4,697
2064	1,668	298	217	6	2,521	4,710
2065	1,663	298	216	6	2,514	4,697
2066	1,663	298	216	6	2,514	4,697
2067	1,663	298	216	6	2,514	4,697
2068	1,668	298	217	6	2,521	4,710
2069	1,663	298	216	6	2,514	4,697
2070	1,663	298	216	6	2,514	4,697
2071	1,663	298	216	6	2,514	4,697
2072	1,668	298	217	6	2,521	4,710
2073	22,411	1,183	1,324	21	3,694	28,634
2074	38,252	8,293	2,154	5,384	7,668	61,751
2075	47,682	24,256	2,053	68,469	17,586	160,046
2076	63,341	15,092	1,775	41,144	16,992	138,344
2077	66,082	10,159	1,621	26,451	16,606	120,920
2078	56,725	7,373	1,230	17,765	13,112	96,205
2079	15,548	693	178	12	2,457	18,888
2080	137	0	0	0	0	137
Total	**512,400**	**78,223**	**38,769**	**161,050**	**397,552**	**1,187,994**

Table 4 - Spent Fuel Management Expenditures
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2018	4,033	12,100	0	0	0	16,133
2019	11,838	35,513	0	0	12,665	60,016
2020	12,611	28,315	0	0	13,768	54,694
2021	12,272	24,230	0	0	12,396	48,898
2022	12,272	24,230	0	0	12,396	48,898
2023	4,188	0	0	0	8,694	12,882
2024	4,200	0	0	0	122	4,322
2025	4,188	0	0	0	122	4,310
2026	4,188	0	0	0	122	4,310
2027	4,188	0	0	0	122	4,310
2028	4,200	0	0	0	122	4,322
2029	4,188	0	0	0	122	4,310
2030	4,188	0	0	0	122	4,310
2031	4,274	259	0	0	122	4,655
2032	4,501	906	0	0	122	5,529
2033	4,188	0	0	0	122	4,310
2034	4,231	129	0	0	122	4,482
2035	4,361	518	0	0	122	5,000
2036	4,329	388	0	0	122	4,839
2037	4,188	0	0	0	122	4,310
2038	4,317	388	0	0	122	4,827
2039	4,188	0	0	0	122	4,310
2040	4,200	0	0	0	122	4,322
2041	4,317	388	0	0	122	4,827
2042	4,274	259	0	0	122	4,655
2043	4,274	259	0	0	122	4,655
2044	4,200	0	0	0	122	4,322
2045	4,317	388	0	0	122	4,827
2046	4,188	0	0	0	122	4,310
2047	4,274	259	0	0	122	4,655
2048	4,286	259	0	0	122	4,667
2049	4,317	388	0	0	122	4,827
2050	4,188	0	0	0	122	4,310
2051	4,274	259	0	0	122	4,655
2052	4,286	259	0	0	122	4,667
2053	4,188	0	0	0	122	4,310
2054	4,274	259	0	0	122	4,655
2055	4,274	259	0	0	122	4,655
2056	4,200	0	0	0	122	4,322
2057	4,274	259	0	0	122	4,655
2058	4,188	0	0	0	122	4,310

Table 4 - Spent Fuel Management Expenditures (continued)
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2059	4,274	259	0	0	122	4,655
2060	4,329	388	0	0	122	4,839
2061	4,188	0	0	0	122	4,310
2062	4,576	1,164	0	0	122	5,862
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
Total	**223,294**	**132,279**	**0**	**0**	**64,677**	**420,250**

Table 5 - Annual Cash Flow Analysis

Pilgrim Nuclear Power Station - SAFSTOR Methodology

Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management, and Site Restoration Costs

(In Thousands, 2018 Dollars)

	Date	Amount
Total Trust Fund Balance as of	10/31/2018	$ 1,051,722
Start of Decommissioning	06/01/2019	
Decommissioning Funds value at Calculation Date	10/31/2018	$ 1,051,722
Total Estimated Costs at Calculation Date	10/31/2018	$ 1,661,258

0.000%	Cost Escalation Rate	Start of Decom to end of Decom - Assumes 0.0% Decom cost escalation rate
2.000%	Fund Earnings Rate	Start of Decom to end of Decom - Assumes 2.0% Earnings Rate

Pilgrim Nuclear Power Station - SAFSTOR Methodology

Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management, and Site Restoration Costs

(In Thousands in 2018 Dollars)

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2018	19,142	16,133	0	35,275	1,051,722	0	0	1,051,722	3,506	1,055,228
2019	100,024	60,016	0	160,040	1,055,228	195,315	0	859,913	17,198	877,112
2020	61,574	54,694	0	116,268	877,112	116,268	0	760,844	15,217	776,061
2021	46,032	48,898	0	94,930	776,061	94,930	0	681,131	13,623	694,753
2022	43,799	48,898	0	92,697	694,753	92,697	0	602,056	12,041	614,097
2023	14,516	12,882	0	27,398	614,097	27,398	0	586,699	11,734	598,433
2024	6,897	4,322	0	11,219	598,433	11,219	0	587,214	11,744	598,958
2025	6,259	4,310	0	10,569	598,958	10,569	0	588,390	11,768	600,158
2026	5,884	4,310	0	10,194	600,158	10,194	0	589,964	11,799	601,763
2027	5,884	4,310	0	10,194	601,763	10,194	0	591,570	11,831	603,401
2028	5,897	4,322	0	10,219	603,401	10,219	0	593,182	11,864	605,046
2029	5,884	4,310	0	10,194	605,046	10,194	0	594,852	11,897	606,749

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2030	5,884	4,310	0	10,194	606,749	10,194	0	596,556	11,931	608,487
2031	5,884	4,655	0	10,539	608,487	10,539	0	597,948	11,959	609,907
2032	5,897	5,529	0	11,427	609,907	11,427	0	598,481	11,970	610,450
2033	5,884	4,310	0	10,194	610,450	10,194	0	600,257	12,005	612,262
2034	5,884	4,482	0	10,366	612,262	10,366	0	601,896	12,038	613,934
2035	5,884	5,000	0	10,884	613,934	10,884	0	603,050	12,061	615,111
2036	5,897	4,839	0	10,737	615,111	10,737	0	604,375	12,087	616,462
2037	5,884	4,310	0	10,194	616,462	10,194	0	606,268	12,125	618,394
2038	5,884	4,827	0	10,711	618,394	10,711	0	607,683	12,154	619,837
2039	5,884	4,310	0	10,194	619,837	10,194	0	609,643	12,193	621,836
2040	5,897	4,322	0	10,219	621,836	10,219	0	611,617	12,232	623,849
2041	5,884	4,827	0	10,711	623,849	10,711	0	613,138	12,263	625,401
2042	5,884	4,655	0	10,539	625,401	10,539	0	614,862	12,297	627,159
2043	5,884	4,655	0	10,539	627,159	10,539	0	616,621	12,332	628,953
2044	5,897	4,322	0	10,219	628,953	10,219	0	618,734	12,375	631,109
2045	5,884	4,827	0	10,711	631,109	10,711	0	620,398	12,408	632,806
2046	5,884	4,310	0	10,194	632,806	10,194	0	622,612	12,452	635,065
2047	5,884	4,655	0	10,539	635,065	10,539	0	624,526	12,491	637,017
2048	5,897	4,667	0	10,564	637,017	10,564	0	626,452	12,529	638,981
2049	5,884	4,827	0	10,711	638,981	10,711	0	628,270	12,565	640,836
2050	5,884	4,310	0	10,194	640,836	10,194	0	630,642	12,613	643,255
2051	5,884	4,655	0	10,539	643,255	10,539	0	632,717	12,654	645,371
2052	5,897	4,667	0	10,564	645,371	10,564	0	634,807	12,696	647,503
2053	5,884	4,310	0	10,194	647,503	10,194	0	637,309	12,746	650,056
2054	5,884	4,655	0	10,539	650,056	10,539	0	639,517	12,790	652,307
2055	5,884	4,655	0	10,539	652,307	10,539	0	641,769	12,835	654,604
2056	5,897	4,322	0	10,219	654,604	10,219	0	644,385	12,888	657,273
2057	5,884	4,655	0	10,539	657,273	10,539	0	646,734	12,935	659,669
2058	5,884	4,310	0	10,194	659,669	10,194	0	649,476	12,990	662,465

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2059	5,884	4,655	0	10,539	662,465	10,539	0	651,927	13,039	664,965
2060	5,897	4,839	0	10,737	664,965	10,737	0	654,228	13,085	667,313
2061	5,884	4,310	0	10,194	667,313	10,194	0	657,119	13,142	670,262
2062	5,884	5,862	0	11,746	670,262	11,746	0	658,516	13,170	671,686
2063	4,697	0	0	4,697	671,686	4,697	0	666,989	13,340	680,329
2064	4,710	0	0	4,710	680,329	4,710	0	675,619	13,512	689,131
2065	4,697	0	0	4,697	689,131	4,697	0	684,434	13,689	698,122
2066	4,697	0	0	4,697	698,122	4,697	0	693,425	13,869	707,294
2067	4,697	0	0	4,697	707,294	4,697	0	702,596	14,052	716,648
2068	4,710	0	0	4,710	716,648	4,710	0	711,938	14,239	726,177
2069	4,697	0	0	4,697	726,177	4,697	0	721,480	14,430	735,909
2070	4,697	0	0	4,697	735,909	4,697	0	731,212	14,624	745,836
2071	4,697	0	0	4,697	745,836	4,697	0	741,139	14,823	755,962
2072	4,710	0	0	4,710	755,962	4,710	0	751,252	15,025	766,277
2073	28,634	0	325	28,959	766,277	28,959	0	737,318	14,746	752,065
2074	61,751	0	713	62,464	752,065	62,464	0	689,601	13,792	703,393
2075	160,046	0	261	160,307	703,393	160,307	0	543,086	10,862	553,947
2076	138,344	0	339	138,683	553,947	138,683	0	415,264	8,305	423,570
2077	120,920	0	379	121,298	423,570	121,298	0	302,271	6,045	308,317
2078	96,205	0	254	96,460	308,317	96,460	0	211,857	4,237	216,094
2079	18,888	0	19,836	38,724	216,094	38,724	0	177,371	3,547	180,918
2080	137	0	30,907	31,044	180,918	31,044	0	149,874	2,997	152,872
Total	**1,187,994**	**420,250**	**53,014**	**1,661,258**		**1,661,258**	**0**	**38,996,799**	**762,407**	**152,872**

Table 5 Definitions:

Column 1: **50.75 License Termination Cost**

Reflects the total annual License Termination costs in 2018 dollars at a 0.0% escalation rate

Column 2: **50.54 (bb) Spent Fuel Management Cost**

Reflects the total annual Spent Fuel Management costs in 2018 dollars at a 0.0% escalation rate

Column 3: **Site Restoration Cost**

Reflects the total annual Site Restoration costs in 2018 dollars at a 0.0% escalation rate

Column 4: **Total Cost**

Reflects the total annual License Termination costs plus total annual Spent Fuel Management costs plus total annual Site Restoration costs, all in 2018 dollars at a 0.0% escalation rate (Column 1 + Column 2 + Column 3)

Column 5: **Beginning of Year Trust Fund Balance**

Reflects the beginning of year Trust Fund balance in 2018 dollars at a 0.0% escalation rate and 2.0% Fund Earnings

Column 6: **Withdraw**

Reflects the annual expenditures from the Trust Fund in 2018 dollars at a 0.0% escalation rate

Column 7: **Contribute**

Reflects the annual contributions to the Trust Fund in 2018 dollars at a 0.0% escalation rate

Column 8: **Balance for Earnings Calculation**

Reflects the Trust Fund balance in 2018 dollars used to calculate the Trust Fund Earnings (Column 5 – Column 6)

Column 9: **Trust Fund Earnings**

Reflects earnings on funds remaining in the Trust Fund. A 2.0% earnings rate is used over a 0.0% cost escalation rate. The annual 2.0% earnings are calculated on the balance after the annual expenditures are removed (Column 8 * 2.0%)

Column 10: **Year Ending Trust Fund Balance**

Reflects the end of year Trust Fund balance after all projected earnings are added and all projected expenditures are deducted for year-end, specified at a 0.0% escalation rate and 2.0% fund earnings in 2018 dollars (Column 5 – Column 6 + Column 9)

V. Regulatory Activities

The SFMP assumes withdrawals from the PNPS decommissioning trust fund for spent fuel management. ENOI is making a separate submittal to request an exemption in accordance with 10 CFR 50.12 from the requirements of 10 CFR 50.82(a)(8)(i)(A), which if approved, would permit the use of decommissioning trust funds for spent fuel management and site restoration expenses (Reference 7). The availability of decommissioning funding sources will be periodically revisited to ensure that withdrawals from the fund do not inhibit the ability to complete license termination and spent fuel management activities.

In addition, in accordance with 10 CFR 50.82(a)(8)(vii), ENOI will submit a report on the status of spent fuel management funding by March 31 of each year. The report will include, current through the end of the previous calendar year, the amount of funds accumulated to cover the cost of managing spent fuel, the projected cost of managing spent fuel until it is transferred to DOE, and if the funds accumulated do not cover the projected cost, a plan to provide additional funding assurance using one of the methods allowed by NRC regulations.

VI. Summary

The spent fuel management activities described in this Updated SFMP must be performed in conjunction with license termination activities. The annual cash flow analysis provided in Table 5 demonstrates that the PNPS decommissioning trust fund with projected earnings is sufficient to cover the estimated license termination and spent fuel management costs.

VII. References

1. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Spent Fuel Management Plan Submittal in accordance with 10 CFR 50.54(bb),” 2.07.055, dated June 7, 2007 (ML071700121)

2. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Response to NRC Request for Additional Information (RAI) Regarding Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb),” 2.08.018, dated April 9, 2008 (ML081060520)

3. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Response to Request for Additional Information to Support the Review of the Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb) and the Preliminary Decommissioning Cost Estimate Pursuant to 10 CFR 50.75(f)(3),” 2.08.052, dated October 14, 2008 (ML082910039)

4. Letter, USNRC to Entergy Nuclear Operations, Inc., Pilgrim Nuclear Power Station - Safety Evaluation Re: Spent Fuel Management Program and Preliminary Decommissioning Cost Estimate (TAC Nos. MD8036 and MD9416), 1.09.001, dated January 7, 2009 (ML083190292)

5. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Notification of Permanent Cessation of Power Operations,” 2.15.080, dated November 10, 2015 (ML15328A053)

6. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Pilgrim Nuclear Power Station Post-Shutdown Decommissioning Activities Report,” 2.18.070, dated November 16, 2018

7. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Request for Exemption from 10 CFR 50.82(a)(8)(i)(A),” 2.18.069, dated November 16, 2018

NMC
Committed to Nuclear Excellence

Nuclear Management Company, LLC

April 21, 2006

L-HU-06-16
10 CFR 50.75
10 CFR 50.54

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Palisades Nuclear Plant
Docket No. 50-255
License No. DPR-20

Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimates for Palisades Nuclear Plant

References: 1) Nuclear Management Company, LLC (NMC) letter to US Nuclear Regulatory Commission (NRC), "Application for Renewed Operating License," dated March 22, 2005. (ADAMS Accession No. ML050940434)

2) Nuclear Management Company, LLC (NMC) letter to US Nuclear Regulatory Commission (NRC), "Decommissioning Funding Status," dated March 22, 2006. (ADAMS Accession No. ML060810686)

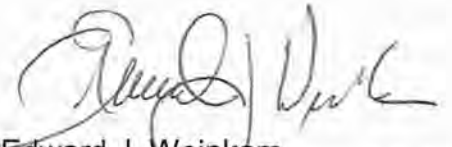
The enclosed Irradiated Fuel Management Plan (Enclosure 1) and Preliminary Decommissioning Cost Estimate (Enclosure 2) are being submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.54(bb) "Conditions of Licenses," and 10 CFR 50.75(f)(2), "Reporting and Recordkeeping for Decommissioning Planning," respectively, for the aforementioned plant. As holder of the plant operating license, Nuclear Management Company, LLC (NMC) is submitting these reports on behalf of the plant owner, Consumers Energy. The financial information presented herein reflects information provided to NMC by the plant owner, Consumers Energy.

Pursuant to 10 CFR 50.54(bb), a licensee shall "submit written notification to the Commission for its review and preliminary approval of the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor following permanent cessation of operation of the reactor until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository." Accordingly, the Irradiated Fuel Management Plan (Enclosure 1) is provided for your review and preliminary approval.

Additionally, 10 CFR 50.75(f)(2), "Reporting and recordkeeping for decommissioning planning" states, "each power reactor licensee shall at or about 5 years prior to the projected end of operations submit a preliminary decommissioning cost estimate which includes an up-to-date assessment of the major factors that could affect the cost to decommission." Accordingly, the Preliminary Decommissioning Cost Estimate (Enclosure 2) is provided for your review and approval.

NMC submitted a sufficient application for renewal of an operating license (Reference 1) and therefore, in accordance with 10 CFR 2.109, "Effect of Timely Renewal Application," "the existing license will not be deemed to have expired until the application has been finally determined." Although NMC is seeking license renewal, the Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimate are submitted based on the current operating license expiration date of March 24, 2011 for Palisades Nuclear Plant. If Palisades' license is renewed, the current Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimate would no longer be applicable and a new plan and cost estimate will be submitted in accordance with 10 CFR 50.54(bb) and 10 CFR 50.75(f)(2), respectively.

This letter contains no new commitments and no revisions to existing commitments.



Edward J. Weinkam
Director, Nuclear Licensing & Regulatory Services
Nuclear Management Company, LLC

Enclosures (2)

cc: Regional Administrator, USNRC, Region III
NRR Project Manager, Palisades Nuclear Plant, USNRC
NRC Resident Inspector, Palisades Nuclear Plant, USNRC
Consumers Energy:
Manager of Depreciation and Decommissioning, Jan Anderson
Asset Manager, Steve Wawro

Enclosure 1

Irradiated Fuel Management Plan For Palisades Nuclear Plant

Background

The Preliminary Decommissioning Cost Estimate (see Enclosure 2) in accordance with 10 CFR 50.75(f)(2) for Palisades Nuclear Plant (PNP) evaluates a SAFSTOR decommissioning option with a March 2011 shutdown date. The Irradiated Fuel Management Plan is also based on the SAFSTOR analysis and March 2011 shutdown date. There are two licensed independent spent fuel storage installations (ISFSIs) on the PNP site. The newly constructed ISFSI was designed to store all spent fuel in dry storage if needed, including spent fuel currently stored in the old ISFSI. Consumers Energy reserves the right to choose the ultimate decommissioning option in accordance with its business needs, recognizing the need to ensure the chosen option meets NRC requirements for decommissioning funding

This Irradiated Fuel Management Plan also considers impact of the spent fuel currently stored at Consumers Energy's Big Rock Point Nuclear Plant (BRP) in Charlevoix County, Michigan. BRP was permanently shut down on August 29, 1997. The spent fuel currently resides in an on-site ISFSI.

Spent Fuel Management Strategy

The NRC requires (10 CFR 50.54(bb)) that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the U. S. Department of Energy (DOE). Interim storage of the fuel will be in the storage pool and/or ISFSIs located on the PNP site until the DOE has completed the transfer. The ISFSIs are independently licensed and operated and will accommodate the inventory of spent fuel residing in PNP's storage pool at the conclusion of the required cooling period. The newly constructed ISFSI was designed to store all spent nuclear fuel on-site. Once the spent fuel is emptied, the Auxiliary Building can be prepared for long-term storage.

The spent fuel pool will remain operational for a minimum of eight years following the cessation of operations. The pool will be isolated and a spent fuel island created. Over the eight-year period, the spent fuel will be packaged into transportable steel canisters for loading into DOE-provided transport casks. The canisters will be stored in concrete overpacks at the PNP ISFSIs until the DOE is able to receive them.

The shipping of spent nuclear fuel assemblies to DOE during decommissioning is based upon several assumptions. Consumers Energy directed TLG Services, Inc, to prepare the "Decommissioning Cost Study for Palisades Nuclear Plant" using 2010 as the year DOE would begin accepting spent fuel. The DOE generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority, and Consumers Energy has no allocations in year 1. It is assumed that the BRP would first use Consumers' allocations, beginning in year 2. Shipment of PNP spent fuel would commence once BRP spent fuel had been completely removed from the site. For purposes of the TLG study, this date was assumed to be 2013. However, any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer

process and result in the fuel remaining at the site longer. In the SAFSTOR scenario, spent fuel is expected to remain at the site for approximately 37 years after the cessation of operations. Consequently, costs are included within this analysis for the continued operation of the storage pool and ISFSIs, as required, and for the long-term caretaking of the spent fuel until the year 2048. At the conclusion of the spent fuel transfer process, each ISFSI will be decommissioned.

Operation and maintenance costs for the storage facilities (ISFSIs and the spent fuel pool) are included within the estimate below and address the cost for staffing the facilities, maintenance of necessary operational requirements as well as security, insurance, and licensing fees. The estimate includes the costs to purchase, load, and transfer the fuel storage canisters to an ISFSI. A cost-estimate for spent fuel management at PNP under the SAFSTOR scenario may be found in Table 2.

In the event that PNP ceases operation in 2011, PNP will continue to comply with existing NRC licensing requirements, including the operation and maintenance of the systems and structures needed to support continued operation of the spent fuel pool and each ISFSI, as necessary, under the decommissioning scenario ultimately selected. In addition, PNP will also comply with applicable license termination requirements in accordance with 10 CFR 50.82 with respect to plant shutdown and post-shutdown activities including seeking such NRC approvals and on such schedules as necessary to satisfy these requirements consistent with the continued storage of irradiated fuel.

Cost Estimate and Funding For Spent Fuel Management Based on the SAFSTOR Decommissioning Option

The "Decommissioning Cost Study for Palisades Nuclear Plant," developed by TLG Services, Inc. included cost estimates of $297.9 million for spent fuel management, $584.1 million for decommissioning and $78.3 million for site restoration using a SAFSTOR scenario (Table 2). The total cost to decommission is estimated to be $960.3 million in 2003 dollars. The NRC minimum decommissioning financial assurance requirement as reported in Reference 2 and set forth in 10 CFR 50.75(c) for PNP is approximately $327.2 million.

As of December 31, 2005, the PNP decommissioning trust fund balance was $544.1 million. As approved by Michigan Public Service Commission (MPSC), this fund is being supplemented with annual contributions of approximately $5.5 million through the end of 2011. Adjustments to annual contributions amounts require Michigan Public Service Commission (MPSC) approval in rate proceedings. To the extent that the trust fund balance exceeds costs required for radiological decommissioning, trust fund monies, in conjunction with Consumers Energy operating revenues, will be used to pay for spent fuel management.

The following items are key costs estimates:

(1) The estimated cost to isolate the spent fuel pool and fuel handling systems is $9.6 million. This cost is based on spent fuel pool isolation costs at other decommissioning facilities and engineering judgment. This cost is considered part of the activities

Enclosure 1

necessary to maintain the spent fuel in a safe and controlled state both during the initial decommissioning activities and during the fuel cool-down period.

(2) Annual costs (excluding labor) of approximately $977,000 and $60,000 are used for operation and maintenance of the spent fuel pool and each ISFSI, respectively.

(3) Annual cost for spent fuel management in the ISFSI is estimated at approximately $6 million (Table 1, years 2033-2047). This cost is based on actual costs at decommissioned facilities, estimated costs for facilities similar to PNP, and engineering judgment. These costs would be incurred annually during the storage period.

(4) An average cost of $250,000 is used for labor to load/transport the spent fuel from the pool to the ISFSI pad, based on industry experience.

(5) The ISFSI Decontamination & Dismantling costs are estimated at $8.3 million.

The following schedule shows the fuel management costs as it relates to decommissioning periods for a SAFSTOR with dry storage scenario:

Period # [(a)]	Title	Cost 2003$ (thousands) [(b)]	Period Duration, Months
0/1	SAFSTOR Preparations (includes pre-shutdown early planning costs)	15,531	18.0
2	12.5 Year Dormancy Maintenance (includes spent fuel transfer to ISFSI)	160,398	150.0
3	Decommissioning Preparations	2,987	18.1
4	Delayed Decommissioning	8,232	49
5b	Site Restoration	3,707	19.5
5c	Post Decommissioning ISFSI Operations (annual average of approximately $6 million)	98,777	198.9
5d, e, f	ISFSI Decontamination & Site Restoration	8,318	6.0
	TOTALS[(c)]	297,950	459.5

[(a)] Figure 4.2, Decommissioning Timeline, TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.
[(b)] Table C, TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.
[(c)] Columns may not add due to rounding.

Enclosure 2

Palisades Nuclear Plant
Preliminary Decommissioning Cost Estimate

I. Introduction

This report presents a summary of the preliminary estimate of the cost to decommission Palisades Nuclear Plant (PNP), as required by 10CFR50.75(f)(2). This cost estimate is based on the "Decommissioning Cost Study for Palisades Nuclear Plant" conducted by TLG Services, Inc. and premised on the assumption that the plant permanently ceases to operate in March 2011. The estimate assumes the eventual removal of all contaminated and activated plant components and structural materials, such that the operating licenses may be terminated to permit unrestricted use of the site. Although Nuclear Management Company, LLC (NMC) is currently seeking license renewal for PNP, this cost estimate is being submitted based on the current operating license expiration date for PNP. If license renewal for PNP is granted, this Preliminary Decommissioning Cost Estimate would no longer be applicable and a new estimate will be submitted in accordance with 10CFR50.75(f)(2).

II. Comparison of the Preliminary Cost Estimate to the Minimum Required Decommissioning Fund

The minimum decommissioning financial assurance requirement for PNP, as reported in Reference 2 and set forth in 10CFR50.75(c), is approximately $327.2 million. The total preliminary decommissioning cost estimate base on the "Decommissioning Cost Study" is approximately $960.3 million. This estimate includes approximately $584.1 million for decommissioning costs, $297.9 million for spent fuel management and $78.3 million for site restoration (Table 2).

III. Assessment of Major Factors That Could Affect Preliminary Cost Estimate

A. Decommissioning Option/Method

This Preliminary Decommissioning Cost Estimate assumes a SAFSTOR decommissioning option with dry storage of spent nuclear fuel. This estimate assumes PNP cessation of operation in March 2011 and a Department of Energy (DOE) spent fuel repository open in 2010. Interim storage of the fuel will be in the storage pool and/or an ISFSI located on the PNP site until the DOE assumed title to the spent fuel. The ISFSIs, which are independently licensed and operated, will accommodate the inventory of spent fuel residing in PNP's storage pool at the conclusion of the required cooling period. Once emptied, the Auxiliary Building will be prepared for long-term storage. Decommissioning of the ISFSIs will commence once DOE has accepted title to all PNP fuel. This cost estimate scenario includes the decontamination and dismantlement of the facility, spent fuel management and restoration of the site.

B. Potential for Known or Suspected Contamination

The Preliminary Decommissioning Cost Estimate does not assume the remediation of any significant volume of contaminated soil. This assumption may be affected by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

C. LLW Disposition Plan

Low Level (Radioactive) Waste (LLW) disposal costs include processing, packaging, shipping, and burial/vendor costs. Palisades currently has access to the disposal facility in Barnwell, South Carolina; however, future use of this facility is likely to be limited. This Preliminary Decommissioning Cost Estimate assumes that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material. Therefore, for estimating purposes, waste disposal costs were generated using available pricing schedules for the currently operating facilities, i.e., at Barnwell in South Carolina and the Envirocare facility in Utah. Due to the high cost per cubic foot of LLW disposal, decontamination, recycling, conditioning and metal processing were incorporated into the decommissioning cost calculations in order to reduce the overall LLW disposal costs.

D. Preliminary Schedule of Decommissioning Activities

A schedule of the decommissioning scenario is illustrated in Table 2. Activity and period-dependent costs are estimated for each of the 5 decommissioning time periods, post-decommissioning ISFSI operation, and ISFSI decontamination and decommissioning. These time periods are briefly described in Section IV, below.

E. Other Factors That Could Significantly Affect the Cost to Decommission

NMC is currently unaware of any major site-specific factors that could have a significant effect on the cost of decommissioning. In order to anticipate unknown or unplanned occurrences during decommissioning, e.g. tool breakage, accidents, illnesses, weather delays, and labor stoppages, contingencies are applied to the cost estimates. Contingencies are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook" as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The amount of contingency depends on the status of design, procurement and construction; and the complexity and uncertainties within the defined project scope. The "Decommissioning Cost Study" conducted by TLG Services, Inc, examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. The composite contingency value calculated for the PNP SAFSTOR alternative is 20.37%. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

Enclosure 2

IV. Preliminary Cost Estimate Considerations

The Preliminary Decommissioning Cost Estimate is based on costs associated with the entire decommissioning work scope, including those activities related to the following periods of the decommissioning project: (0/1) SAFSTOR Preparations, (2) Dormancy, (3) Decommissioning Preparations, (4) Decommissioning Operations and (5) Site Restoration. The cost estimate also includes ISFSIs operating and decommissioning costs. The scope of each of those activities is described below. Disposition of LLW is also accounted for in the Preliminary Decommissioning Cost Estimate, as described in Section III.C, above.

A summary of activities and time duration for each SAFSTOR period follows (see Table 2 for cost estimates for each period):

(0/1) SAFSTOR Preparations: Includes preliminary engineering and planning to permanently de-fuel the reactor, revision of technical specifications applicable to operating conditions and requirements, a characterization of the facility and major components, and the development of the Post-Shutdown Decommissioning Activities Report (PSDAR). This period includes activities including, but not limited to, transfer of the spent fuel to the ISFSI, draining and de-energizing of non-contaminated systems, disposal of contaminated filter elements and resin beds, decontamination of the reactor coolant system, draining of the reactor vessel, preparing lighting, alarm, and security systems, and performing radiation surveys. Period duration is estimated at 18 months.

(2) Dormancy: Includes 24-hour security and surveillance, preventative and corrective maintenance of security systems, area lighting, buildings, heating and ventilation, routine radiological and environmental surveillance programs, and maintenance of structural integrity. Transfer of remaining spent fuel in the spent fuel pool to the ISFSI. Shipments of spent fuel from the ISFSI to the DOE should begin and occur throughout this period. Period duration is estimated at 150 months.

(3) Decommissioning Preparations: Includes reactivation of site services, engineering and planning, a detailed site characterization, the assembly of a decommissioning management organization, specification of transport and disposal requirements for activated and/or hazardous materials, final planning for decommissioning activities and the writing of activity specifications and detailed procedures. Period duration is estimated at 18.1 months.

(4) Decommissioning Operations: Includes physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the 10CFR50 operating license. Period duration is estimated at 49 months.

(5) Site Restoration: Includes activities required to remove contaminated materials and verify that residual radionuclide concentrations are below NRC limits. This will include prompt removal of site structures, removal of foundations and exterior walls to a nominal depth of three feet below grade, and fill and grading of the site. Period duration is estimated at 19.5 months.

Enclosure 2

ISFSI Operations and Decommissioning: The ISFSIs will continue to operate under a separate and independent license following the termination of the 10CFR50 license. At the conclusion of spent fuel operations, each ISFSI will be decommissioned. Once the canisters are removed, the modules will be dismantled, the storage pad removed, and the area will be graded and landscaped. Period duration is estimated at 204.9 months.

V. Plans for Adjusting Levels of Funding

NMC submitted a sufficient application for renewal of an operating license (Reference 1) and therefore, in accordance with 10 CFR 2.109, "Effect of Timely Renewal Application," "the existing license will not be deemed to have expired until the application has been finally determined." Although NMC is seeking license renewal, the Preliminary Decommissioning Cost Estimate is submitted based on the current operating license expiration date for PNP—March 24, 2011. If license renewal for Palisades is granted, the Preliminary Decommissioning Cost Estimate would no longer be applicable and a new plan and cost estimate will be submitted in accordance with 10 CFR 50.75(f)(2).

The cost to decommission PNP is estimated to be $960.3 million in 2003 dollars. The "Decommissioning Cost Study" for PNP developed by TLG Services, Inc. included cost estimates of approximately $584.1 million for decommissioning costs, $297.9 million for spent fuel management and $78.3 million for site restoration using a SAFSTOR scenario. The total estimated decommissioning costs by period and decommissioning activity are provided in Tables 1 and 2.

The NRC minimum decommissioning financial assurance requirement for PNP as reported in Reference 2 and set forth in10CFR50.75(c) is approximately $327.2 million. As of December 31, 2005, the PNP decommissioning trust fund balance was $544.1 million.

Consumers Energy applies reasonable earnings rates to the decommissioning funds throughout the decommissioning periods described above. In addition, the Preliminary Decommissioning Cost Estimate includes reasonable escalation factors for the decommissioning activities. Based on a cash flow analysis for the decommissioning activities to be performed for the periods described above, NMC believes that there is reasonable assurance that adequate decommissioning funds will be available to decommission PNP as described herein (assuming a 2011 shutdown). Consumers Energy plans to review the decommissioning fund status on a regular basis as described above.

Table 1 [a]
PNP Schedule of Annual Expenditures: SAFSTOR Scenario
(Thousands, 2003 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2008	0	0	0	0	8,698	8,698
2009	0	0	0	0	0	0
2010	0	0	0	0	0	0
2011	31,770	4,089	951	1,395	14,531	52,736
2012	31,337	5,504	1,103	1,253	12,854	52,051
2013	11,754	67	905	29	15,330	28,086
2014	11,754	67	905	29	15,330	28,086
2015	11,754	67	905	29	15,330	28,086
2016	11,786	67	908	29	15,372	28,163
2017	11,754	67	905	29	15,330	28,086
2018	11,754	67	905	29	15,330	28,086
2019	6,037	67	439	29	8,280	14,852
2020	2,767	67	172	29	4,251	7,286
2021	2,760	67	171	29	4,239	7,266
2022	2,760	67	171	29	4,239	7,266
2023	2,760	67	171	29	4,239	7,266
2024	2,767	67	172	29	4,251	7,286
2025	33,132	460	751	29	8,467	42,840
2026	47,846	19,175	896	13,849	17,353	99,119
2027	48,137	18,246	873	25,880	8,247	101,384
2028	45,222	4,710	686	20,784	6,547	77,950
2029	45,099	4,697	684	20,727	6,530	77,737
2030	18,915	2,255	282	1,157	12,902	35,512
2031	23,616	7,190	171	0	17,358	48,336
2032	10,958	3,053	107	0	9,858	23,977
2033	1,608	0	60	0	4,301	5,969
2034	1,608	0	60	0	4,301	5,969
2035	1,608	0	60	0	4,301	5,969
2036	1,612	0	60	0	4,313	5,985
2037	1,608	0	60	0	4,301	5,969
2038	1,608	0	60	0	4,301	5,969
2039	1,608	0	60	0	4,301	5,969
2040	1,612	0	60	0	4,313	5,985
2041	1,608	0	60	0	4,301	5,969
2042	1,608	0	60	0	4,301	5,969
2043	1,608	0	60	0	4,301	5,969
2044	1,612	0	60	0	4,313	5,985
2045	1,608	0	60	0	4,301	5,969
2046	1,608	0	60	0	4,301	5,969
2047	1,608	0	60	0	4,301	5,969
2048	1,624	705	60	22	20,023	22,434
2049	2,490	1,027	0	2,590	2,048	8,155
[b]	**454,688**	**71,920**	**14,198**	**88,027**	**331,491**	**960,325**

Table 2 [a]
PNP Summary of SAFSTOR Cost Estimate by Period Cost and Activity Cost
(Thousands, 2003 dollars)

	Total Contingency	Total Costs	NRC License Term Costs	Spent Fuel Management Costs	Site Restoration Costs
Period 0: Pre-Shutdown Early Planning	305	8,698	0	8,698	0
Period 1: Transition & Preparations	13,855	96,323	89,490	6,833	0
Period 2: Dormancy	22,478	229,730	69,332	160,398	0
Period 3: Preparations	14,756	110,217	106,256	2,987	974
Period 4: Decommissioning Operations	50,131	312,938	299,777	8,232	4,929
Period 5: Site Restoration, ISFSI Operations and D&D	9,609	78,794	2,678	3,707	72,409
Post-Decommissioning ISFSI Operations	50,237	115,308	16,531	98,777	0
ISFSI Decontamination & Decommissioning [b]	1,156	8,318	0	8,318	0
	162,527	**960,325**	**584,064**	**297,948**	**78,312**

[a] TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.
[b] Columns may not add due to rounding.

EXHIBIT 2

AFFIRMATION ITEM

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Chairman Allison M. Macfarlane

SUBJECT: SECY-14-0072 – FINAL RULE: CONTINUED STORAGE OF SPENT NUCLEAR FUEL (RIN 3150-AJ20)

Approved __X__ **Disapproved** __X__ **Abstain** _____

Not Participating _____

COMMENTS: **Below** ___ **Attached** __X__ **None** ___

SIGNATURE

8/7/2014
DATE

Entered on "STARS" Yes __X__ **No** ___

Chairman Macfarlane's Comments on SECY-14-0072
"Proposed Rule: Continued Storage of Spent Nuclear Fuel"

Introduction

I approve publishing the rule for the Continued Storage of Spent Nuclear Fuel, subject to the following comments and edits to the *Federal Register* Notice (FRN) and the final Generic Environmental Impact Statement for continued storage of spent nuclear fuel (GEIS). I do not approve publishing the GEIS without addressing the potential range of environmental impacts for indefinite storage, with and without institutional controls.

Under consideration is a rulemaking regarding the environmental impacts of continued storage of spent nuclear fuel *beyond* the licensed life of nuclear power reactor operations.[1] This is a departure from a "Waste Confidence Decision" by the Commission, which historically included a set of findings about the availability of a mined geologic repository and the safe management of spent nuclear fuel in the interim. The staff has by contrast prepared the GEIS for Commission consideration.[2] The GEIS addresses the environmental impacts of continued above ground storage and provides a regulatory basis for completing this rulemaking. The GEIS also documents the results of extensive engagement with the public on the matter and accounts for the feedback we received.

An important backdrop to the Commission's decision on this matter is how to make a determination about the environmental impacts of on-site storage of spent nuclear fuel until a repository is sited and constructed at an unknown time in the future – while not inadvertently enabling the continued postponement of efforts to secure a geologic disposal solution. In essence, the GEIS concludes that unavoidable adverse environmental impacts are "small" for short-term, long-term, and indefinite time frames for storage of spent nuclear fuel. The proverbial "elephant in the room" is this: if the environmental impacts of storing waste indefinitely on the surface are essentially small, then is it necessary to have a deep geologic disposal option?

Deep geologic disposal is necessary. A majority of the public, industry, academia, and regulators agree on the need for geologic storage. Their reasoning is based on a number of factors: intergenerational equity, safety risks posed by unmonitored spent fuel, the high costs of indefinite storage, and the potential security and proliferation risks posed by lower activity spent fuel. However, siting and operating a repository is challenging, politically and technically. I believe it is essential to account for the broader context of national policy related to the management and disposition of spent nuclear fuel. In short, the U.S. government has yet to meet its own long-established responsibility to site a repository for the permanent disposal of spent nuclear fuel, contrary to the hopes expressed in previous Waste Confidence decisions. I want to ensure that the NRC, through its own policymaking, does not tip the balance in the direction of avoiding this necessary task.

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[1] This rule is not applicable to the assessment of environmental impacts of spent fuel storage that occur during a reactor's licensed life for operation.

[2] The requirement to complete an environmental impact statement for major federal actions was established by the National Environmental Policy Act (NEPA) to promote informed decision-making by federal agencies and to ensure that information about potential environmental impacts of a pending federal action are available to both agency leadership and the public.

Therefore, my vote last year on the draft "Waste Confidence" rule continues to underpin my review of this final rule.[3] I am pleased that staff has addressed my belief that the Commission should not make a finding regarding the feasibility of repository availability as Commission policy. Staff is instead recommending that the Commission remove "waste confidence" from the lexicon and not include findings regarding repository availability in the final rule. I also objected to the assumption that institutional controls, the ability of the state to assure the safety and security of spent fuel, would continue indefinitely. I appreciate the staff's expanded discussion on institutional controls in Appendix B.3.4 of the GEIS, including the potential environmental impacts of both a temporary and a permanent loss of control. I still believe, however, that the GEIS needs to fully analyze the potential range of environmental impacts for indefinite storage, with and without institutional controls.

Lastly, I compliment our technical and legal staff for their work to complete this complex task on schedule. The Commission's charge to the staff demanded broad-based engagement with the public and extensive internal debate and deliberation. I am particularly appreciative of the staff's openness to consider the range of perspectives offered by the public and the Commission during this undertaking.

Repository Availability and Safe Storage

Consistent with my previous vote, I support the approach to discontinue a Commission policy decision on predicting the timing of a repository. The Commission's original policy was that it "would not continue to license reactors if it did not have reasonable confidence that wastes can and will be in 'due course' be disposed of safely." The resultant Waste Confidence Decision had historically been a set of five generic findings that consisted of two key ingredients: (1) affirmation that spent fuel can be safely stored for a certain period of time, and (2) affirmation that a repository to permanently dispose the spent fuel would be available within that timeframe. The first ingredient has been proven true thus far with experience. The second has not.[4] The timing of a repository is based on policy decisions and societal factors that are beyond the authority and control of the Commission.

Given the current progress being made in some countries and the U.S. experience with – and lessons learned from the operation of – the Waste Isolation Pilot Project, I have reasonable confidence that a deep geologic repository can be designed, authorized, constructed, and opened to accept waste for permanent disposal.[5] But there is not convincing evidence that a repository will be available in a "due course" of time given the nation's legislative and executive branch policy impasse. I will have confidence in the timing when a renewed national consensus emerges on a repository for spent nuclear fuel. In this context, however, I do not agree with certain supporting statements in the FRN and GEIS that seem to subtly affirm Commission conclusions that a repository will be available in the near-term (presumably by the middle of this century) as the "most likely scenario." These statements may be viewed as Commission policy and have no significant bearing on the environmental impact findings in the GEIS.[6] Therefore,

[3] Chairman Macfarlane's Comments on SECY-13-0061, "Proposed Rule: Waste Confidence - Continued Storage of Spent Nuclear Fuel," July 12, 2013. Available at http://pbadupws.nrc.gov/docs/ML1321/ML13217A261.pdf
[4] The original Waste Confidence Decision (1984), which set precedent on the structure of the Commission's approach, had determined that a repository would be available by 2009.
[5] Sweden, Finland, and France have selected repository sites already and Canada is making significant progress.
[6] It is important to note that both the plans of the current Administration to establish a repository by 2048, and the plans of the previous Administration to license and operate Yucca Mountain, would continue to be dependent on

the staff should revise statements in the GEIS and FRN to characterize repository availability in the near-term as "one reasonable scenario" rather than the "most likely scenario."

Institutional Controls During Indefinite Storage

Again, consistent with my previous vote, I do not fully approve the final GEIS without a formal analysis of indefinite storage to fully address a loss of institutional controls as one scenario. While I acknowledge that NEPA does not require consideration of worst case scenarios, I find that this is a unique and unprecedented review: the task of examining the impacts of indefinitely storing spent fuel on the surface without a repository – which would require millennia of active human oversight. Other power industries (e.g., coal or gas) may not be required to predict and disclose the indefinite impacts of their waste products (e.g., carbon pollution, heavy metals in coal ash) with the same rigor as considered here in this GEIS.[7] But we must.

Based on comments received on the draft GEIS, the staff has provided a discussion of the loss of institutional controls (see Appendix B.3.4). The staff recognizes some relevant analyses and literature, including the environmental impact statement for Yucca Mountain that analyzes environmental consequences of a storage alternative assuming loss of institutional controls.[8] The staff also notes the difficulty in reasonably foreseeing loss of institutional control scenarios and in predicting future consequences. The staff maintains that the most reasonably foreseeable assumption is that institutional controls will continue indefinitely, claiming in part that it would be illogical for any government to abandon the storage facilities given the significant hazards posed by spent fuel. Nonetheless, the staff concludes that a temporary loss of control would have impacts similar to spent fuel storage accidents and that a permanent loss of institutional controls would be a "catastrophe to the environment." These impacts "across nearly all resource areas would be clearly noticeable and destabilizing to the environment."[9]

In its remand, the Court "focused on the effects of failure to secure permanent storage."[10] Current institutional controls have already stalled in the U.S., in the sense that permanent disposal of spent fuel in a deep geologic repository is in itself a primary institutional control that was designated by Congress to permanently isolate long-lived radionuclides from the environment and human population. The court's remand was based on the federal government's failure thus far to implement the primary institutional control of permanent

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approvals and long-term commitment from future Congresses and Administrations (e.g., authorizations, appropriations).

[7] The staff in fact may need to consider indefinite or irreversible impacts of these technologies when implementing the GEIS and comparing alternate power replacement sources in site-specific EIS for reactors.

[8] U.S. Department of Energy, "Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada." DOE EIS-0250F-S1, Office Civilian Radioactive Waste Management, Las Vegas, Nevada, 2008.

National Academy of Sciences "*Technical Bases for Yucca Mountain Standards,"* National Academy of Sciences / National Research Council of Board on Radioactive Waste Management, Committee on the Remediation of Buried and Tank Waste, National Academy Press, Washington, D.C., 1995.

National Academy of Sciences, "*Long-Term Institutional Management of the U.S. Department of Energy Legacy Waste Sites,"* National Academy of Sciences/National Research Council of Board on Radioactive Waste Management, Committee on the Remediation of Buried and Tank Waste, National Academy Press, Washington, D.C., 2000

[9] "Clearly noticeable and destabilizing" impacts are associated with LARGE environmental impacts as defined in Section 1.8.5 of the GEIS.

[10] *New York v. NRC*, 681, F.3d 471, 479 (D.C. Cir. 2012).

isolation. On this basis alone it is reasonable to question whether political and societal willingness to maintain obvious institutional controls will continue forever. Objectively, there are significant uncertainties such as (1) the lack of experience in repeatedly repackaging spent fuel into new storage devices over time, (2) the lack of a guarantee that responsible parties would pay for the costs of repackaging over time, and (3) unforeseen events in our natural environment and society. These all pose challenges to the assumption that indefinite institutional controls is the only scenario to consider in the resource impact assessments of the GEIS.

In my view, a thorough and complete analysis would have refined and expanded the assumptions made in the DOE analysis and analyzed the impact of radionuclides on the local environment that would occur if the barriers maintained by institutional controls failed.[11] I believe the agency should present a complete analysis of indefinite storage, including the full range of potential impacts from the worst case scenario. I disagree in part with the staff's views about the difficulty of quantitatively measuring impact, and believe it is relatively straightforward to calculate bounding impacts of indefinite storage. There is no need, however, to hypothesize which institutions will exist hundreds of years from now, or imagine what a future society would be like. I agree with staff that these are impossible tasks. We should only put forward what we can know with some certainty: if the casks containing the spent fuel and the fuel cladding were to fail, we can still calculate the concentrations of radionuclides at a given time. We can then qualitatively argue, underpinned by this factual analysis, that the impacts on the environment, surrounding soils, air, surface and ground waters would be LARGE.

I therefore maintain the position that the staff should fully evaluate the potential range of environmental impacts for indefinite, no-repository storage under two scenarios – keeping and losing institutional controls. Chapters 4 and 5 of the GEIS should be updated to systematically examine indefinite storage in the major resource areas that would be affected by uncontrolled releases from loss of institutional controls. Factually stating these impacts is transparent, stays closest to using assumptions based on factual data, and best conveys the potential range of environmental and societal consequences of generating spent nuclear fuel and failing to dispose of it in a repository – regardless of how unthinkable, remote, or speculative it may deemed to be today.

Spent Fuel Management Funds and Storage Costs (An Institutional Control Issue)

In the GEIS, the staff estimate that costs for activities related to onsite spent fuel storage, away-from reactor storage, periodic replacement of casks, and/or the use of dry transfer systems could reach hundreds of millions to billions of (2014) dollars for each site during a hundred-year lifetime (e.g., long-term scenario). They also note the Standard Contract of 10 CFR Part 961 requires the federal government to take title to and dispose of spent fuel, and numerous successful lawsuits filed by licensees have resulted in payments from the Judgment Fund for partial breaches of the Standard Contract.[12]

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[11] An underlying assumption of the impacts in the GEIS is that as long as the spent fuel remains sealed and isolated in a dry storage cask, there will be no significant exposures to the natural environment and humans that surround the cask.

[12] The NRC staff acknowledges that, because of delays in the siting and licensing of a repository, the federal government bears an increasing share of the financial responsibility for storage costs. Although the annual costs for continued storage are manageable, cumulative costs will be large. The staff references a GAO report that indicates that the federal government has estimated it will pay a total of approximately $20 billion in damage awards and

To ensure safety and security at spent fuel storage sites, NRC requires that licensees have sufficient financial resources (e.g., revenue, trust funds) to maintain spent fuel management operations. In the GEIS, the staff points to spent fuel management funding requirements as the mechanism to ensure decommissioned licensees have these resources. This system and processes suffice over the short term. The question remains as to how to assure funding over the long-term and indefinite storage scenarios.

The business plan for nuclear power reactor licensees has been that the federal government would assume ownership of spent fuel under the Standard Contract, and would cover any additional costs. Decommissioned licensees will likely not have sufficient revenue to pay for the reoccurring expenses such as repackaging of spent fuel, construction of dry transfer facilities, and increased security needs assumed in the GEIS. As spent fuel ages, its radioactivity decreases, and hence it loses its self-protecting qualities that increase vulnerability to theft. As a result, security requirements for storage facilities will increase over time. It is only logical that the federal government would have to step in at some point to directly finance indefinite storage; or licensees would have to rely upon favorable judgments from the courts to reimburse them indefinitely for continued storage costs. While funding near-term storage is not a crisis, the staff should revise the GEIS and associated comments in Appendix D to reflect the genuine reality that the U.S. government will have to pay for the long-term storage of spent fuel.[13]

Site-specific Environmental Issues

The NRC received numerous public comments on the use of a generic analysis that would represent the environmental impacts for each location in the U.S. where storage of commercial spent nuclear fuel may continue. As discussed in question A5 of the Federal Register Notice (FRN), the NRC staff determined that the impacts of continued storage will not vary significantly across sites, despite variations in site-specific characteristics. Some commenters still questioned whether the generic analysis can adequately account for site-specific conditions and unique attributes surrounding each facility. Some commenters also expressed concern that the GEIS would preclude a site-specific evaluation of spent fuel storage where they live. I am receptive to some of these concerns, in particular, concerns that some power plant sites may have unique resources, liabilities, or other characteristics, such as location in a marine or wet environment, that influence environmental impacts. The staff assigns impact ranges to a few areas, such as historic and cultural resources. In addition, staff points out that each future site-specific storage application (in the continued storage phase) will have its own site-specific environmental analysis.[14] For purposes of this rulemaking, I believe a generic environmental impact statement (with a full understanding of indefinite storage as discussed above) is the best approach for establishing this rule. However, in implementing the GEIS findings into site-specific environmental analyses, the staff should develop approaches and procedures that are transparent to the public on how these impact ranges are considered for each specific site.

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settlements by the year 2020 and $500 million per year after that, if DOE does not accept fuel by 2021 and spent fuel continues to accumulate at reactor sites.

[13] This substantial financial burden again underscores the importance of considering scenarios that cover the range of possibilities related to the impact of the loss of institutional controls over an indefinite timeframe.

[14] This could result in a conundrum if the licensee or NRC determines there is a significant safety or environmental issue during operations or in a future licensing proceeding – because the spent fuel has already been generated and exists at the site. Unlike reactor facilities, dry storage casks are passive systems that cannot immediately "cease operating." Dry storage casks must remain safe and secure until they are transferred to a regional storage or disposal facility.

I am also concerned about generic statements in the GEIS that could imply that all current reactor sites that enter the continued storage phase will be automatically subject to specific licensing actions and have site-specific environmental reviews. Storage under a site-specific license will result in a site-specific environmental review. However, the majority of current reactor licensees store spent fuel under their general license and use storage casks that are certified by NRC through rulemaking, based on generic NEPA assessments. These sites therefore do not have site-specific NEPA analyses. The staff should revise the response to question A10 of the FRN to clarify that appropriate site-specific NEPA analysis may not be conducted for continued storage until the end of the short term storage timeframe for general license storage.

Finally, I take note of the significant number of comments on spent fuel pool fire hazards. Some commented that the spent fuel pool fire risk depends on site-specific factors and cannot be assessed generically. Others disagree with the risk-based impact finding of SMALL, which results from the low probability assigned to spent fuel pool loss of water and fire events.[15] I have previously commented on spent fuel fire risks in regard to the need for optimizing spent fuel management at operating reactors with pools and dry cask storage.[16] One key objective of NEPA is full disclosure of potential environmental impacts so that decision makers can use this knowledge to inform decisions. In this regard, I approve the record of discussion in the GEIS: while deemed a very low probability, the potential consequences of a spent fuel fire could be significant and destabilizing to the environment (see Appendix F of the GEIS).

Periodic Re-examination of the GEIS and Rule

The GEIS should not be a one-time exercise. The GEIS that supports this continued storage rule contains a great level of specificity in its analyses and assumptions regarding long-term storage. These assumptions are based on the best-available information today. The GEIS will need to remain viable over the long-term. It underpins both the rule language in 10 CFR Part 51 and the way in which staff examines spent fuel storage impacts in site-specific NEPA reviews. There is also a significant amount of public interest with valuable input on this matter. The staff proposes that the Commission review the GEIS for possible revision when warranted by significant events that may call into question the appropriateness of the rule.

For effectiveness, openness, and in the spirit of public participation in the NEPA process, a periodic review of the GEIS is warranted. On a ten year periodic basis, the staff should examine the GEIS, including: (1) the fundamental assumptions that underpin the impact findings for all three storage scenarios, (2) changes in U.S. national policy or direction on long-term spent fuel

[15] NRC uses the terms SMALL, MODERATE, and LARGE to define the standard of significance in assessing environmental issues. SMALL environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter an important attribute of the resource. MODERATE environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource. LARGE environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource. For risk-based determinations, such as analyses of spent fuel pool fires, the probability of occurrence and potential consequences have been factored into the determination of significance.

[16] See Chairman Macfarlane comments on COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," April 8, 2014. Key elements of managing spent fuel fire risks is the thermal management of recently discharged fuel assemblies and reducing source terms in spent fuel pools. In this regard, I believe the risks for spent fuel fires in a pool during the continued storage period is generically lower than at operating plants. The decay heat significantly decreases after the first few years of reactor shutdown, thus making thermal management factors less relevant.

management, and (3) experience gained through licensing proceedings that implement the revised rule. Based on this formal examination, the staff should provide a recommendation on whether to supplement the GEIS or rule, if needed. To support this approach and identify implementation issues that may need more timely resolution, the staff on a periodic basis (e.g., every 3 years), should provide an information paper to the Commission that reports any significant events, major research activities, and licensing proceedings that have bearing on the rule and GEIS. The response to item A14 and other areas of the proposed rule should be revised accordingly to reflect this plan to periodically re-examine the GEIS and Rule.

Other Corrections to Final FRN and GEIS

In addition to the changes noted above, the staff should update the FRN and GEIS as shown in Attachments 1 and 2 of my vote, to reflect other important changes and clarifications.

Conclusion

I approve the general approach for assessing impacts in the short term and longer term storage scenarios, but I do not endorse the determination of impacts of indefinite storage of spent nuclear fuel without an additional scenario that accounts for the impact in each resource area of the potential loss of institutional controls. I believe a "worst case" estimate of potential environmental impacts is needed to fully inform decision makers about the entire range of potential environmental impacts of generating new spent fuel without a repository for permanent disposal.

In order to have a full and complete record of the potential range of environmental impacts of generating spent fuel without a deep geologic repository, the GEIS should fully examine indefinite storage with and without institutional controls. Further, I believe that a ten-year periodic review of the GEIS is warranted. On a three year basis, the staff should provide an information paper to the Commission that reports on any significant events, major research activities, and licensing proceedings that have bearing on the rule.

Finally, I note that at least one commenter has suggested that development of a repository in the U.S. has devolved into a Sisyphean task. I agree that much in the national management of spent fuel and development of a geologic repository over the past decades fits this analogy. I believe that it is essential that the Nuclear Regulatory Commission should not, through its own regulatory policy-making, inadvertently give impetus to policy makers to avoid the pursuit of a repository. There is a well-recognized, internationally-accepted finding, and long-standing national policy, that the only suitable end point for high-level nuclear waste is permanent isolation in a deep geologic repository. I remain firm in my belief that indefinite or even long-term surface storage is not the appropriate alternative to deep geologic disposal.

If nuclear power is going to be an essential element of our nation's base load power, particularly as a means to counter carbon-induced climate change, legislative and executive branch leaders must bear the responsibility to chart a path for final disposition of spent nuclear fuel.

Allison M. Macfarlane Date

EXHIBIT 3

SAN ONOFRE
COMMUNITY
ENGAGEMENT
PANEL

CEP Regular Meeting
SONGS Dismantlement and Removal of Spent Fuel from San Onofre

Thursday, November 21, 2019
5:30 - 8:30 p.m.
Oceanside, California

SAN ONOFRE
COMMUNITY
ENGAGEMENT
PANEL

Public comment?

Write to: nuccomm@songs.sce.com

Agenda Topic	Presenter	Time
CEP and SCE welcome & opening comments	David Victor Doug Bauder	5:30 - 5:35 (5 min)
CEP general updates • **NRC NEIMA CAB meeting**: • **CEP visit to Holtec International, Inc. in Camden, NJ** • **3Q CEP meeting questions and answers**	David Victor David Victor D. Victor, D. Stetson, J. Kern	5:35 – 5:50 (15 min)
SONGS decommissioning update • **Decommissioning plan** • **Fuel transfer operations** • **Environmental stewardship**	Doug Bauder Lou Bosch Ron Pontes	5:50 – 6:10 (20 min)
Dismantlement & removal of plant structures • **Decommissioning general contractor/SONGS Decommissioning*Solutions* - Radiological safety**	Tom Dieter (SDS) Bob Corbett (SDS)	6:10 – 6:30 (20 min)
Advancing Spent Fuel Removal from San Onofre • **Experts Team** • **SONGS Strategic Plan update**	Tom Isaacs (ET) Phil Niedzielski-Eichner (NWT) Brian Gutherman (NWT) Joe Hezir (NWT)	6:30 – 6:50 (20 mins)
Nuclear Waste Technical Review Board • **Mission and recent reports**	Bret Leslie	6:50 – 6:55 (5 min)
Break		6:55 – 7:05 (10 min)
Public comment		7:05 - 8:05 (60 min)
Facilitated dialogue	Dan Stetson Jerry Kern	8:05 – 8:25 (20 min)
SCE and CEP closing comments	Doug Bauder David Victor	8:25 – 8:30 (5 min)

SAN ONOFRE
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Welcome and Opening Comments

David Victor and Doug Bauder

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CEP General Community Updates

- NRC NEIMA community advisory board meeting
- CEP Visit to Holtec International, Inc.
- 3rd Quarter CEP Meeting Questions and Answers

CEP Updates

David Victor, Dan Stetson & Jerry Kern

SAN ONOFRE COMMUNITY ENGAGEMENT PANEL

- NRC public meeting on community advisory board best practices – Aug. 29, 2019 in San Juan Capistrano

- CEP leadership visit with Holtec – Sept. 17, 2019

SAN ONOFRE COMMUNITY ENGAGEMENT PANEL

3Q CEP Meeting Q&A

Dan Stetson & Jerry Kern

Answers to questions related to the following topics are available on songscommunity.com:

1. Information on double walled canisters assessed by SCE
2. Why the Holtec system was selected among the top three vendors
   https://www.songscommunity.com/need-to-know/overview/sce-releases-comprehensive-dry-storage-overview-paper

3. "Risk driven" inspections and reason for the number of canisters inspected
4. TN/NUHOMS canister inspections using robotics
5. Determine if there are any leaking canisters in U.S.
6. How much low level radiological waste is on site and expected to be shipped
7. Information on sea-level rise
   https://www.songscommunity.com/internal_redirect/cms.ipressroom.com.s3.amazonaws.com/339/files/201910/3Q%20CEP%20QA%20Document%20Rev.%203%20FINAL%2011-18-19.pdf

8. NRC requirements on canister retrievability
   https://www.songscommunity.com/internal_redirect/cms.ipressroom.com.s3.amazonaws.com/339/files/201910/201911180405/Canister%20UnloadingTraining%20Excercise%20versus%20Retrievability%20Requirements.pdf

9. Write a white paper on Inspection & Maintenance and Aging Management Program for CEP members and general audience and post it on the website
   https://www.songscommunity.com/internal_redirect/cms.ipressroom.com.s3.amazonaws.com/339/files/201910/CEP%20White%20Paper%20Licensing%20Inspection%20and%20Mitigation%20for%20TN%20and%20Holtec%20Systems%2011%2012%2019.pdf

Safety | Stewardship | Engagement

Decommissioning
San Onofre
Nuclear Generating Station

SONGS Decommissioning Update

Doug Bauder
Chief Nuclear Officer and
VP Decommissioning

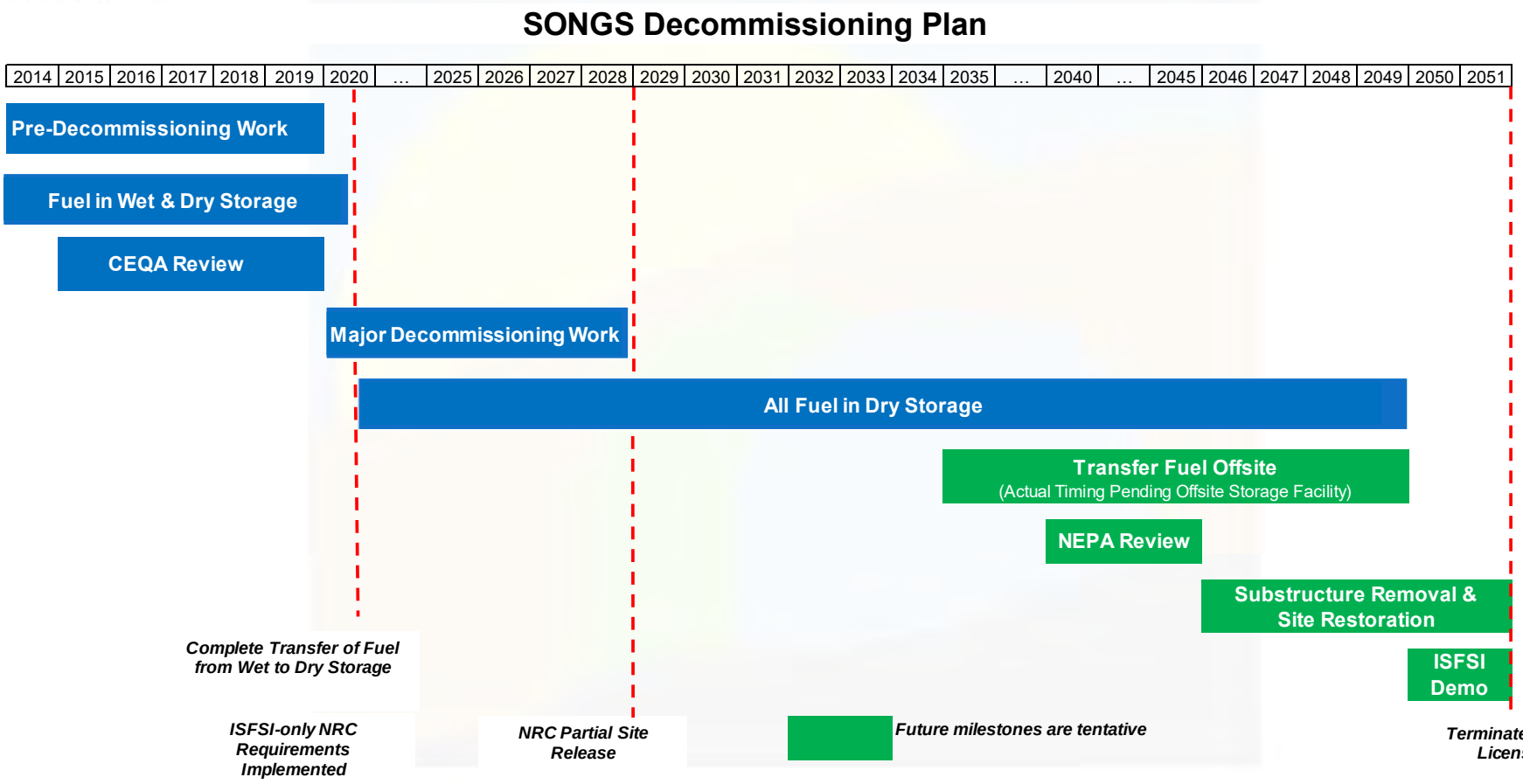
Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

Decommissioning Update Topics

- Decommissioning plan
- Fuel Transfer Operations Update
- Environmental Stewardship
  - Permitting
  - Radiation monitoring and reporting
  - Environmental monitoring – public notifications

Decommissioning San Onofre Nuclear Generating Station
Safety | Stewardship | Engagement

Decommissioning Plan



SUBJECT TO SONGS DECOMMISSIONING AGREEMENT, SECTION 19.3

Safety | Stewardship | Engagement

Decommissioning
San Onofre
Nuclear Generating Station

Fuel Transfer Operations

Lou Bosch
SONGS Plant Manager

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

Decommissioning Principles

Safety

Stewardship

Engagement

For more information on SONGS visit
www.SONGScommunity.com

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Decommissioning
San Onofre
Nuclear Generating Station

Tracking Fuel Movement

40 downloaded to date
forecast complete mid-2020

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

Pool To Pad Transfer Summary

- Continued focus on Safety
- Low threshold for use of Corrective Action Program
- Early identification of issues and prompt resolution
- Schedule pressure not an issue

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

Challenges

- Shield cone
- Vertical Cask Transporter (VCT) diesel exhaust fumes
- Vertical Cask Transporter (VCT) tower height sensor cable failed
- Unit 2 cask crane speed sensor broken bolt

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

Status Summary

- No serious safety or human performance issues
- Continued good teamwork
- Healthy and effective relationship between Holtec and SCE
- Continuous improvement actions are in process
  - Procedure revisions to improve clarity

Safety | Stewardship | Engagement

Decommissioning
San Onofre
Nuclear Generating Station

Environmental Stewardship

Ron Pontes
Manager Environmental Decommissioning

Case: 20-70899, 03/31/2020, ID: 11647799, DktEntry: 2-12, Page 70 of 214

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Permitting: California Environmental Quality Act

Two permits required to start dismantlement and removal of plant structures

MILESTONE	TIMING
Final Environmental Impact Report (EIR) and lease certified by CSLC at public meeting	Approved March 21, 2019
Coastal Development Permit (CDP) application for onshore work approved by CCC at public meeting	Approved October 17, 2019

Offshore work on intake and discharge conduits requires a CDP from CCC with a public meeting anticipated by mid-2021

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Dry Cask Storage Radiation Monitoring System

- Radiation monitoring:
  - Added in response to public interest; SCE exceeds NRC requirements
  - ISFSI radiation data to be streamed to offsite agencies
  - Monthly public reports published by CA Department of Public Health, Radiologic Health Branch
  - System will be in service before dismantlement of the plant begins
  - System installation and testing underway

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Liquid Batch Radiological Releases

- Liquid batch radiological releases
  - Effluents processed and cleaned to ensure safety to people, marine life, and the environment
  - Releases performed since start of Unit 1 operations
  - Performed in accordance with NRC license and regulations (none require advance notice due to low, safe levels)
  - All releases monitored, measured and reported annually to the NRC (reports are available to the public at the NRC website)
  - Significantly reduced following shutdown of Unit 1 in 1992 and shutdown of Units 2 and 3 in 2013

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Reporting Future Liquid Batch Releases

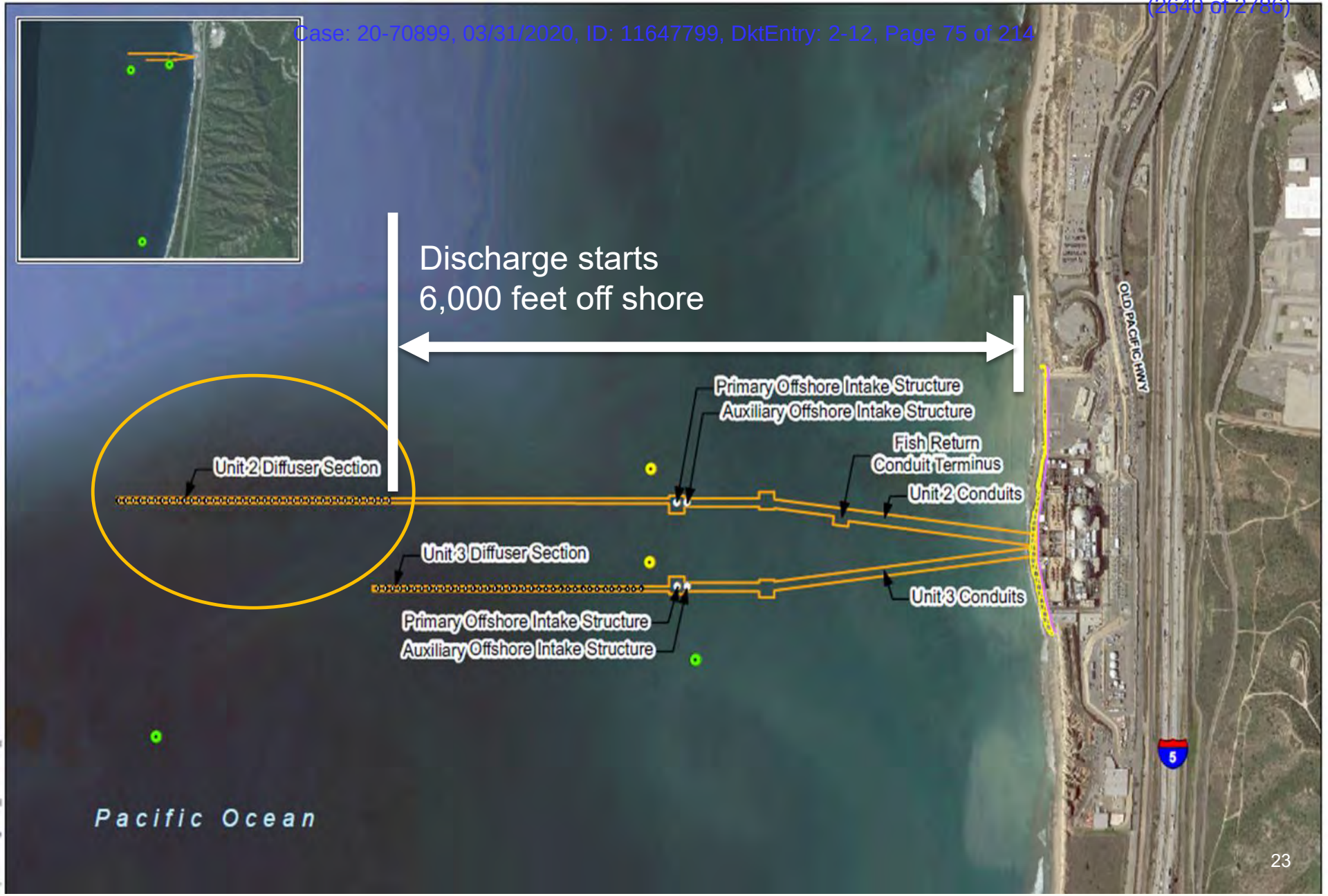
- SCE will notify the public 48 hours prior to release via the website

- Information will include
  - ✓Estimated volume
  - ✓Estimated duration
  - ✓Radiological characterization

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Radiological Environmental Monitoring

- To ensure health & safety of the public and environment, SCE conducts year-round radiological monitoring including:
  - Ocean water
  - Soil
  - Kelp
  - Beach sand sediment
  - Non-migratory fish species surrounding the plant
- Environmental monitoring results will be posted to www.SONGScommunity.com
- Batch release is anticipated in mid-December 2019
- Additional batch releases planned during 1Q 2020


Discharge starts
6,000 feet off shore
Primary Offshore Intake Structure
Auxiliary Offshore Intake Structure
Fish Return
Conduit Terminus
Unit 2 Conduits
Unit 2 Diffuser Section
Unit 3 Diffuser Section
Unit 3 Conduits
Primary Offshore Intake Structure
Auxiliary Offshore Intake Structure
OLD PACIFIC HWY
5
Pacific Ocean

Safety | Stewardship | Engagement

Decommissioning
San Onofre
Nuclear Generating Station

SONGS Dismantlement and Removal of Plant Structures

Doug Bauder
Chief Nuclear Officer and
VP Decommissioning

SONGS Decontamination and Dismantlement

Thomas J. Dieter
Executive Sponsor
SONGS Decommissioning*Solutions*
(SDS)

Thomas J. Dieter

Executive Sponsor, SONGS Decommissioning*Solutions* (SDS)

Vice President and Project Manager
Rocky Flats Closure Project

ZION Decommissioning SDS Partner EnergySolutions

Zion Nuclear Station
Sept 2010

Zion Nuclear Station
Sept 2019

D&D Start Date
Oct 2010

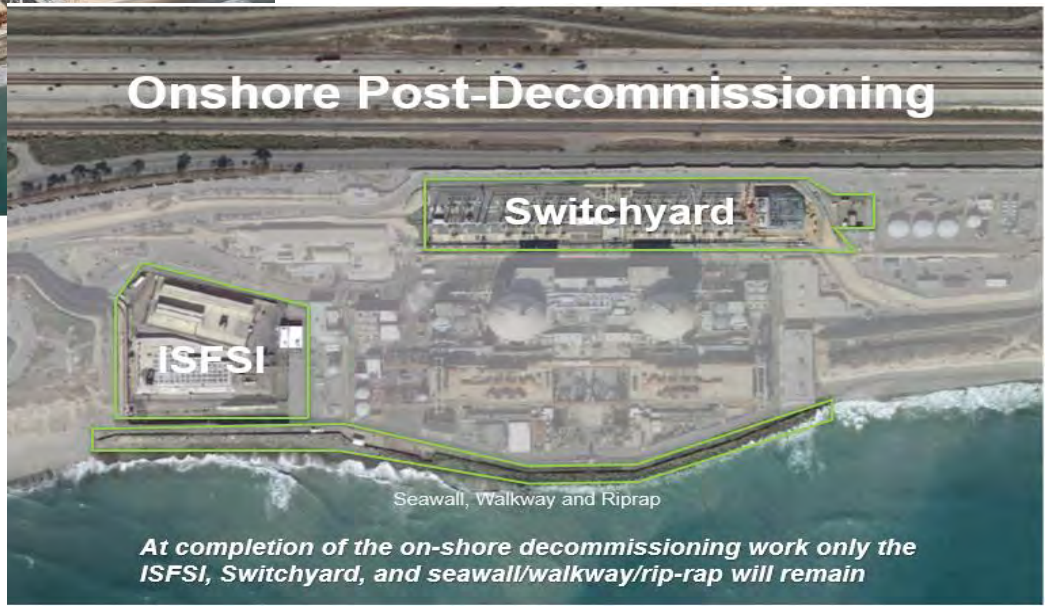
Current Status
Demo Complete
Oct 2019

Projected Finish
Early 2020

Original Planned Completion [Dec 2020]

SONGSDS
Delivers

San Onofre Decommissioning Project



Decommissioning Video

- SDS video of San Onofre plant dismantlement

SONGSDS

Delivers

Bob Corbett

Radiation Protection Manager, SONGS Decommissioning*Solutions* (SDS)

Radiological Safety During Decommissioning

- #1 Priority: Ensure radiological safety for both site workers and public
  - Employ fully trained and qualified staff
  - Maintain control of radioactive material (keep it where it belongs)
    - Verification methods include: surveys, sampling, and monitoring
  - Site condition will meet or exceed federal standards when complete

Safety | Stewardship | Engagement

Decommissioning
San Onofre
Nuclear Generating Station

Advancing Spent Fuel Removal from San Onofre

Tom Isaacs
Experts Team Chair &
Independent Strategic Advisor
for Waste Management

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

A Unique Effort to Relocate Spent Nuclear Fuel Offsite

- A utility exploring alternatives for removing spent nuclear fuel from a commercial nuclear plant is unique in the U.S.

- A Strategic Plan will consider a range of alternatives for offsite storage/disposal and recommend actions that SCE can take to:
  - advance viable solutions for relocating spent fuel off-site,
  - be ready to transport once a site becomes available, and
  - advance policy and regulations to promote off-site storage/disposal

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

SONGS Experts Team is Providing Guidance and Peer Review

Team Member	Expertise
Tom Isaacs (Chairman)	Siting and licensing
Kris Cummings	Nuclear engineering
Gary Lanthrum	Transportation
Allison Macfarlane	Siting and licensing
Rick Moore	Transportation
Dr. Josie Piccone	Radiation monitoring and detection

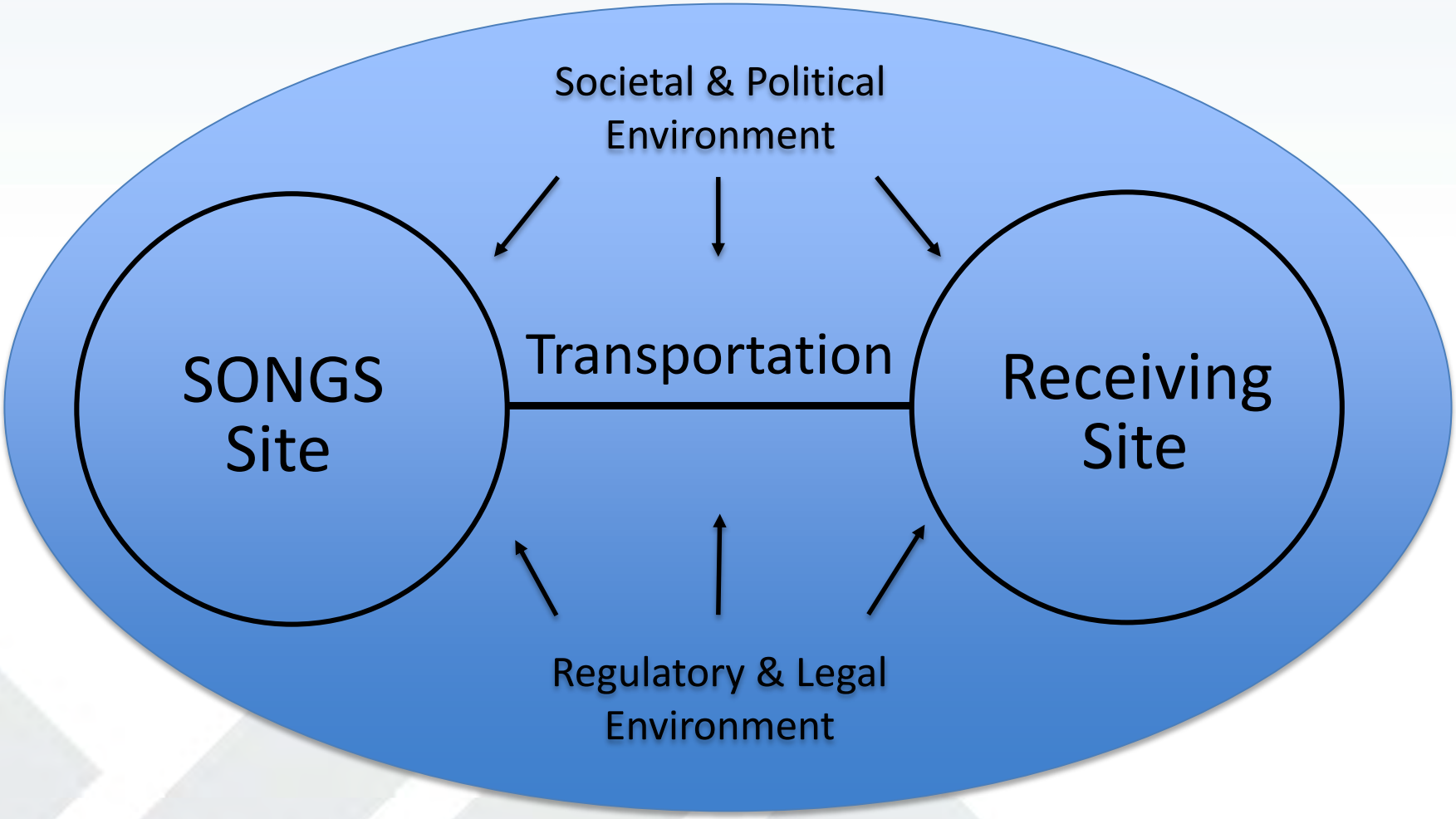
- Roles and activities of Experts Team
  - Helped select consultant North Wind Team to develop Strategic Plan
  - Providing ongoing guidance and peer review on Strategic Plan
  - Assisting in the selection of the consultant to develop a Conceptual Transportation Plan
  - Will provide guidance and peer review on Conceptual Transportation Plan

STRATEGIC PLAN FOR SONGS SPENT FUEL REMOVAL

Today's North Wind Team Members:

- **Phil Niedzielski-Eichner | Team Director**
- **Brian Gutherman | Regulatory Lead**
- **Joe Hezir | Legislative and Policy Lead**

An Old Problem



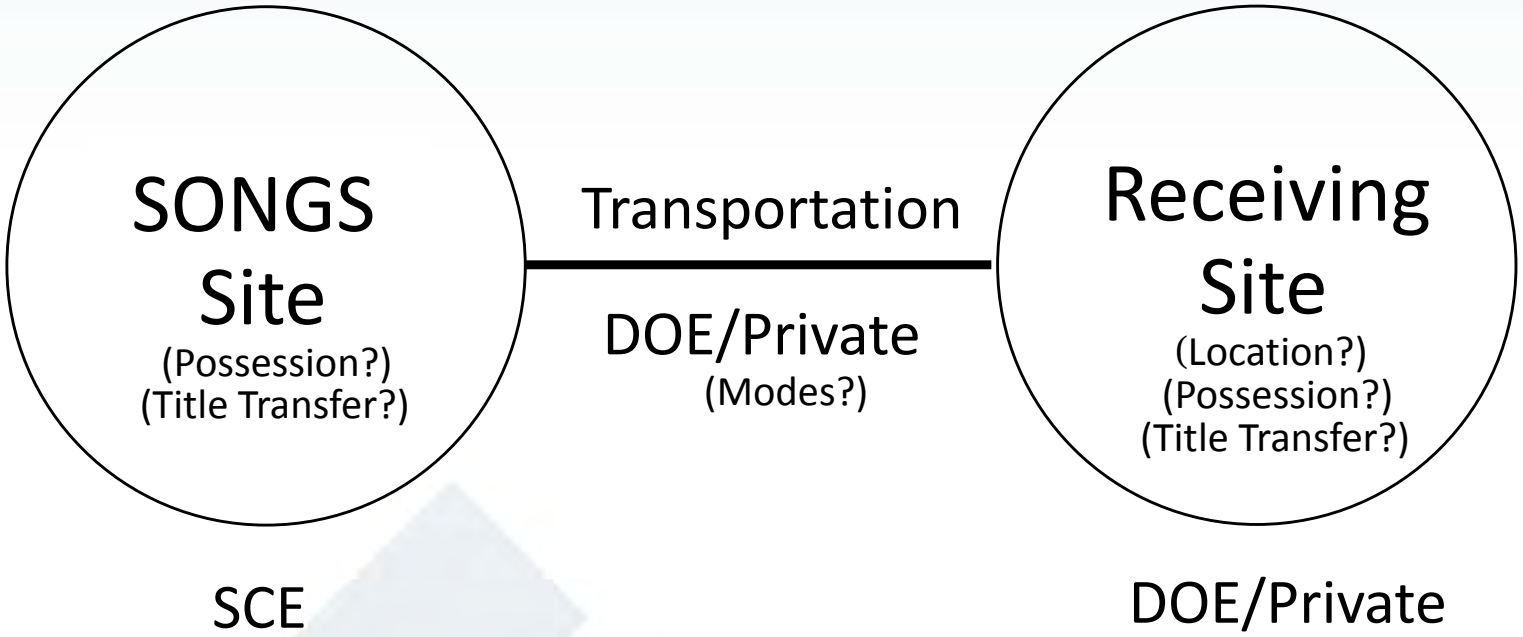
Seeking a SONGS Solution

- Develop a strategy to relocate the SONGS spent fuel to an offsite storage or disposal facility
  - Conduct economic, regulatory, logistical, legal and statutory analysis of a range of alternatives
  - Examine potential sources of funding
  - Identify actions required to implement viable solutions
  - Solicits local, regional and national stakeholder input
- Identify actions that will enhance SCE's readiness to ship spent fuel offsite

TALENT WORKING ON THE SOLUTION

North Wind Team Member	Role and Subject Matter Expertise
Phillip Niedzielski-Eichner	Team Director, Policy and Legal Analysis
Elizabeth Helvey	Project Manager, Transportation Stakeholder Engagement
Ernest Moniz	Senior Advisor | Former Secretary of Energy
Tom Hassenboehler	Senior Advisor | Former Congressional Staff Director
Steven Croley	Policy and Legal Analysis
Brian Gutherman	Regulatory, Cask Loading and Operations
Joseph Hezir	Strategic Planning and Options Analysis
Jeanette Pablo	Legal Advisor
Joseph Rivers	Environmental Analysis
Timothy Runyon	Transportation Operations and Regulatory Analysis
Marika Tatsutani	Writer and Editor
James Voss	Engineering and Operations
Mary Woollen	Stakeholder Engagement

Analyze the Alternatives
Brian Gutherman



Tackle Hard Questions

- SONGS Site
  - When and under what conditions does possession and title transfer of the spent fuel occur?
  - What does SCE need to do to prepare for transportation?
  - What are the national implications of SONGS actions?
- Transportation
  - If not DOE, who is the shipper?
  - How would a private shipping model work (e.g., licensing, insurance)
  - What transportation modes are available and feasible?
  - Strategic Plan content | Conceptual Transportation Plan content
- Receiving Site
  - Federal or private facility?
  - Timeframe for licensing, construction, operation?
  - Commerical arrangements

Legislative & Funding Challenges
Joe Hezir

- Legislative
  - McNerney/Shimkus (House)
  - Levin (House)
  - Murkowski/Alexander/Feinstein (Senate)
- Funding
  - Congressional Appropriation
  - Nuclear Waste Fund
  - Judgment Fund
  - Private Investment

The Schedule

- Commenced work June 2019
- Publish Strategic Plan in December 2020

Stay Involved

- Continue to follow national efforts and understand historical barriers to success
- Track progress at [website address]
- Submit comments to [website address]
- Attend CEP meetings for progress reports

U.S. Nuclear Waste Technical Review Board

NWTRB
www.nwtrb.gov

U.S. Nuclear Waste Technical Review Board: Its Mission and Recent Reports on Management of DOE Spent Nuclear Fuel and Preparing for Nuclear Waste Transportation

Presented to:
SONGS Community Engagement Panel (CEP)

Presented By:
Bret Leslie, Senior Professional Staff

San Onofre Nuclear Generating Station CEP Meeting

November 21, 2019

Oceanside, CA

Board Mission

- The U.S. Nuclear Waste Technical Review Board (Board) was established by Congress as an independent federal agency in the 1987 amendments to the Nuclear Waste Policy Act

- The Board evaluates the "technical and scientific validity" of U.S. Department of Energy (DOE) Nuclear Waste Policy Act-related activities, wherever in DOE the activities are undertaken, including

  - Activities relating to packaging or transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW)

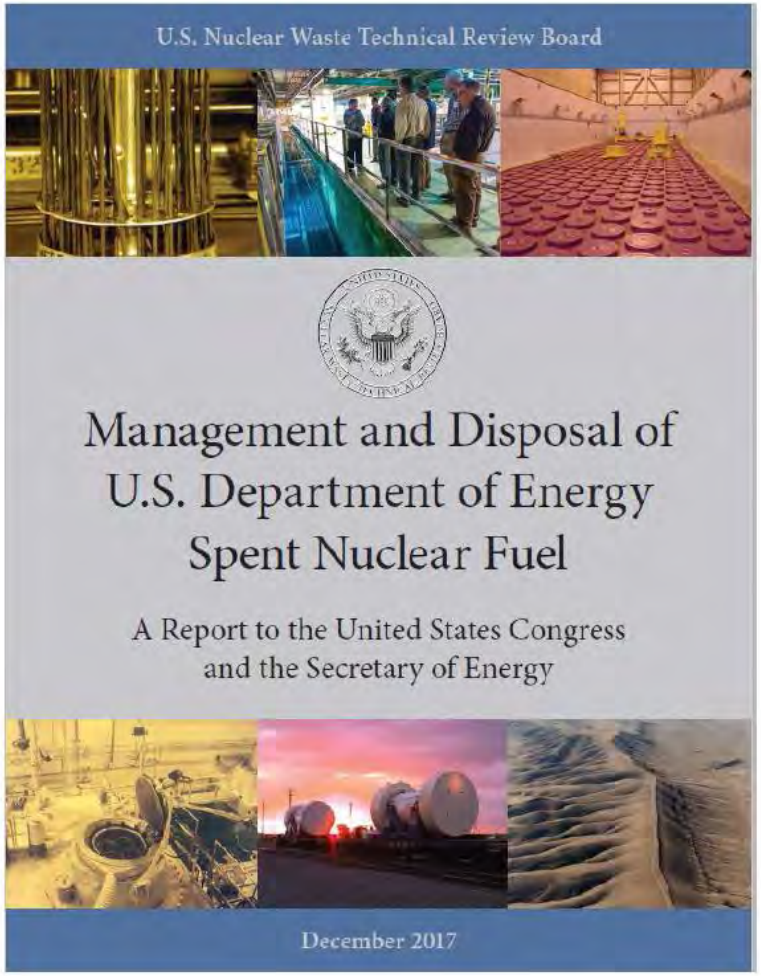
  - Site characterization, design, and development of facilities for disposing of SNF or HLW

Board Mission (continued)

- The Board's interest in the management of SNF at utility sites is limited to the impact this may have on the operations DOE may need to undertake after taking title to the SNF
- Statements or presentations in Board public meetings are not Board positions
- The Board's positions are found in our reports to Congress and DOE and in our correspondence to DOE or to Congress

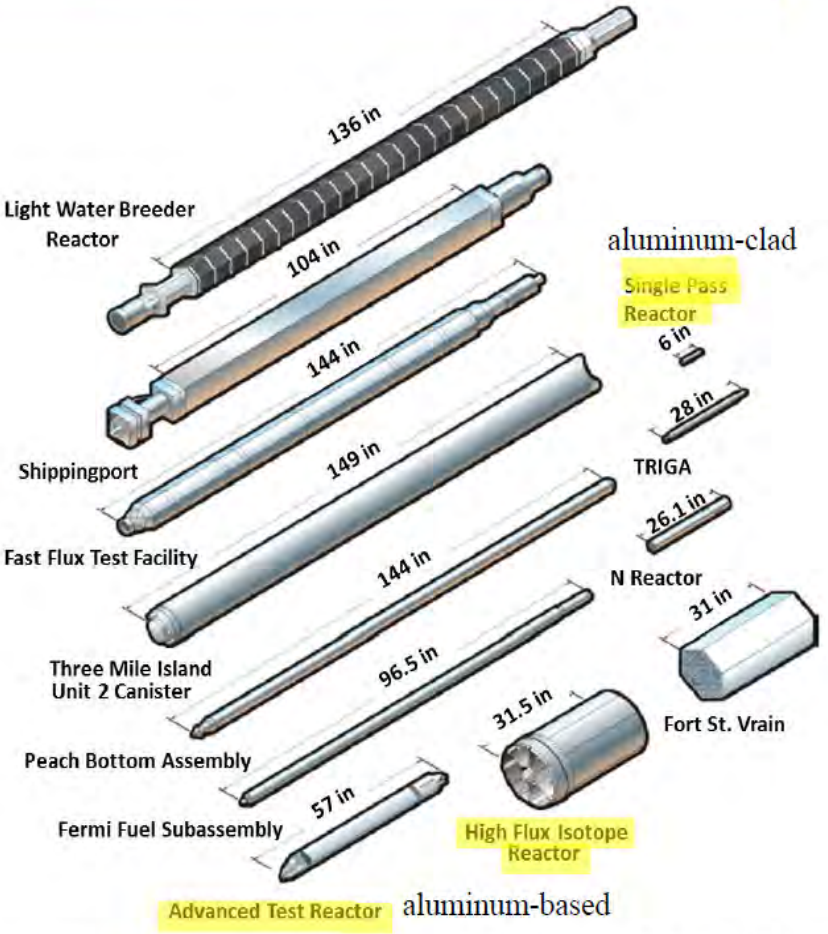
Board Report on the Management of DOE Spent Nuclear Fuel

- Covers the management and disposal of the full range of SNF managed by DOE
- Discusses differences between the characteristics of different types of SNF managed by DOE
- Examined technical issues related to DOE SNF packaging and storage that might affect continued storage, transportation, and disposal by DOE



Board Report on DOE Spent Nuclear Fuel (continued)

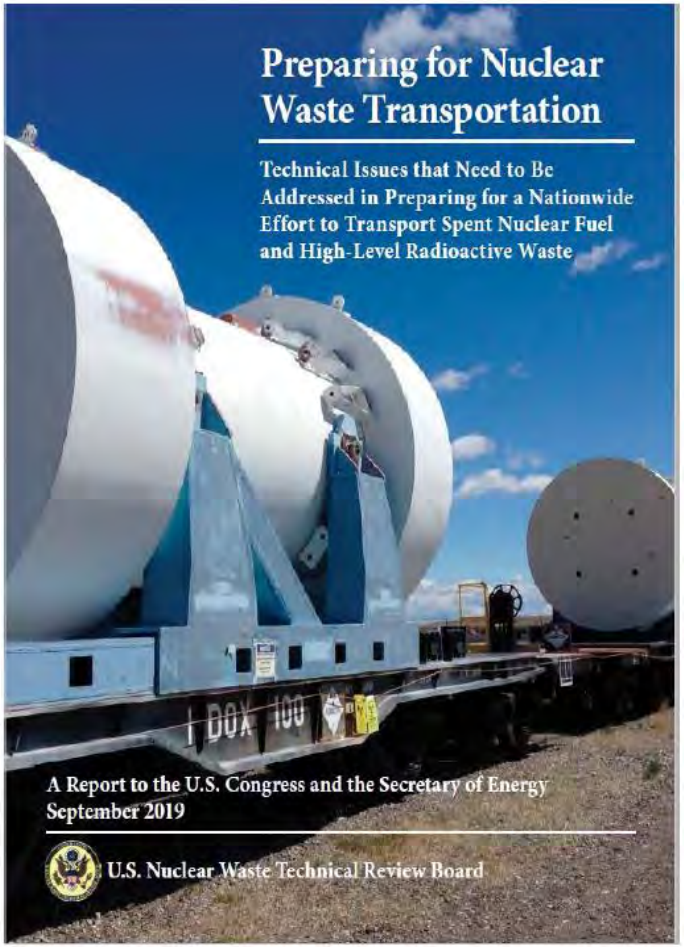
- Findings and recommendations are specific to the type(s) of DOE SNF identified, e.g.:
  - Potential accumulation of hydrogen gas relates to dry-storage of aluminum-clad and aluminum-based DOE SNF, not commercial SNF or "sodium-bonded" DOE SNF
  - The monitoring and inspection recommendations relate to the DOE standardized canister, not dual-purpose canisters used for storage of commercial SNF



There are approximately 250 types of DOE SNF. Aluminum-clad and aluminum-based fuel types are highlighted

Board Report on Transportation

- Identified and evaluated technical issues that need to be addressed by DOE in preparing a nationwide effort to transport SNF and HLW
- The Board analyzed two possible scenarios as basis for its evaluation but made no recommendations on whether either of these options is preferable
  - DOE accepts bare commercial SNF assemblies (i.e., SNF assemblies not sealed inside SNF canisters) from nuclear utilities
  - DOE accepts SNF assemblies pre-packaged in casks or canisters



Board Report on Transportation (cont.)

- The Board did not suggest that repackaging of most SNF in dry-storage would be required prior to removal from nuclear power plant sites

- The report also includes discussion of DOE analysis of transportation of SNF away from the nuclear power plant sites in the existing casks and canisters

- The Board recommended that, for planning purposes, DOE should allow for a minimum of a decade to develop new cask and canister designs for SNF and HLW storage and transportation

SAN ONOFRE
COMMUNITY
ENGAGEMENT
PANEL

BREAK

Information Booths Available

SAN ONOFRE
COMMUNITY
ENGAGEMENT
PANEL

Public Comment

Submit written comments to:

nuccomm@songs.sce.com

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

CLOSING COMMENTS

DAVID VICTOR AND DOUG BAUDER

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

2020 CEP Meetings

Planned Focus Topics	*Timing
SONGS Strategic Plan for Removing Spent and Dismantlement	11-21-19
1Q CEP Meeting	Feb. 27, 2020
Dry Cask Storage Design, Potential Events, & Remedies	Mar. 26, 2020
2Q CEP Meeting	May 28, 2020
3Q CEP Meeting	Aug. 20, 2020
4Q CEP Meeting	Nov. 19, 2020

* Topics to be determined

Subject to Change

Safety | Stewardship | Engagement
Decommissioning San Onofre Nuclear Generating Station

Acronyms

AMP	Aging Management Program
C&D	Cold & Dark
CAP	Corrective Action Program
CCC	California Coastal Commission
CDP	Coastal Development Permit
CEC	Cavity Enclosure Container
CEP	Community Engagement Panel
CEQA	California Environmental Quality Act
CIS	Consolidated Interim Storage
CISCC	Chloride-Induced Stress Corrosion Cracking
CPUC	California Public Utilities Commission
CSLC	California State Lands Commission
D&D	Decontamination & Dismantlement
DA	Decommissioning Agreement; Decommissioning Agent
DCE	Decommissioning Cost Estimate
DDT	Decommissioning & Dismantlement Team
DGC	Decommissioning General Contractor
DID	Defense-in-Depth
DOD	Department of Defense
DOE	Department of Energy
DON	Department of Navy
DSAR	Defueled Safety Analysis Report (replaces FSAR)
DSC	Dry Storage Canister
D-SEIS	Draft Supplemental Environmental Impact Statement
D-SER	Draft Safety Evaluation Report
DTF	Decommissioning Trust Fund
EIR	Environmental Impact Report
EP	Emergency Plan
EPRI	Electric Power Research Institute
FIER	Final Environmental Impact Report
FTO	Fuel Transfer Operations
GEIS	Generic Environmental Impact Statement
HI-PORT	Holtec International – (Engineered Low Profile) Transporter
HI-TRAC	Holtec International – Transfer Cask

IFMP	Irradiated Fuel Management Plan
ISFSI	Independent Spent Fuel Storage Installation
LAR	License Amendment Request
LOED	Large Organism Exclusion Device
MAPS	Managing Aging Programs in Storage
MARSSIM	Multi-Agency Radiation Survey Site & Investigation Manual
MOU	Memorandum of Understanding
NAHC	Native American Heritage Commission
NDCTP	Nuclear Decommissioning Cost Triennial Proceeding
NDE	Non Destructive Examination
NDTF	Nuclear Decommissioning Trust Fund
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NGS	Nuclear Generating Station
NOP	Notice of Preparation
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
OC	Orange County
PDEP	Permanently Defueled Emergency Plan
PDTS	Permanently Defueled Technical Specifications
PSDAR	Post-Shutdown Decommissioning Activities Report
Q&A	Questions & Answers
REIR	Request for Environmental Impact Review
SCE	Southern California Edison
SD	San Diego
SDG&E	San Diego Gas & Electric
SDS	SONGS Decommissioning Solutions
SFP	Spent Fuel Pool
SFPI	Spent Fuel Pool Island
SLC	State Lands Commission (CA)
SLR	Sea Level Rise
SONGS	San Onofre Nuclear Generating Station
TBA	To Be Announced
VCT	Vertical Canister Transporter
ZCAP	Zion Community Advisor Panel

Safety | Stewardship | Engagement
Decommissioning
San Onofre
Nuclear Generating Station

APPENDIX

Decommissioning San Onofre Nuclear Generating Station
Safety | Stewardship | Engagement

Used Fuel Readiness for Transportation

- Some fuel qualified for transport now
- Remaining fuel qualifies over time

	NOW	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	TOTAL
Units 2/3 AREVA NUHOMS 24PT4	33												33
Unit 1 AREVA NUHOMS 24PT1	2				1					5		9	17
Units 2/3 HOLTEC MPC-37		67		2	2		1			1			73

EXHIBIT 4

ADVICE LETTER (AL) SUSPENSION NOTICE
ENERGY DIVISION

Utility Name: Southern California Edison	Date Utility Notified: December 24, 2019
Utility Number/Type: U 338-E	[X] Emailed to: Darrah.Morgan@sce.com,
Advice Letter Number(s) 4122-E	AdviceTariffManager@sce.com
Date AL(s) Filed) December 4, 2019	ED Staff Contact: David Zizmor
Utility Contact Person: Dara Morgan	ED Staff Email: David.Zizmor@cpuc.ca.gov
Utility Phone No.: 626-302-2086	ED Staff Phone No.: 415-703-1575

[X] INITIAL SUSPENSION (up to 120 DAYS from the expiration of the initial review period)

This is to notify that the above-indicated AL is suspended for up to 120 days beginning January 6, 2020 for the following reason(s) below. If the AL requires a Commission resolution and the Commission's deliberation on the resolution prepared by Energy Division extends beyond the expiration of the initial suspension period, the advice letter will be automatically suspended for up to 180 days beyond the initial suspension period.

[ ] A Commission Resolution is Required to Dispose of the Advice Letter

[ ] Advice Letter Requests a Commission Order

[X] Advice Letter Requires Staff Review

The expected duration of initial suspension period is 120 days

[ ] FURTHER SUSPENSION (up to 180 DAYS beyond initial suspension period)

The AL requires a Commission resolution and the Commission's deliberation on the resolution prepared by Energy Division has extended beyond the expiration of the initial suspension period. The advice letter is suspended for up to 180 days beyond the initial suspension period.

If you have any questions regarding this matter, please contact David Zizmor at David.Zizmor@cpuc.ca.gov.

cc:
EDTariffUnit

* Note: reference – Decision D.02-02-049, dated February 21, 2002, and Rule 7.5 in appendix A of D.O7-01-024

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

Gary A. Stern, Ph.D.
Managing Director, State Regulatory Operations

PUBLIC VERSION

December 4, 2019

ADVICE 4122-E
(U 338-E)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA
ENERGY DIVISION

SUBJECT: Request for Authorization of Disbursements from the Decommissioning Master Trusts for 2020 San Onofre Nuclear Generating Station (SONGS) 2&3 Forecasted Decommissioning Costs

I. PURPOSE AND INTRODUCTION

Southern California Edison Company (SCE) respectfully submits this Tier 2 advice letter (AL) requesting that the California Public Utilities Commission (Commission) authorize disbursements of $405.5 million[1] (SCE share, 2020 $) from the San Onofre Nuclear Generating Station Unit Nos. 2&3 (SONGS 2&3) nuclear decommissioning trusts (NDTs) for SCE's share of 2020 SONGS 2&3 forecasted decommissioning costs.[2]

SCE does not seek in this AL any rate increase or additional funding for the NDTs. The trusts have accumulated funds for more than 30 years, funded by SCE customers pursuant to the Nuclear Facilities Decommissioning Act of 1985 (Decommissioning Act).[3] Accordingly, SCE seeks to pay for SONGS 2&3 decommissioning expenses by utilizing the NDTs for their intended purposes.

This AL follows the direction provided by the Commission in D.11-07-003, which established the advice letter process and content requirements for reporting costs; D.14-12-082, which adopted the process to be followed by SCE for SONGS 2&3 decommissioning activities;[4] and D.16-04-019, which adopted the two-step process

1 $535.0 million (100% share, 2020 $). See Attachment 6.
2 The participants respective decommissioning cost shares are set forth in Section 4.21 of the SONGS Decommissioning Agreement, dated April 23, 2015. Based on this agreement, SCE's share is approximately 76% of the costs.
3 California Public Utilities Code, Section 8321, et. seq.
4 D.14-12-082, p. 40.

(forecast and recorded) for reporting decommissioning costs and disbursing NDT funds.[5] In addition, in accordance with D.18-11-034, this AL provides additional information regarding the SONGS decommissioning schedule and status of certain activities (i.e., fuel transfer operations, environmental permitting process, and other developments occurring in the past year).

II. BACKGROUND

A. SONGS 2&3 STATUS

SONGS 2&3 was a 2250-megawatt nuclear generation facility consisting of two pressurized water reactors that commenced operation in 1983 and 1984, respectively. On June 7, 2013, SCE announced plans to permanently retire SONGS 2&3. On June 12, 2013, SCE submitted a Certification of Permanent Cessation of Power Operations to the NRC. SCE submitted to the NRC a Certification of Permanent Removal of Fuel for SONGS Unit 3 on June 28, 2013, and for SONGS Unit 2 on July 22, 2013. As a result of these submittals, SCE now holds an NRC license that does not permit power operations but does authorize the possession of the SONGS 2&3 facilities and licensed nuclear material (i.e., spent nuclear fuel).

B. CPUC REGULATORY PROCEEDINGS

On March 1, 2016, SCE and San Diego Gas & Electric Company (SDG&E), jointly filed Application (A.)16-03-004 for the 2015 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP). The application included a number of requests relating to SCE's and SDG&E's 2016 SONGS 1 Decommissioning Cost Estimate (DCE), recorded decommissioning costs for SONGS 1, 2, and 3; and SCE's share of the 2016 Palo Verde Nuclear Generating Station Unit Nos. 1, 2, and 3 (PVNGS) DCE. SCE's application (A.15-01-014) and SDG&E's application (A.15-02-006) for a reasonableness review of 2014 SONGS 2&3 decommissioning costs were consolidated with the 2015 NDCTP.

On December 7, 2018, the Commission issued D.18-11-034 for Phases 2 and 3 of the 2015 NDCTP. That decision adopted the Milestone Framework and required the utilities' advice letters to provide schedule performance of Major Projects, to identify any expected impacts of delays upon undistributed costs, and to provide plans to avoid or minimize such schedule and cost impacts. Accordingly, SCE is providing this information as part of Attachment 11 to this advice filing.

In addition, D.18-11-034 required SCE and SDG&E to meet with the Energy Division and interested parties to discuss the potential for additional modifications to the annual Tier 2 advice letter process for requesting NDT disbursements and reporting recorded decommissioning costs. SCE held these meetings in early 2019. Working with the Energy Division and interested parties, SCE has incorporated, at their request in this

[5] D.16-04-019, Ordering Paragraph 4, p. 34.

advice filing: (1) the SONGS 2&3 NDT balances, (2) the percent expended of the SONGS 2&3 NDT, and (3) an expanded overview of project performance.

On March 15, 2018, SCE and SDG&E jointly filed A.18-03-009 for the 2018 NDCTP. SCE and SDG&E requested in the application that the Commission, among other things find: (1) the 2017 SONGS 1 DCE is reasonable; (2) the 2017 SONGS 2&3 DCE is reasonable; (3) SONGS 1 decommissioning expenses incurred during 2016-2017 are reasonable; (4) certain SONGS 2&3 decommissioning expenses incurred during 2016-2017 are reasonable; and (5) the Utilities are compliant with prior Commission decisions regarding the NDCTP. These issues are all still pending before the Commission.

C. CPUC AUTHORITY TO APPROVE DISBURSEMENTS

The Commission's authority to approve access to the NDTs**,** as requested in this AL, is governed by SCE's Nuclear Facilities Qualified and Non-Qualified CPUC Decommissioning Master Trust Agreements for the San Onofre and Palo Verde Nuclear Generating Stations (Master Trust Agreements), which the Commission approved in D.87-05-062. The Master Trust Agreements expressly provide that the advice letter process may be utilized for obtaining disbursements. Specifically, Section 2.01 of the Master Trust Agreement states:

> The Trustee shall make payments of the Decommissioning Costs in accordance with the following procedures… (4)(d) a CPUC Order authorizing either Interim Disbursements or Final Disbursements.

Section 1.01 (8) of the Master Trust Agreements further provides:

> CPUC Order shall mean an order or resolution issued by the CPUC after the Company, the Committee, the CPUC Staff, the Trustee, and other interested parties have been given notice and an opportunity to be heard. The order may be issued with or without hearing or *by the CPUC Advice Letter procedure or comparable procedure*." (emphasis added)

III. 2019 STATUS UPDATE

On March 21, 2019, the California State Lands Commission (CSLC) certified its Final Environmental Impact Report (FEIR) regarding SCE's decommissioning of the SONGS facility. On October 17, 2019, the California Coastal Commission (CCC) approved SCE's application for a Coastal Development Permit (CDP) for the onshore portion of the SONGS decommissioning project and on October 21, 2019, issued the corresponding CDP (No. 09-19-0194). Having obtained certification of the FEIR and issuance of the CDP, SCE now has the regulatory approvals needed to authorize the SONGS decommissioning general contractor, SONGS Decommissioning*Solutions*

(SDS), to commence decontamination and dismantling (D&D) activities of SONGS 2&3. SCE anticipates that SDS will commence D&D activities in early 2020.[6]

While awaiting the issuance of the CDP, SDS performed detailed planning of many of the D&D activities and executed contracts with several subcontractors who will be performing various portions of the D&D work scope. In addition, one of SDS's offsite subcontractors completed the fabrication of specialized equipment that will be used to perform underwater segmentation of the highly radioactive SONGS 2&3 reactor vessels and internals.

During the period that SONGS Fuel Transfer Operations (FTO) were suspended following the August 3, 2018 canister downloading event, SCE and Holtec reviewed all aspects of FTO and updated FTO procedures, processes, equipment, and staffing. On July 15, 2019, after having satisfied themselves and the U.S. Nuclear Regulatory Commission that appropriate corrective actions had been incorporated, FTO resumed and as of November 22, 2019, 41 of 73 canisters have been safely transferred from the wet storage pools into dry storage in the on-site Independent Spent Fuel Storage Installation (ISFSI). SCE forecasts completing FTO by mid-to-late 2020.

IV. CONTRACTUAL ISSUES

[redacted]

[6] CCC confirmation of SCE's compliance with certain conditions in the CDP is required before SCE will be authorized to issue the Notice to Proceed to SDS. SCE anticipates that the CCC will confirm SCE's compliance with these conditions by the end of 2019 or early in 2020.

[redacted]

V. PREVIOUS ADVICE LETTER REQUESTS FOR NDT WITHDRAWALS

On November 28, 2018, SCE submitted Tier 2 AL 3903-E requesting Commission approval to withdraw up to $341.3 million from SCE's SONGS 2&3 NDTs for decommissioning costs forecasted for 2019. SCE received authorization from the Commission, effective December 28, 2018. SCE will submit a Tier 2 AL reporting 2019 recorded decommissioning costs in comparison to this forecast in the spring of 2020.

Attachment 9 provides a breakdown of total amounts requested by SCE in advice letters and approved by the Commission to date.

VI. PRESENT REQUEST

The approval sought by this AL will authorize disbursements from the NDTs for the 2020 forecasted costs. SCE will submit a separate advice letter in the spring of 2021 providing 2020 recorded cost information and a comparison to the forecasted costs provided in this AL. In addition, the final recorded 2020 decommissioning costs will be subject to the Commission's reasonableness review in a future NDCTP or other proceeding, as designated by the Commission.

To present the 2020 forecasted costs in 2014 dollars, SCE de-escalated current dollars (i.e., year of expense dollars) based on the forecasted de-escalation factors summarized in Attachment 7. Summarizing costs in 2014 dollars allows the Commission to compare the 2020 forecasted costs in this AL to the 2017 SONGS 2&3 DCE, which is currently being reviewed in the 2018 NDCTP. Although costs are presented in 2014 dollars for comparison, SCE is requesting disbursement of funds based on the expected year of expense or 2020 dollars in this AL.

In Table 1 below, SCE summarizes 2020 forecasted costs compared to the corresponding cost estimate provided in the 2017 DCE.

Table 1
Comparison Of 2020 Forecast Costs To 2017 DCE
(Dollars In Millions)

	2017 DCE (forecast for 2020)	2020 Forecast Advice Letter	Variance To 2017 DCE
100% Share, 2020 $	$ 191.7	$ 535.0	$ (343.3)
SCE Share, 2020 $	145.4	405.5	(260.1)
100% Share, 2014 $	166.3	461.8	(295.5)

A. DISBURSEMENTS FOR 2020 EXPENSES

The 2017 SONGS 2&3 DCE included $166.3 million (100% share, 2014 $) for 2020 activities and associated expenses. For the same time period, SCE currently forecasts expenditures of $461.8 million (100% share, 2014$), or $295.5 million (100% share, 2014 $) more than included in the DCE for this year. As explained in further detail below, the variance includes costs for work deferred from 2018 and 2019 to 2020, as well as accelerated from later years into 2020.

This variance occurred primarily due to the regulatory delays SCE experienced in obtaining certification of the FEIR and approval of the CDP. In addition, SCE experienced delays due to the nearly year-long suspension of fuel transfer operations following the August 3, 2018 canister downloading event. The cash flows for these activities were deferred from prior years to 2020.

The activities for which SCE seeks 2020 NDT disbursements, are further discussed in Attachment 2.

In accordance with D.16-04-019, SCE is providing the following additional information to assist in the review of this AL:

Attachment 1	Graph Tracking Total 2017 DCE Estimate and Actual and Forecasted Decommissioning Expenditures
Attachment 2	Description of Work Activities and Preliminary Variance Explanations for 2020 Forecasted Expenses with Reference to the 2017 DCE
Attachment 3	Comparison of 2017 DCE Estimated and Forecasted Expenditures by Cost Category and DCE Line Number
Attachment 4	Comparison of 2017 DCE Estimated and Forecasted Cash Flow
Attachment 5	Schedule

Attachment 6	Adjusted Total Amounts Requested to Date Including Previous Advice Letters
Attachment 7	Forecasted Escalation and De-Escalation Factors
Attachment 8	2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs in 2014$
Attachment 9	SCE Trust Fund Disbursement Amounts Requested, Approved, and Withdrawn
Attachment 10	2017 DCE Waste Disposal Adjustment
Attachment 11	Status Report for Projected 2021 NDCTP Completed Projects

V. REQUEST FOR RELIEF

For the reasons explained above, SCE requests that the Commission approve this AL by authorizing disbursements from the NDTs of up to $405.5 million (SCE share, 2020 $) for 2020 SONGS 2&3 forecasted decommissioning expenditures.

VI. OTHER INFORMATION

A. TIER DESIGNATION

Pursuant to GO 96-B, Energy Industry Rule 5.2, this advice letter is submitted with a Tier 2 designation.

B. EFFECTIVE DATE

SCE requests that this advice letter become effective on January 3, 2020, the 30th calendar day after the date of filing.

C. NOTICE

Anyone wishing to protest this advice letter may do so by letter via U.S. Mail, facsimile, or electronically, any of which must be received no later than December 24, 2019, which is 20 days after the date of this advice letter. Protests should be mailed to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue, 4th Floor
San Francisco, California 94102
Facsimile: (415) 703-2200
E-mail: EDTariffUnit@cpuc.ca.gov

Copies of protests should also be mailed to the attention of the Director, Energy Division, Room 4004, at the address shown above.

The protest and all other correspondence regarding this advice letter should also be sent by letter and transmitted via facsimile or electronically to the attention of:

Gary A. Stern, Ph.D.
Managing Director, State Regulatory Operations
Southern California Edison Company
8631 Rush Street
Rosemead, California 91770
Telephone: (626) 302-9645
Facsimile: (626) 302-6396
E-mail: AdviceTariffManager@sce.com

Laura Genao
Managing Director, State Regulatory Affairs
c/o Karyn Gansecki
Southern California Edison Company
601 Van Ness Avenue, Suite 2030
San Francisco, California 94102
Facsimile: (415) 929-5544
E-mail: Karyn.Gansecki@sce.com

With a copy to:
Jose L. Perez
Principal Manager, Nuclear CPUC Regulatory Affairs and Compliance
Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, California 91770
Telephone: (949) 368-9133
E-mail: Jose.Perez@sce.com

There are no restrictions on who may file a protest, but the protest shall set forth specifically the grounds upon which it is based and must be received by the deadline shown above.

In accordance with General Rule 4 of GO 96-B, SCE is serving copies of this advice filing to the interested parties shown on the attached GO 96-B, A.12-12-012 et al, I.12-10-013, A.15-01-014, A.16-03-004, and A.18-03-009 service lists.

Address change requests to the GO 96-B service list should be directed by electronic mail to AdviceTariffManager@sce.com or at (626) 302-4039. For changes to all other service lists, please contact the CPUC's Process Office at (415) 703-2021 or by electronic mail at Process_Office@cpuc.ca.gov.
Further, in accordance with Public Utilities Code Section 491, notice to the public is hereby given by filing and keeping the advice filing at SCE's corporate headquarters. To view other SCE advice letters filed with the CPUC, log on to SCE's web site at https://www.sce.com/wps/portal/home/regulatory/advice-letters.

For questions, please contact Jose Perez at (949) 368-9133 or by electronic mail at Jose.Perez@sce.com.

Southern California Edison Company

/s/ Gary A. Stern, Ph.D
Gary A. Stern, Ph.D.

GAS:jp:jm
Enclosures

ADVICE LETTER SUMMARY

ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Southern California Edison Company (U 338-E)

Utility type:
☑ ELC ☐ GAS ☐ WATER
☐ PLC ☐ HEAT

Contact Person: Darrah Morgan
Phone #: (626) 302-2086
E-mail: AdviceTariffManager@sce.com
E-mail Disposition Notice to: AdviceTariffManager@sce.com

EXPLANATION OF UTILITY TYPE
ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 4122-E

Tier Designation: 2

Subject of AL: Request for Authorization of Disbursements from the Decommissioning Master Trusts for 2020 San Onofre Nuclear Generating Station (SONGS) 2&3 Forecasted Decommissioning Costs

Keywords (choose from CPUC listing): Compliance

AL Type: ☐ Monthly ☐ Quarterly ☐ Annual ☑ One-Time ☐ Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #:
Decisions 11-07-003 and 14-12-082

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL:

Summarize differences between the AL and the prior withdrawn or rejected AL:

Confidential treatment requested? ☑ Yes ☐ No

If yes, specification of confidential information: See Confidentiality Declaration
Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information: Contact Walker.Matthews@sce.com or 626-302-6879

Resolution required? ☐ Yes ☑ No

Requested effective date: 1/3/2020 No. of tariff sheets: -0-

Estimated system annual revenue effect (%):

Estimated system average rate effect (%):

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: None

Service affected and changes proposed[1]:

Pending advice letters that revise the same tariff sheets: None

[1]Discuss in AL if more space is needed.

Clear Form

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102
Email: EDTariffUnit@cpuc.ca.gov

Name: Gary A. Stern, Ph.D.
Title: Managing Director, State Regulatory Operations
Utility Name: Southern California Edison Company
Address: 8631 Rush Street
City: Rosemead
State: California Zip: 91770
Telephone (xxx) xxx-xxxx: (626) 302-9645
Facsimile (xxx) xxx-xxxx: (626) 302-6396
Email: advicetariffmanager@sce.com

Name: Laura Genao c/o Karyn Gansecki
Title: Managing Director, State Regulatory Affairs
Utility Name: Southern California Edison Company
Address: 601 Van Ness Avenue, Suite 2030
City: San Francisco
State: California Zip: 94102
Telephone (xxx) xxx-xxxx: (415) 929-5515
Facsimile (xxx) xxx-xxxx: (415) 929-5544
Email: karyn.gansecki@sce.com

Clear Form

ENERGY Advice Letter Keywords

Affiliate	Direct Access	Preliminary Statement
Agreements	Disconnect Service	Procurement
Agriculture	ECAC / Energy Cost Adjustment	Qualifying Facility
Avoided Cost	EOR / Enhanced Oil Recovery	Rebates
Balancing Account	Energy Charge	Refunds
Baseline	Energy Efficiency	Reliability
Bilingual	Establish Service	Re-MAT/Bio-MAT
Billings	Expand Service Area	Revenue Allocation
Bioenergy	Forms	Rule 21
Brokerage Fees	Franchise Fee / User Tax	Rules
CARE	G.O. 131-D	Section 851
CPUC Reimbursement Fee	GRC / General Rate Case	Self Generation
Capacity	Hazardous Waste	Service Area Map
Cogeneration	Increase Rates	Service Outage
Compliance	Interruptible Service	Solar
Conditions of Service	Interutility Transportation	Standby Service
Connection	LIEE / Low-Income Energy Efficiency	Storage
Conservation	LIRA / Low-Income Ratepayer Assistance	Street Lights
Consolidate Tariffs	Late Payment Charge	Surcharges
Contracts	Line Extensions	Tariffs
Core	Memorandum Account	Taxes
Credit	Metered Energy Efficiency	Text Changes
Curtailable Service	Metering	Transformer
Customer Charge	Mobile Home Parks	Transition Cost
Customer Owned Generation	Name Change	Transmission Lines
Decrease Rates	Non-Core	Transportation Electrification
Demand Charge	Non-firm Service Contracts	Transportation Rates
Demand Side Fund	Nuclear	Undergrounding
Demand Side Management	Oil Pipelines	Voltage Discount
Demand Side Response	PBR / Performance Based Ratemaking	Wind Power
Deposits	Portfolio	Withdrawal of Service
Depreciation	Power Lines	

Clear Form

SCE's 2019 FALL ADVICE LETTER

DECLARATION OF JOSE LUIS PEREZ

REGARDING THE CONFIDENTIALITY OF CERTAIN DATA

I, Jose Luis Perez, declare and state:

1. I am employed by Southern California Edison (SCE) as a Principal Manager for Nuclear CPUC Regulatory Affairs and Compliance. In my position as Principal Manager, I am familiar with the Decommissioning General Contractor (DGC) Agreement between SCE, Energy*Solutions* Services, Inc. (Energy*Solutions*), and AECOM Energy & Construction, Inc. (AECOM), dated December 20, 2016 (DGC Agreement). EnergySolutions and AECOM formed a joint venture known as SONGS Decommissioning*Solutions* (SDS). I also am familiar with the Independent Spent Fuel Storage Installation (ISFSI) Agreement between SCE and Holtec International (ISFSI Agreement), dated December 5, 2015. I had responsibility for overseeing and reviewing the Fall advice letter and its attachments, which contain certain confidential information pertaining to the DGC Agreement and ISFSI Agreement. Doug Bauder, Vice President of SONGS Decommissioning and Chief Nuclear Officer, delegated authority to me to sign this declaration regarding the confidentiality of this information, as described below.

2. I am making this declaration in accordance with the instructions set forth in Decision 16-08-024 and Decision 17-09-023 of R. 14-11-001, which were issued August 25, 2016, and September 28, 2017, respectively, and govern the submission of confidential documents to the Commission.

3. I have personal knowledge of the facts and representations herein and, if called upon to testify, could and would do so, except for those facts expressly stated to be based upon information and belief, and as to those matters, I believe them to be true.

4. Listed below are the data for which SCE is seeking confidential protection and the basis for SCE's confidentiality request. Paragraphs 5-10 also provide additional reasons supporting SCE's confidentiality claim.

Location of Confidential Data	**Pages** (if available)	**Description of Information that is Confidential**	**Basis for SCE's Confidentiality Claim**
Advice Letter	Section IV, Contractual issues	1. Discussion of contractual issues	California Gov. Code § 6255 (the public interest served by not disclosing the information outweighs the public interest served by disclosure of the record).
Advice Letter	Attachment 2, pp. 1-2, 4-5;	2. DGC Agreement contract terms, including decommissioning plans and pricing terms contained therein. 3. Contingency and cost-estimating information pertaining to the DGC Agreement and ISFSI Agreement.	California Gov. Code § 6255 (the public interest served by not disclosing the information outweighs the public interest served by disclosure of the record).

5. Both the DGC Agreement and ISFSI Agreement require SCE to make reasonable efforts to protect the confidentiality of the terms and conditions in the agreements. The agreements and discussions between SCE and its contractors regarding contractual issues under those agreement require confidentiality because the agreements and discussions involve commercially sensitive pricing terms and proprietary information, such as work sequencing and scope. If this information was publicly disclosed without protection, competitors, including potential vendors for decommissioning sub-contract work and other activities, could mis-use the information to the detriment of SCE's customers. For example, if a vendor seeking to bid on a subcontract or another activity knew the DGC Agreement or ISFSI Agreement pricing terms, the vendor would have an opportunity to adjust its bid prices (e.g., the vendor could bid higher than it otherwise may have bid).

6. Public release of this information could also hinder SCE's ability to obtain favorable contract terms for related decommissioning work not covered under the DGC Agreement and ISFSI Agreement. For example, if a vendor (who SCE has not yet contracted with for SONGS decommissioning) was aware of various terms in the DGC Agreement and ISFSI Agreement, the vendor could mis-use this information during contract negotiations to extract terms favorable to the vendor that the vendor may not have otherwise sought.

7. Finally, it is also in the best interest of the long-term success of the SONGS decommissioning project that SDS and Holtec remain commercially competitive throughout the terms of the DGC Agreement and ISFSI Agreement, respectively. Both agreements are long-term agreements that will require SDS' and Holtec's continued performance for the next decade and beyond. If information regarding the agreements was disclosed without protection, their competitors could mis-use the information against them during the bidding process for other decommissioning projects across the world and potentially threaten the financial health of both companies. This in turn could threaten the companies' ability to complete contractually required services for SONGS in the future without interruption.

8. The other category of information that SCE seeks to maintain as confidential is contingency. SCE applied various contingency amounts on the remaining decommissioning work identified in the 2017 SONGS 2&3 decommissioning cost estimate (DCE) used in this advice letter, including work to be completed under the DGC Agreement and ISFSI Agreement. The contingency reflects SCE's judgment of potential costs, based on the technical complexity, contracting status, estimating approach, and timing, of the remaining work scope. It is in SCE customers' interest for contingency included for the DGC Agreement and ISFSI Agreement to be protected as confidential, because the disclosure of the information without protection could allow vendors to mis-use the information to the detriment of SCE's customers. For example, if a vendor (including SDS, Holtec, or one of their competitors) knew the contingency SCE has applied in the 2017 DCE to work to be completed under the DGC Agreement and ISFSI Agreement, the vendor would have an opportunity to manipulate its negotiating strategy pertaining to new contracts and/or change orders regarding that work (e.g., the vendor could demand higher prices than it otherwise would have demanded).

9. The confidential information identified in Paragraph 4 cannot be provided in a form that can be further aggregated, redacted, summarized, masked, or otherwise protected in a manner that would allow partial disclosure of the data while protecting confidential information.

10. For the reasons described above, the confidential information should be protected from public disclosure. Information regarding the DGC Agreement and ISFSI Agreement, including the pricing terms of those agreements and contingency SCE applied in the 2017 DCE for work remaining under those agreements, is market sensitive information that should remain confidential under GO-66-C Section 2.2(b) ("unfair business advantage") and GO 66-C Section 2.8 ("Information obtained in confidence from other than a business regulated by this Commission where the disclosure would be against the public interest").

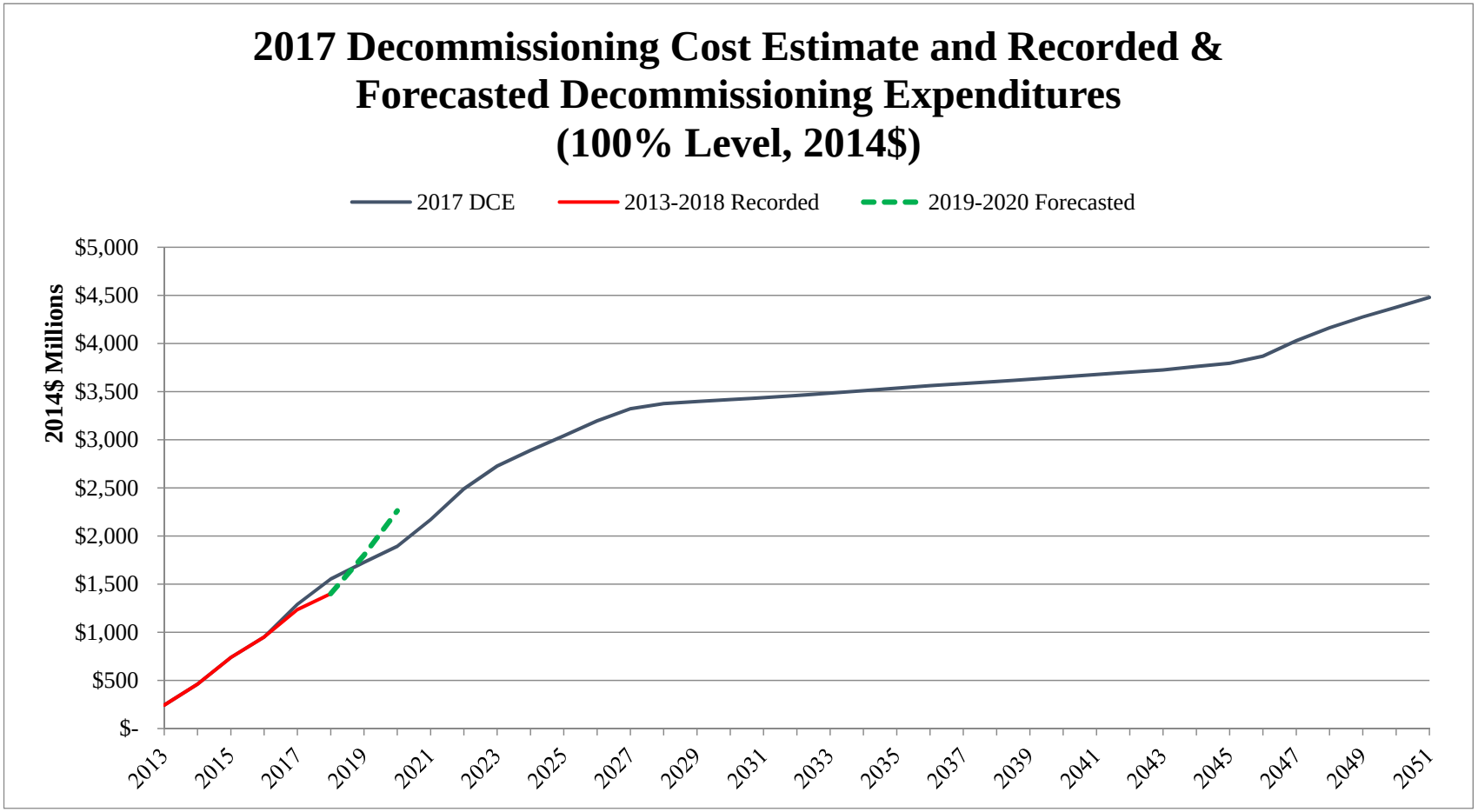
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on November 25, 2019 at San Onofre Nuclear Generating Station, near San Clemente, California.

Jose Luis Perez

Attachment 1

Graph Tracking Total 2017 DCE Estimate and Actual and Forecasted Decommissioning Expenditures



General Note:

(A) The 2019 forecast includes amounts for certain milestone payments that have slipped into 2020 from 2019 (i.e., there is a substantial 2019 underrun as explained further in this AL). These milestones have been included in this Advice Letter's 2020 forecast. The 2019 underrun will be reflected in the Spring 2020 recorded costs Advice Letter, showing the forecasted costs through 2020 (dashed/green line) as tracking more closely to the DCE (blue line).

Attachment 2

Description of Work Activities and Preliminary Variance Explanations for 2020 Forecasted Expenses with Reference to the 2017 DCE

Attachment 2

Description of Work Activities and Preliminary Variance Explanations for 2020 Forecasted Expenses with Reference to the 2017 Decommissioning Cost Estimate

The 2017 SONGS 2&3 Decommissioning Cost Estimate (DCE) included $166.3 million for 2020 activities and associated expenses. For the same time period, SCE currently forecasts expenditures of $461.8 million, or $295.5 million more than included in the DCE for this year. As explained in further detail below, the variance includes costs for work deferred from 2018 and 2019 to 2020, as well as accelerated from later years into 2020.

Table 1
Summary Comparison Of 2020 Forecasted Expenses To The 2017 DCE
(2014 Dollars In Millions, 100% Level)

		2017 DCE	Forecasted	Variance
1	**Major Projects (Distributed)**			
2	Decontamination, Demolition, & Disposal	[redacted]	$ 231.3	[redacted]
3	ISFSI		65.4	
4	Other Major Projects	19.2	26.9	(7.7)
5	**Subtotal**	**$ 88.1**	**$ 323.6**	**$ (235.5)**
6				
7	**Undistributed**			
8	Labor-Staffing	$ 47.3	$ 81.8	$ (34.5)
9	Non-Labor	22.1	47.7	(25.6)
10	Service Level Agreements	8.8	8.7	0.1
11	**Subtotal**	**$ 78.2**	**$ 138.2**	**$ (60.0)**
12				
13	**Total**	**$ 166.3**	**$ 461.8**	**$ (295.5)**

The variance is primarily the result of the delays associated with environmental permitting activities and transferring the spent nuclear fuel to the ISFSI. Having completed the environmental permitting activities and nearing completion of fuel-transfer activities, SCE anticipates performing many of the activities in 2020 that were previously planned to be performed in 2018 and 2019, and in later years. This results in an increased work scope for 2020 as compared to the DCE schedule and the associated cash flow for 2020. These shifts in the timing of expenditures do not change overall estimated decommissioning costs.

The forecast provided in this Advice Letter was developed by SONGS personnel based on the current decommissioning project schedule, expected contract milestone payments, and expected SCE staffing level in 2020.

SCE discusses below the major activities planned to be performed in 2020, and explains variances by distributed cost activities and undistributed costs.

Attachment 2

Table 2
Comparison Of 2020 Forecasted Expenses To The 2017 DCE
(2014 Dollars In Millions, 100% Level)

	Category	2017 DCE	Forecasted	Variance
1	**Major Projects (Distributed)**			
2	Initial D&D Activities	[redacted]	$ 19.5	[redacted]
3	Internals and Vessel Segmentation		21.8	
4	Steam Generator Removal		46.1	
5	Non-Essential System Removal		17.8	
6	Removal of Spent Fuel Systems/ Equipment		0.3	
7	Containment Building Demo		14.1	
8	Initial Plant Building Demo		11.0	
9	Final Survey/License Reduction		2.4	
10	D&D Waste		98.3	
11	**Decontamination, Demolition, & Disposal Subtotal**		**$ 231.3**	
12				
13	ISFSI	[redacted]	65.4	[redacted]
14	**ISFSI Subtotal**		**$ 65.4**	
15				
16	ISFSI CDP Settlement	-	1.7	(1.7)
17	Coastal Development Permit Extensions	0.4	0.3	0.1
18	ISFSI Aging Management	6.5	4.9	1.6
19	GTCC Waste	7.7	13.8	(6.1)
20	Siren Removals	-	0.0	(0.0)
21	NIA Sump Modifications	0.4	-	0.4
22	NEPA	1.6	0.5	1.1
23	Mesa Turnover	2.3	5.4	(3.1)
24	DCE Updates	0.3	0.3	0.0
25	**Other Major Projects Subtotal**	**$ 19.2**	**$ 26.9**	**$ (7.7)**
26				
27	**Total Major Projects (Distributed)**	**$ 88.1**	**$ 323.6**	**$ (235.5)**
28				
29	**Undistributed**			
30	Labor-Staffing	$ 47.3	$ 81.8	$ (34.5)
31	Non-Labor	22.1	47.7	(25.6)
32	Service Level Agreements	8.8	8.7	0.1
33				
34	**Total Undistributed**	**$ 78.2**	**$ 138.2**	**$ (60.0)**
35				
36	**Grand Total**	**$ 166.3**	**$ 461.8**	**$ (295.5)**

Distributed Cost Activities – Major Projects

Based on the Milestone Framework approved by the CPUC, all distributed cost activities have been incorporated into Major Projects. For the period January 1, 2020 through December 31, 2020, Major Project costs in the 2017 DCE were estimated to be $88.1 million. SCE now forecasts that $323.6 million will be incurred for Major Projects in 2020, or $235.5 million more than included in the DCE. The variances are discussed in more detail below:

- **Decontamination, Demolition, & Disposal (Table 2 Lines 2 through 11)**

On December 20, 2016, SCE awarded the decommissioning general contract to SONGS Decommissioning*Solutions* (SDS) to perform the major decontamination & dismantlement (D&D) activities for SONGS 2&3 decommissioning. Beginning on the contract effective date of January 9, 2017, SDS began planning and preparing for the major D&D activities. The 2017 DCE assumed that the major D&D activities would begin in January 2019 after the California State Lands Commission (CSLC) completed its environmental review of the decommissioning project as required under the California Environmental Quality Act (CEQA), and after the California Coastal Commission (CCC) issued the required Coastal Development Permit (CDP) in late 2018. However, due to regulatory delays beyond SCE's control, the CCC did not issue the CDP to SCE until October 2019.

During this permitting delay period, SCE completed certain activities that could be performed outside the scope of the pending permitting process, including the detailed planning of many D&D activities and executing contracts with several subcontractors who will be performing various portions of the D&D work scope. In addition, one of SDS's offsite subcontractors completed the fabrication of specialized equipment that will be used to perform underwater segmentation of the highly radioactive SONGS 2&3 reactor vessels and internals.

Now that the CDP has been issued, and barring any unexpected legal impediments, SCE forecasts that work on major D&D activities will begin in early 2020 (i.e., Phase II of the DGC Agreement).[1] An overview of significant work forecasted to be performed by the DGC in 2020 is provided below.

Initial D&D Activities

- Survey, preparation, and removal of the four Unit 3 reactor vessel concrete missile shields from containment and stage for packaging.
- Disassembly, rigging, and removal of the Unit 2 steel missile shields from containment and stage for packaging.
- Modification of the Unit 2 containment exterior concrete shield door and internal equipment hatch opening.

Internals and Vessel Segmentation

- Completion of the reactor vessel segmentation equipment design and delivery to site.
- Delivery of reactor vessel internals segmentation equipment to site.
- Reactor vessel and internals segmentation equipment mock-up, testing, and training.

[1] CCC confirmation of SCE's compliance with certain conditions in the CDP is required before SCE will issue the Notice to Proceed to SDS. SCE anticipates that the CCC will confirm SCE's compliance with these conditions by the end of 2019 or early in 2020.

Steam Generator Removal

- Preparation and air gapping[2] of reactor coolant supply and feedwater piping as necessary for removal of steam generators.
- Size reduction activities to facilitate future disposal.

Initial Plant Building Demolition

- Demolition of the high flow make-up demineralizer area structures, systems, and components.
- Subcontract award for design and fabrication of the demolition isolation enclosure[3] and the material handling facility for loading and shipping debris.

Non-Essential Systems Removal

- Removal of non-essential systems (e.g., interior/exterior equipment and components) from the Administration, Warehouse, and Shop (AWS) Building, site Maintenance Buildings, South Security Processing Facility, Outage Control Center, and other ancillary buildings.
- Demolition of the main and reserve auxiliary transformers.

Containment Building Demolition

- Detension and removal of horizontal and vertical metal strand tendons in both Containment Buildings including the collection of tendon grease as necessary to package and prepare for shipping.

D&D Waste

- Preparation and loading of waste material generated during decommissioning activities for off-site transportation.
- Transportation and disposition of waste materials generated during decommissioning activities.

Although certain D&D activities have been deferred or advanced in the D&D schedule for performance in 2020, the total cost for these activities has not changed, and the costs for these activities in the DGC contract remains consistent with the costs included in the 2017 DCE. For January 1, 2020 through December 31, 2020, DGC costs included in the 2017 DCE were [redacted] million. SCE now forecasts that it will incur [redacted] million for DGC costs in 2020, or [redacted] million more than estimated in the DCE. For additional context and comparison, the DGC Agreement assumed a total of [redacted] million of work would be performed during the first year of physical D&D activities (i.e., during 2019). As noted above, the variance of $162.4 million is primarily the result of the regulatory delays associated with environmental permitting

[2] Air gapping is the physical isolation of the installed components, in this case the steam generators, from all potential inputs, outflows, or energy sources. The steam generators' primary system (hot and cold leg) and secondary system (main feedwater and main steam line) pipes are severed and capped, preparing the steam generators for removal.

[3] The demolition isolation enclosure will be a large temporary enclosure that will be installed between SONGS 2 and SONGS 3 to support major demolition activities. It will serve as a physical barrier between the demolition work and the outside elements and will maintain negative pressure ventilation to prevent the spread of radioactive contamination.

activities. Most of this variance is related to SDS' anticipated waste disposal effort (i.e., [redacted] million of the [redacted] million total variance).

- **ISFSI & Fuel Transfer Operations (Table 2 lines 13 through 14)**

The 2017 DCE forecasted that the fuel transfer operations (FTO) would be completed by mid-2019, therefore, the DCE assumed $0 in 2020 for this project. SCE now forecasts [redacted] million for 2020 ISFSI-related activities, resulting in the [redacted] million variance shown in Table 2. Following the August 3, 2018 canister downloading event, SCE and Holtec stopped FTO activities, pending a review of the event and implementation of various corrective actions. SCE and Holtec resumed FTO activities on July 15, 2019, following the NRC's review of the corrective actions implemented. SCE anticipates completing FTO activities by mid-to-late 2020.[4] For 2020, SCE will incur FTO costs relating to its oversight of Holtec, waste disposal, and various other milestone payments related to FTO completion. As noted above, the DCE forecasted these costs to be incurred by SCE prior to 2020. The schedule change created a timing variance relative to the DCE, but not a cost change for the contractual costs included in the DCE.

- **Other Major Projects (Table 2 Lines 16 through 25)**

For 2020, the 2017 DCE estimated $19.2 million for Other Major Projects. SCE now forecasts $26.9 million will be incurred in 2020 for Other Major Projects, resulting in a $7.7 million increase. As discussed below, the primary driver for this variance is the GTCC Waste Storage project and the timing impacts related to the delayed issuance of the CDP. The remainder of the variance for Other Major Projects is driven by project timing issues unrelated to the CDP. Nevertheless, the total budgets for all Other Major Projects do not exceed the 2017 DCE estimated cost.

  - **GTCC Waste Storage (Table 2 Line 19)**

SCE forecasts $13.8 million in 2020 related to GTCC Waste Storage, whereas the 2017 DCE included $7.7 million in 2020. The 2017 DCE assumed that SCE will be required to license and purchase ten new canisters for storing GTCC waste generated during the segmentation of the reactor vessel internals and move the GTCC to the ISFSI. The DCE assumed that SCE would start the GTCC Waste Storage project in 2018 and complete it in 2020. However, due to the delayed issuance of the CDP, the anticipated GTCC canister procurement activities and associated expenses did not occur in 2018 as the DCE estimated. SCE now estimates the canister procurement process will start in 2020.

Undistributed Costs

For January 1, 2020 through December 31, 2020, undistributed costs in the 2017 DCE were estimated to be $78.2 million. SCE now forecasts these costs at $138.2 million, or $60.0 million more than included in the DCE. The variances are discussed below.

[4] SCE currently forecasts that it will have transferred 45 of the 73 canisters to the ISFSI by the end of 2019.

- **Undistributed Labor-Staffing (Table 2 Line 30)**

The 2017 DCE included $47.3 million in 2020 undistributed labor, which includes SCE utility staff, security force, and DGC staff. SCE now forecasts $81.8 million in 2020, or $34.5 million more than estimated in the DCE. The increase, in part, is due to SCE's need to maintain the appropriate level of security staffing to keep SONGS safe and compliant with NRC regulations during the FTO project. Additionally, as long as spent fuel remains in the spent fuel pools, SCE is required to maintain an operations organization consistent with NRC regulations. SCE currently anticipates that a staffing ramp down will occur at the completion of the FTO project that will maintain compliance with site programs and plans approved by the NRC, such as the ISFSI-only technical specifications, the security plan, the emergency plan, and the ISFSI-only decommissioning quality assurance plan. In addition, SCE forecasted higher DGC monthly staffing costs during 2020 than were estimated in the DCE. The primary reason for the variance is the impact on DGC staff resulting from the delayed start of D&D activities and the need to maintain the site programs (e.g., maintenance, engineering, and chemistry), that were transitioned to the DGC in 2018 until Phase II of the contract commences in early 2020.

- **Undistributed Non-Labor (Table 2 Line 31)**

The 2017 DCE included $22.1 million in 2020 for undistributed non-labor costs. SCE now forecasts $47.7 million in 2020, or $25.6 million more than estimated in the DCE. The primary reason for this variance is a timing delay in the expenditure for severance costs associated with the post-FTO staffing ramp down. Additionally, contracted services is higher than forecasted in the DCE due to required site infrastructure maintenance activities that either were not estimated or will be higher than estimated in the 2017 DCE, including repairs to the public beach walkway and adjacent rip-rap resulting from ocean currents and wave action. Finally, SCE will be required to incur costs associated with the special conditions and mitigation requirements imposed by the CSLC and the CCC arising from the FEIR and the CDP. These compliance and mitigation-related costs imposed during the environmental permitting process could not have been known at the time the DCE was developed and were therefore not included in the estimate.

Attachment 3

Comparison of 2017 DCE Estimated and Forecasted Expenditures by Cost Category and DCE Line Number

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project[1]	Description[2]	2020 [A] 2017 DCE[3]	2020 [B] Forecasted	2020 [C=A-B] Variance	[D] Forecasted Inception To Date Through 2020[4]	[E] Total 2017 DCE[3][5]	[F] Current Start	[G] Current Finish
1	LT-2-D-2.17	Historical Site Assessment /Characterization	Perform Historic Site Assessment and Site Characterization	$ -	$ -	$ -	$ 6.2	$ 6.2	1/17/2014	7/14/2015
2	**Historical Site Assessment/Characterization Subtotal**			**$ -**	**$ -**	**$ -**	**$ 6.2**	**$ 6.2**		
3										
4	LT-2-D-2.16	Legacy Radwaste Disposal	Disposition of Legacy Wastes	-	-	-	11.6	11.6	1/2/2014	6/30/2015
5	LT-1-D-1.05	Legacy Radwaste Disposal	Disposition of Legacy Waste	-	-	-	8.4	8.4	7/19/2013	10/10/2013
6	**Legacy Radwaste Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ 20.0**	**$ 20.0**		
7										
8	SR-1-D-14.04	Project Governance and Admin	Fuel Cancellation Expense	-	-	-	54.4	54.4	7/8/2013	10/30/2015
9	**Project Governance and Admin Subtotal**			**$ -**	**$ -**	**$ -**	**$ 54.4**	**$ 54.4**		
10										
11	LT-2-D-2.02	Regulatory Compliance	Prepare Post-Shutdown QA Plan	-	-	-	0.4	0.4	1/2/2014	8/21/2015
12	LT-2-D-2.03	Regulatory Compliance	Prepare Post-Shutdown Security Plan	-	-	-	0.1	0.1	1/2/2014	4/22/2015
13	LT-2-D-2.04	Regulatory Compliance	Prepare Post-Shutdown Fire Protection Plan	-	-	-	0.0	0.0	1/2/2014	4/22/2015
14	LT-2-D-2.06	Regulatory Compliance	Prepare Preliminary Defueled Technical Specifications	-	-	-	0.3	0.3	1/2/2014	7/17/2015
15	LT-2-D-2.08	Regulatory Compliance	Implement Technical Specification Modifications	-	-	-	0.1	0.1	7/10/2015	8/21/2015
16	LT-2-D-2.09	Regulatory Compliance	Prepare Post-Shutdown Emergency Preparedness Plan	-	-	-	1.7	1.7	1/2/2014	10/29/2015
17	LT-2-D-2.11	Regulatory Compliance	Prepare Post-Shutdown Decommissioning Activities Report (PSDAR)	-	-	-	0.2	0.2	1/2/2014	6/19/2014
18	LT-2-D-2.12	Regulatory Compliance	Post-Shutdown Decommissioning Activities Report (PSDAR) - NRC Review	-	-	-	0.2	0.2	9/24/2014	8/21/2015
19	LT-2-D-2.14	Regulatory Compliance	Prepare Decommissioning Cost Estimate (DCE)	-	-	-	1.2	1.2	1/2/2014	7/30/2014
20	SNF-1-D-7.03	Regulatory Compliance	Post Fukushima Modifications - Unit 2	-	-	-	0.1	0.1	6/7/2013	12/31/2013
21	SNF-2-D-FLEX	Regulatory Compliance	Flex Initiative	-	-	-	0.2	0.2	1/2/2014	12/31/2014
22	SNF-2-D-8.02	Regulatory Compliance	Decay Heat Analysis	-	-	-	0.2	0.2	1/2/2014	8/28/2014
23	SNF-2-D-8.03	Regulatory Compliance	Zirconium Fire/ Shine Analysis	-	-	-	0.1	0.1	1/2/2014	8/28/2014
24	SNF-2-D-8.05	Regulatory Compliance	Prepare Irradiated Fuel Management Plan & NRC Review	-	-	-	0.0	0.0	1/2/2014	8/19/2015
25	**Regulatory Compliance Subtotal**			**$ -**	**$ -**	**$ -**	**$ 4.9**	**$ 4.9**		
26										
27	LT-2-D-2.31	Transition Modifications - Phase 1	Transition Project Modifications	-	-	-	1.1	1.1	8/1/2015	10/16/2015
28	**Transition Modifications - Phase 1 Subtotal**			**$ -**	**$ -**	**$ -**	**$ 1.1**	**$ 1.1**		
29										
30	SNF-1-D-7.01	Security Programs	Security Shutdown Strategy	-	-	-	2.9	2.9	11/1/2013	12/31/2013
31	SNF-2-D-8.01	Security Programs	Security Shutdown Strategy	-	-	-	4.5	4.5	1/3/2014	11/13/2014
32	**Security Programs Subtotal**			**$ -**	**$ -**	**$ -**	**$ 7.5**	**$ 7.5**		
33										
34	LT-2-D-2.22	DGC RFP & Prep	Select Decommissioning General Contractor (DGC)	-	-	-	13.8	13.8	4/11/2014	12/20/2016
35	**DGC RFP & Preps Subtotal**			**$ -**	**$ -**	**$ -**	**$ 13.8**	**$ 13.8**		
36										
37	LT-2-D-LOED	Transition Modifications - Phase 2	Large Organism Exclusion Device Modification	-	-	-	1.3	1.3	8/1/2015	10/13/2016
38	LT-3-D-RecB	Transition Modifications - Phase 2	Records Backlog	-	-	-	1.9	1.9	5/5/2016	12/31/2016
39	LT-3-D-S&S	Transition Modifications - Phase 2	Simplification & Streamlining Project	-	-	-	1.3	1.3	3/6/2015	11/30/2016
40	LT-D-SPV	Transition Modifications - Phase 2	Special Purpose Vehicle Support	-	-	-	0.4	0.4	10/1/2015	3/16/2016
41	**Transition Modifications - Phase 2 Subtotal**			**$ -**	**$ -**	**$ -**	**$ 5.0**	**$ 5.0**		
42										
43	LT-2-D-2.26	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 2	-	-	-	4.2	4.2	11/3/2014	6/30/2016
44	LT-2-D-2.27	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 3	-	-	-	4.2	4.2	11/3/2014	6/30/2016
45	**Spent Fuel Islanding Subtotal**			**$ -**	**$ -**	**$ -**	**$ 8.4**	**$ 8.4**		
46										
47	SNF-1-D-7.05	Cyber Security Modifications	Cyber Security Modifications	-	-	-	9.4	9.4	6/7/2013	4/27/2017
48	**Cyber Security Modifications Subtotal**			**$ -**	**$ -**	**$ -**	**$ 9.4**	**$ 9.4**		
49										
50	LT-3-D-DCE	Phase 2 Regulatory Compliance	DCE Update	-	-	-	1.8	1.5	3/1/2017	3/8/2018
51	LT-2-D-2.07	Phase 2 Regulatory Compliance	Prepare Defueled Safety Analysis Report (DSAR)	-	-	-	2.0	2.0	1/2/2014	4/13/2016
52	**Phase 2 Regulatory Compliance Subtotal**			**$ -**	**$ -**	**$ -**	**$ 3.7**	**$ 3.5**		
53										
54	LT-2-D-2.18	Initial D&D Activities	Planning & Design For Cold and Dark	-	-	-	20.2	20.2	2/3/2014	12/15/2016
55	LT-2-D-2.19	Initial D&D Activities	Implement Cold and Dark (Repower Site)	-	-	-	54.0	54.0	11/3/2014	1/11/2017
56	LT-2-D-2.20	Initial D&D Activities	Install 12 kV Service Line to Power Temp Power Ring	-	-	-	10.1	10.1	11/3/2014	9/30/2017
57	LT-2-D-2.21	Initial D&D Activities	Drain & De-Energize Non-Essential Systems (DEC Process)	-	-	-	6.1	6.1	1/2/2014	11/16/2016

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

				2020						
				[A]	[B]	[C=A-B]	[D]	[E]	[F]	[G]
	DCE No.	Major Project[1]	Description[2]	2017 DCE[3]	Forecasted	Variance	Forecasted Inception To Date Through 2020[4]	Total 2017 DCE[3] [5]	Current Start	Current Finish
58	LT-2-D-2.29	Initial D&D Activities	Implement Control Room Modifications (Command Center Relocation)	-	-	-	0.3	0.3	4/2/2015	7/18/2016
59	LT-3-D-3.10	Initial D&D Activities	Modify Containment Access- Unit 2		2.2		2.5		4/24/2018	12/31/2020
60	LT-3-D-3.12	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 2		4.1		8.2		6/25/2019	9/15/2020
61	LT-3-D-3.13	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 2		-		3.0		2/28/2018	12/3/2020
62	LT-3-D-3.11	Initial D&D Activities	Modify Containment Access- Unit 3		-		0.3		12/27/2018	12/8/2020
63	LT-3-D-3.14	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 3		4.9		9.7		8/7/2019	8/6/2020
64	LT-3-D-3.15	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 3		-		3.0		2/28/2018	10/1/2020
65	LT-3-D-3.01	Initial D&D Activities	Prepare Integrated Work Sequence and Schedule for Decommissioning		-		7.5		1/8/2017	1/11/2018
66	LT-4-D-4.02	Initial D&D Activities	Install GARDIAN System		-		1.3		8/14/2017	9/28/2017
67	LT-3-D-3.17	Initial D&D Activities	Prepare Activity Specifications - U2		-		-		1/8/2017	12/31/2018
68	LT-3-D-3.02	Initial D&D Activities	Prepare Detailed Work Procedures and Activity Specifications for Decommissioning		-		-		1/8/2017	1/11/2018
69	LT-4-D-4.14	Initial D&D Activities	Remove and Dispose of Legacy Class B and C Waste - Unit 2		-		1.9		6/4/2018	9/17/2018
70	LT-4-D-4.15	Initial D&D Activities	Remove and Dispose of Legacy Class B and C Waste - Unit 3		-		1.9		6/4/2018	9/17/2018
71	LT-3-D-DGC_BUR	Initial D&D Activities	Waste Contracts		-		33.2		2/22/2017	2/27/2018
72	LT-D-FRASB	Initial D&D Activities	Removal of Friable Asbestos		8.3		8.3		12/3/2019	5/20/2020
73	**Initial D&D Activities Subtotal**			**$**	**$ 19.5**	**$**	**$ 171.5**	**$**		
74										
75	LT-3-D-3.23	Internals and Vessel Segmentation	Finalize Internals and Vessel Segmenting Details - Unit 2		-		0.9		12/18/2017	1/25/2019
76	LT-3-D-3.26	Internals and Vessel Segmentation	Finalize Internals and Vessel Segmenting Details - Unit 3		-		2.0		10/30/2017	12/20/2017
77	LT-3-D-3.24	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 2		4.8		18.1		5/25/2017	8/22/2022
78	LT-3-D-3.27	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 3		4.8		17.0		5/25/2017	9/6/2022
79	LT-3-D-3.19	Internals and Vessel Segmentation	Design, Specify, and Procure Special Items and Materials		6.1		6.1		10/24/2020	12/19/2020
80	LT-3-D-3.22	Internals and Vessel Segmentation	Test Special Cutting and Handling Equipment and Train Operators		6.0		6.0		1/28/2019	10/23/2020
81	**Internals and Vessel Segmentation Subtotal**			**$**	**$ 21.8**	**$**	**$ 50.1**	**$**		
82										
83	LT-4-D-4.33	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 2		25.5		46.1		7/23/2018	2/12/2024
84	LT-4-D-4.35	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 3		20.6		41.0		7/23/2018	6/28/2023
85	**Steam Generator Removal Subtotal**			**$**	**$ 46.1**	**$**	**$ 87.1**	**$**		
86										
87	LT-4-D-4.06	Non-Essential System Removal	Remove, Package and Dispose of Non-Essential Systems - Unit 2		7.3		14.2		5/21/2018	10/18/2023
88	LT-4-D-4.09	Non-Essential System Removal	Remove, Package and Dispose of Non-Essential Systems - Unit 3		10.5		14.5		5/11/2018	6/5/2024
89	**Non-Essential System Removal Subtotal**			**$**	**$ 17.8**	**$**	**$ 28.7**	**$**		
90										
91	SR-4-D-17.05	Removal of Spent Fuel Systems/ Equipment	Remove Protected Area Security Fencing		0.3		0.3		10/1/2020	3/23/2021
92	**Removal of Spent Fuel Systems/ Equipment Subtotal**			**$**	**$ 0.3**	**$**	**$ 0.3**	**$**		
93										
94	SR-4-D-17.07	Containment Building Demo	Detension and Remove Unit 3 Containment Building Tendons		7.1		7.1		4/20/2020	7/14/2020
95	SR-4-D-17.15	Containment Building Demo	Detension and Remove Unit 2 Containment Building Tendons		7.0		7.0		8/7/2019	7/14/2020
96	**Containment Building Demo Subtotal**			**$**	**$ 14.1**	**$**	**$ 14.1**	**$**		
97										
98	SR-4-D-17.17	Initial Plant Building Demo	Demolish Condensate Building and Transformer Pads - Unit 2		-		-		3/19/2018	11/13/2023
99	SR-4-D-17.01	Initial Plant Building Demo	Procure Clean Building Demolition Equipment		9.6		19.1		2/3/2020	9/7/2023
100	SR-4-D-17.30	Initial Plant Building Demo	Demolish Auxiliary Radwaste Building - Common		-		-		5/17/2023	6/21/2024
101	SR-4-D-17.32	Initial Plant Building Demo	Remove Systems and Demolish Make-Up Demineralizer Structures		1.3		1.3		5/7/2018	3/3/2021
102	SR-4-D-17.33	Initial Plant Building Demo	Install Concrete Plugs in Intake and Discharge Structures		-		2.5		12/10/2018	8/26/2021
103	**Initial Plant Building Demo Subtotal**			**$**	**$ 11.0**	**$**	**$ 23.0**	**$**		
104										
105	LT-5-D-5.05	Building Decontamination	Decon Turbine Building - Unit 3		-		0.3		5/29/2018	7/3/2023
106	LT-5-D-5.10	Building Decontamination	Decon Turbine Building - Unit 2		-		0.3		5/29/2018	7/3/2023
107	**Building Decontamination Subtotal**			**$**	**$ -**	**$**	**$ 0.6**	**$**		
108										
109	LT-4-D-4.23	Final Plant Building Demo	Asbestos Abatement and Hazardous Waste Disposal for Essential Systems		-		0.4		8/1/2018	2/12/2019
110	**Final Plant Building Demo Subtotal**			**$**	**$ -**	**$**	**$ 0.4**	**$**		
111										
112	LT-4-D-4.39	Final Survey/License Reduction	Prepare License Termination Plan		2.4		4.9		12/18/2017	8/14/2024
113	SR-3-D-16.02	Final Survey/License Reduction	Subsurface Structure Removal Engineering Planning and Design		-		0.8		10/1/2017	12/31/2017
114	**Final Survey/License Reduction Subtotal**			**$**	**$ 2.4**	**$**	**$ 5.6**	**$**		

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project[1]	Description[2]	2020 [A] 2017 DCE[3]	2020 [B] Forecasted	2020 [C=A-B] Variance	[D] Forecasted Inception To Date Through 2020[4]	[E] Total 2017 DCE[3] [5]	[F] Current Start	[G] Current Finish
115										
116	LT-D-WPTT	D&D Waste	Waste Taxes (Pass Through)	[redacted]	2.1	[redacted]	7.8	[redacted]	1/24/2017	12/31/2027
117	LT-D-BUR	D&D Waste	Waste Disposal		96.2		168.6		1/24/2017	12/31/2027
118	**D&D Waste Subtotal**			**$**	**$ 98.3**	**$**	**$ 176.4**	**$**		
119										
120	**Decontamination, Demolition, & Disposal Subtotal**			**$**	**$ 231.3**	**$**	**$ 557.8**	**$**		
121										
122	SNF-1-D-7.02	ISFSI	Holtec Long Lead Items and Areva Contract Closure		-		31.1		6/7/2013	6/28/2018
123	SNF-2-D-8.07	ISFSI	ISFSI Pad Study		-		0.2		2/4/2014	12/31/2014
124	SNF-2-D-8.08	ISFSI	Design ISFSI Expansion, Fuel Inspection, and Oversight		11.8		84.5		12/8/2014	9/14/2020
125	SNF-2-D-8.09	ISFSI	Construct ISFSI Expansion		6.8		46.8		1/1/2016	1/15/2020
126	SNF-2-D-8.10	ISFSI	Fabrication of Spent Fuel Canisters - Unit 2		-		43.2		12/5/2014	6/28/2018
127	SNF-2-D-8.11	ISFSI	Fabrication of Spent Fuel Canisters - Unit 3		-		34.6		12/5/2014	6/28/2018
128	SNF-2-D-8.12	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 2		23.3		54.1		11/1/2015	6/10/2020
129	SNF-2-D-8.13	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 3		23.5		54.3		11/1/2015	8/14/2020
130	**ISFSI Subtotal**			**$**	**$ 65.4**	**$**	**$ 348.9**	**$**		
131										
132	**ISFSI Subtotal**			**$ -**	**$ 65.4**	**$ (65.4)**	**$ 348.9**	**$ 270.2**		
133										
134	SNF-2-D-CDP	ISFSI CDP Settlement	ISFSI CDP Settlement	-	1.7	(1.7)	4.7	4.3	8/30/2017	8/30/2021
135	**ISFSI Coastal Development Permit Settlement Subtotal**			**$ -**	**$ 1.7**	**$ (1.7)**	**$ 4.7**	**$ 4.3**		
136										
137	SNF-2-D-EP Areva	Coastal Development Permit Extensions	Environmental Permitting - Areva	0.4	0.3	0.1	0.3	1.9	1/1/2020	12/20/2022
138	**Coastal Development Permit Extensions Subtotal**			**$ 0.4**	**$ 0.3**	**$ 0.1**	**$ 0.3**	**$ 1.9**		
139										
140	SNF-2-D-AM Areva	ISFSI Aging Management	Areva ISFSI Relicensing	2.4	2.8	(0.4)	8.1	14.1	9/1/2016	5/22/2022
141	SNF-2-D-AM Holtec1	ISFSI Aging Management	Holtec ISFSI I&M Program Development	4.1	2.1	2.0	8.5	16.7	2/15/2017	10/6/2020
142	**ISFSI Aging Management Subtotal**			**$ 6.5**	**$ 4.9**	**$ 1.6**	**$ 16.7**	**$ 30.8**		
143										
144	SNF-2-D-GTCC	GTCC Waste Storage	GTCC Waste Storage	7.7	13.8	(6.1)	27.9	26.6	12/11/2019	8/1/2022
145	**GTCC Waste Storage Subtotal**			**$ 7.7**	**$ 13.8**	**$ (6.1)**	**$ 27.9**	**$ 26.6**		
146										
147	SNF-D-SIREN	Siren Removals	Siren Removals	-	0.0	(0.0)	0.0	-	10/1/2018	2/28/2020
148	**Siren Removal Subtotal**			**$ -**	**$ 0.0**	**$ (0.0)**	**$ 0.0**	**$ -**		
149										
150	SNF-D-NIA Sump	NIA Sump Modifications	NIA Sump Modifications	0.4	-	0.4	-	1.1	1/1/2020	12/31/2021
151	**NIA Sump Modifications Subtotal**			**$ 0.4**	**$ -**	**$ 0.4**	**$ -**	**$ 1.1**		
152										
153	SR-3-D-16.05	CEQA	Obtain CEQA Permit & Approvals	-	-	-	8.0	7.9	7/1/2015	10/17/2019
154	**CEQA Subtotal**			**$ -**	**$ -**	**$ -**	**$ 8.0**	**$ 7.9**		
155										
156	SR-3-D-16.03	NEPA	Initial Real Estate Authorization Renewal and Plant Easement	1.6	0.5	1.1	3.4	14.4	5/15/2015	5/23/2024
157	**NEPA Subtotal**			**$ 1.6**	**$ 0.5**	**$ 1.1**	**$ 3.4**	**$ 14.4**		
158										
159	SR-1-D-14.02	Mesa Turnover	Disposition Hazardous Waste from Mesa Site	-	-	-	0.2	0.2	7/4/2014	9/6/2021
160	SR-2-D-15.09	Mesa Turnover	Mesa Buildings - Demo, Maintenance	1.0	3.1	(2.1)	10.7	9.5	9/1/2014	9/6/2021
161	SR-2-D-15.02	Mesa Turnover	Obtain Required Permits - Mesa	-	-	-	0.1	0.1	8/1/2015	5/26/2020
162	SR-1-D-14.01	Mesa Turnover	Mesa Site Phase I and II Site Assessment and Lease Surrender	1.3	2.4	(1.0)	8.7	8.5	4/11/2014	11/11/2021
163	SR-1-D-14.03	Mesa Turnover	Mesa Site Characterization Survey	-	-	-	0.1	0.1	6/2/2014	6/2/2021
164	**Mesa Turnover Subtotal**			**$ 2.3**	**$ 5.4**	**$ (3.1)**	**$ 19.7**	**$ 18.4**		
165										
166	LT-D-DCE2 [6]	DCE Updates	DCE Update 2020	0.3	0.3	0.0	0.3	0.3	6/1/2020	12/21/2020
167	**DCE Updates Subtotal**			**$ 0.3**	**$ 0.3**	**$ 0.0**	**$ 0.3**	**$ 0.3**		
168										
169	**Other Major Projects Subtotal**			**$ 19.2**	**$ 26.9**	**$ (7.7)**	**$ 81.0**	**$ 105.7**		
170										
171	**Major Projects (Distributed) Subtotal**			**$ 88.1**	**$ 323.6**	**$ (235.5)**	**$ 1,122.1**	**$** [redacted]		

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project[1]	Description[2]	2020 [A] 2017 DCE[3]	[B] Forecasted	[C=A-B] Variance	[D] Forecasted Inception To Date Through 2020[4]	[E] Total 2017 DCE[3] [5]	[F] Current Start	[G] Current Finish
172										
173	LT-U-1.01	Undistributed - Labor-Staffing	Utility Staff	18.9	17.4	1.5	199.4	308.3		
174	SNF-U-2.01	Undistributed - Labor-Staffing	Utility Staff	5.2	13.1	(7.9)	153.1	295.4		
175	SR-U-3.01	Undistributed - Labor-Staffing	Utility Staff	0.3	0.8	(0.5)	4.2	109.4		
176	**Utility Staff Subtotal**			**$ 24.4**	**$ 31.3**	**$ (7.0)**	**$ 356.6**	**$ 713.1**		
177										
178	LT-U-1.03	Undistributed - Labor-Staffing	Security Force	-	0.6	(0.6)	7.6	6.7		
179	SNF-U-2.04	Undistributed - Labor-Staffing	Security Force	2.7	14.3	(11.6)	140.0	212.0		
180	SR-U-3.02	Undistributed - Labor-Staffing	Security Force	-	-	-	-	-		
181	**Security Force Subtotal**			**$ 2.7**	**$ 15.0**	**$ (12.3)**	**$ 147.7**	**$ 218.7**		
182										
183	LT-U-1.11	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing	[redacted]	23.0	[redacted]	154.0	[redacted]		
184	SNF-U-2.14	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing		9.9		9.9			
185	SR-U-3.08	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing		-		3.7			
186	**Decommissioning General Contractor Subtotal**			**$**	**$ 32.9**	**$**	**$ 167.7**	**$**		
187										
188	LT-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		2.6		14.0			
189	SNF-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		(0.0)		9.1			
190	SR-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		0.0		0.5			
191	**Short-Term Incentive Compensation Subtotal**			**$**	**$ 2.7**	**$**	**$ 23.6**	**$**		
192										
193	**Undistributed - Labor-Staffing Subtotal**			**$ 47.3**	**$ 81.8**	**$ (34.5)**	**$ 695.5**	**$ 1,244.7**		
194										
195	LT-U-1.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	-	-	-	1.0	1.1		
196	SNF-U-2.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	0.0	-	0.0	1.7	2.5		
197	**Utility Staff Health Physics Supplies Subtotal**			**$ 0.0**	**$ -**	**$ 0.0**	**$ 2.7**	**$ 3.7**		
198										
199	LT-U-1.04	Undistributed - Non-Labor	Security Related Expenses	-	0.0	(0.0)	0.4	0.7		
200	SNF-U-2.05	Undistributed - Non-Labor	Security Related Expenses	0.1	0.7	(0.6)	2.9	10.6		
201	SR-U-3.03	Undistributed - Non-Labor	Security Related Expenses	-	-	-	0.4	0.6		
202	**Security Related Expenses Subtotal**			**$ 0.1**	**$ 0.7**	**$ (0.6)**	**$ 3.8**	**$ 11.8**		
203										
204	LT-U-1.05	Undistributed - Non-Labor	Insurance	0.5	1.5	(1.0)	8.3	19.7		
205	LT-U-1.14	Undistributed - Non-Labor	Workers Compensation Insurance	-	-	-	1.3	0.4		
206	SNF-U-2.06	Undistributed - Non-Labor	Insurance	1.1	2.5	(1.4)	3.0	38.5		
207	SR-U-3.04	Undistributed - Non-Labor	Insurance	0.0	0.2	(0.2)	0.3	5.0		
208	**Insurance Subtotal**			**$ 1.6**	**$ 4.2**	**$ (2.6)**	**$ 12.9**	**$ 63.7**		
209										
210	LT-U-1.06	Undistributed - Non-Labor	Site Lease and Easement Expenses	-	-	-	4.3	4.4		
211	SR-U-3.05	Undistributed - Non-Labor	Site Lease and Easement Expenses	2.3	2.9	(0.6)	13.0	47.1		
212	**Site Lease and Easement Expenses Subtotal**			**$ 2.3**	**$ 2.9**	**$ (0.6)**	**$ 17.4**	**$ 51.5**		
213										
214	LT-U-1.07	Undistributed - Non-Labor	NRC Fees	0.3	0.3	(0.0)	5.9	11.5		
215	SNF-U-2.08	Undistributed - Non-Labor	NRC Fees	0.3	0.3	(0.0)	1.9	19.7		
216	**NRC Fees Subtotal**			**$ 0.6**	**$ 0.6**	**$ (0.0)**	**$ 7.8**	**$ 31.2**		
217										
218	LT-U-1.08	Undistributed - Non-Labor	Contracted Services	4.7	5.5	(0.8)	77.0	100.2		
219	SNF-U-2.11	Undistributed - Non-Labor	Contracted Services	1.7	6.2	(4.6)	41.1	99.1		
220	SR-U-3.06	Undistributed - Non-Labor	Contracted Services	0.1	2.7	(2.6)	4.9	26.1		
221	SR-U-Bank	Undistributed - Non-Labor	Bank Fees And Interest	-	-	-	(0.1)	(0.1)		
222	SR-U-Inv Adj	Undistributed - Non-Labor	Vendor Invoice Adjustment	-	-	-	(0.3)	(0.2)		
223	**Contracted Services Subtotal**			**$ 6.4**	**$ 14.4**	**$ (7.9)**	**$ 122.6**	**$ 225.2**		
224										
225	LT-U-1.09	Undistributed - Non-Labor	DAW Disposal	-	-	-	0.0	0.0		
226	SNF-U-2.12	Undistributed - Non-Labor	DAW Disposal	-	-	-	0.0	0.0		
227	**DAW Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ 0.0**	**$ 0.0**		
228										

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project[1]	Description[2]	2020 [A] 2017 DCE[3]	2020 [B] Forecasted	2020 [C=A-B] Variance	[D] Forecasted Inception To Date Through 2020[4]	[E] Total 2017 DCE[3] [5]	[F] Current Start	[G] Current Finish
229	LT-U-1.10	Undistributed - Non-Labor	Energy	3.8	2.9	0.9	23.4	49.9		
230	SNF-U-2.13	Undistributed - Non-Labor	Energy	0.8	1.3	(0.5)	7.0	18.4		
231	SR-U-3.07	Undistributed - Non-Labor	Energy	0.2	0.4	(0.2)	0.9	16.4		
232	**Energy Subtotal**			**$ 4.8**	**$ 4.6**	**$ 0.2**	**$ 31.3**	**$ 84.7**		
233										
234	LT-U-1.15	Undistributed - Non-Labor	Community Engagement Panel	0.4	0.4	0.0	3.6	7.6		
235	SNF-U-2.25	Undistributed - Non-Labor	Community Engagement Panel	0.1	0.1	(0.0)	0.5	2.7		
236	SR-U-3.21	Undistributed - Non-Labor	Community Engagement Panel	0.0	0.0	0.0	0.2	2.1		
237	**Community Engagement Panel Subtotal**			**$ 0.5**	**$ 0.5**	**$ 0.0**	**$ 4.3**	**$ 12.5**		
238										
239	LT-U-1.17	Undistributed - Non-Labor	Association Fees and Expenses	0.4	0.4	0.1	2.4	4.9		
240	SNF-U-2.26	Undistributed - Non-Labor	Association Fees and Expenses	0.1	0.2	(0.1)	0.4	2.3		
241	SR-U-3.17	Undistributed - Non-Labor	Association Fees and Expenses	0.0	0.1	(0.0)	0.1	1.4		
242	**Association Fees and Expenses Subtotal**			**$ 0.6**	**$ 0.6**	**$ 0.0**	**$ 2.9**	**$ 8.6**		
243										
244	LT-U-1.18	Undistributed - Non-Labor	Water	0.3	0.1	0.2	1.4	4.2		
245	SNF-U-2.18	Undistributed - Non-Labor	Water	0.1	0.1	0.0	1.2	9.1		
246	SR-U-3.13	Undistributed - Non-Labor	Water	0.0	0.0	-	0.1	3.3		
247	**Water Subtotal**			**$ 0.4**	**$ 0.2**	**$ 0.2**	**$ 2.7**	**$ 16.5**		
248										
249	LT-U-1.19	Undistributed - Non-Labor	Tools and Equipment	-	-	-	0.1	0.0		
250	**Tools and Equipment Subtotal**			**$ -**	**$ -**	**$ -**	**$ 0.1**	**$ 0.0**		
251										
252	LT-U-1.20	Undistributed - Non-Labor	Information Technology	0.6	1.5	(0.9)	16.0	18.4		
253	LT-U-1.21	Undistributed - Non-Labor	Telecommunications	-	-	-	2.3	2.3		
254	LT-U-1.22	Undistributed - Non-Labor	Personal Computers	-	-	-	0.0	0.0		
255	SNF-U-2.20	Undistributed - Non-Labor	Information Technology	0.1	0.7	(0.6)	3.1	5.6		
256	SNF-U-2.22	Undistributed - Non-Labor	Personal Computers	-	-	-	0.0	0.0		
257	SR-U-3.15	Undistributed - Non-Labor	Information Technology	0.0	0.2	(0.2)	0.5	5.5		
258	**Information Technology Subtotal**			**$ 0.7**	**$ 2.4**	**$ (1.6)**	**$ 22.0**	**$ 31.9**		
259										
260	LT-U-1.24	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	0.0	(0.0)	3.7	3.8		
261	SNF-U-2.27	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	0.0	(0.0)	0.0	1.1		
262	SR-U-3.23	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	0.0	(0.0)	0.0	1.8		
263	**Environmental Permits and Fees Subtotal**			**$ 0.0**	**$ 0.0**	**$ (0.0)**	**$ 3.7**	**$ 6.7**		
264										
265	LT-U-1.25	Undistributed - Non-Labor	Decommissioning Advisor	0.5	0.4	0.1	4.6	7.9		
266	SNF-U-2.28	Undistributed - Non-Labor	Decommissioning Advisor	0.1	0.2	(0.1)	0.4	0.3		
267	SR-U-3.22	Undistributed - Non-Labor	Decommissioning Advisor	0.0	0.1	(0.0)	0.1	1.7		
268	**Decommissioning Advisor Subtotal**			**$ 0.6**	**$ 0.6**	**$ 0.0**	**$ 5.1**	**$ 9.9**		
269										
270	LT-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.8	0.9	(0.1)	5.0	9.4		
271	SNF-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.2	-	0.2	2.3	10.1		
272	SR-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.0	-	0.0	0.9	4.3		
273	**Third-Party Legal Subtotal**			**$ 1.1**	**$ 0.9**	**$ 0.2**	**$ 8.2**	**$ 23.8**		
274										
275	LT-U-CO	Undistributed - Non-Labor	DGC Executive Oversight Committee	0.3	0.3	0.0	0.6	2.9		
276	**DGC Executive Oversight Committee Subtotal**			**$ 0.3**	**$ 0.3**	**$ 0.0**	**$ 0.6**	**$ 2.9**		
277										
278	SNF-U-2.09	Undistributed - Non-Labor	Emergency Preparedness Fees	1.8	1.7	0.1	16.3	48.3		
279	**Emergency Preparedness Fees Subtotal**			**$ 1.8**	**$ 1.7**	**$ 0.1**	**$ 16.3**	**$ 48.3**		
280										
281	SNF-U-AM Holtec	Undistributed - Non-Labor	Holtec ISFSI Aging Management	0.1	0.1	0.0	0.1	11.2		
282	**Aging Management Subtotal**			**$ 0.1**	**$ 0.1**	**$ 0.0**	**$ 0.1**	**$ 11.2**		
283										
284	SR-U-CEQA-RPT	Undistributed - Non-Labor	CEQA Reporting	-	1.6	(1.6)	1.6	-		
285	**CEQA Reporting Subtotal**			**$ -**	**$ 1.6**	**$ (1.6)**	**$ 1.6**	**$ -**		

Detailed Comparison Of 2020 Forecasted Costs To The 2017 DCE
(2014 Dollars in Millions, 100% Level)

				2020						
				[A]	[B]	[C=A-B]	[D]	[E]	[F]	[G]
	DCE No.	Major Project[1]	Description[2]	2017 DCE[3]	Forecasted	Variance	Forecasted Inception To Date Through 2020[4]	Total 2017 DCE[3] [5]	Current Start	Current Finish
286										
287	SR-U-3.11	Undistributed - Non-Labor	Severance	-	11.4	(11.4)	128.8	121.0		
288	**Severance Subtotal**			**$ -**	**$ 11.4**	**$ (11.4)**	**$ 128.8**	**$ 121.0**		
289										
290	**Undistributed - Non-Labor Subtotal**			**$ 22.1**	**$ 47.7**	**$ (25.6)**	**$ 395.0**	**$ 765.2**		
291										
292	LT-U-SLA	Service Level Agreement	Service Level Agreements	6.9	5.4	1.5	27.9	76.1		
293	SNF-U-SLA	Service Level Agreement	Service Level Agreements	1.5	2.5	(1.0)	19.9	45.9		
294	SR-U-SLA	Service Level Agreement	Service Level Agreements	0.4	0.8	(0.4)	2.1	46.2		
295	**Undistributed - Service Level Agreement Subtotal**			**$ 8.8**	**$ 8.7**	**$ 0.1**	**$ 50.0**	**$ 168.2**		
296										
297	**Undistributed Subtotal**			**$ 78.2**	**$ 138.2**	**$ (60.0)**	**$ 1,140.5**	**$** [redacted]		
298										
299	**Total**			**$ 166.3**	**$ 461.8**	**$ (295.5)**	**$ 2,262.6**	**$**		
300										
301						**Other DCE Costs**		$ [redacted]		
302										
303								**$ 4,478.6**		

General Notes:
(A) Totals may not reconcile due to rounding.
(B) Amounts with $0.0 or $(0.0) indicate that costs are included in the category but round to $0 when rounded to the nearest hundred thousand. $ - indicates that no costs are included in the category.

Notes:
(1) Not all line items associated with each major project are included. Only line items with costs in 2020 in the DCE or forecast, or line items with costs forecasted inception to date through 2020 are summarized.
(2) All descriptions are consistent with the 2017 Decommissioning Cost Estimate.
(3) 2017 DCE values are from Attachment 10, "2017 DCE Waste Disposal Adjustment."
(4) The current year's forecast includes amounts for certain milestone payments that have slipped into 2020 from 2019 and had been included in the 2019 disbursement Advice Letter request. These amounts will be adjusted in the Spring recorded costs Advice Letter.
(5) The "Total 2017 DCE" column contains the total DCE cost associated with each line item.
(6) For convenience in the 2017 DCE, all DCE updates were included in line number LT-3-D-DCE. Each DCE is actually treated as its own distributed project, so a new line item (LT-D-DCE2) for the 2020 DCE update has been created and the portion of costs assumed in the 2017 DCE for the 2020 update have been moved to this new line.

Attachment 4

Comparison of 2017 DCE Estimated and Forecasted Cash Flow

Comparison Of Annual Cash Flow
(2014 Dollars In Thousands, 100% Level)

Year[1]	[A] Total 2017 DCE	[B] Recorded / Forecasted
2013-A	$ 243,504	$ 243,504
2014-A	217,175	217,175
2015-A	277,491	277,491
2016-A	213,002	213,002
2017-A	339,744	283,878
2018-A	262,910	165,878
2019	173,493	399,800
2020	166,288	461,832 [2]
2021	276,416	
2022	320,235	
2023	237,386	
2024	162,140	
2025	151,283	
2026	155,336	
2027	126,368	
2028	52,748	
2029	22,046	
2030	19,580	
2031	21,094	
2032	21,903	
2033	24,760	
2034	24,718	
2035	27,283	
2036	24,921	
2037	22,091	
2038	21,851	
2039	22,701	
2040	25,313	
2041	23,575	
2042	24,775	
2043	24,117	
2044	35,098	
2045	33,490	
2046	73,197	
2047	160,624	
2048	134,176	
2049	113,710	
2050	99,449	
2051	102,574	
Total	**$ 4,478,566**	**$ 2,262,560**

Notes:

(1) "-A" indicates the costs for the given year in Column [B] are actual recorded costs. All other years are forecasted amounts.

(2) The current year's forecast includes amounts for certain milestone payments that have slipped into 2020 from 2019 and had been included in the 2019 disbursement Advice Letter request. These amounts will be adjusted in the Spring recorded costs Advice Letter.

Attachment 5

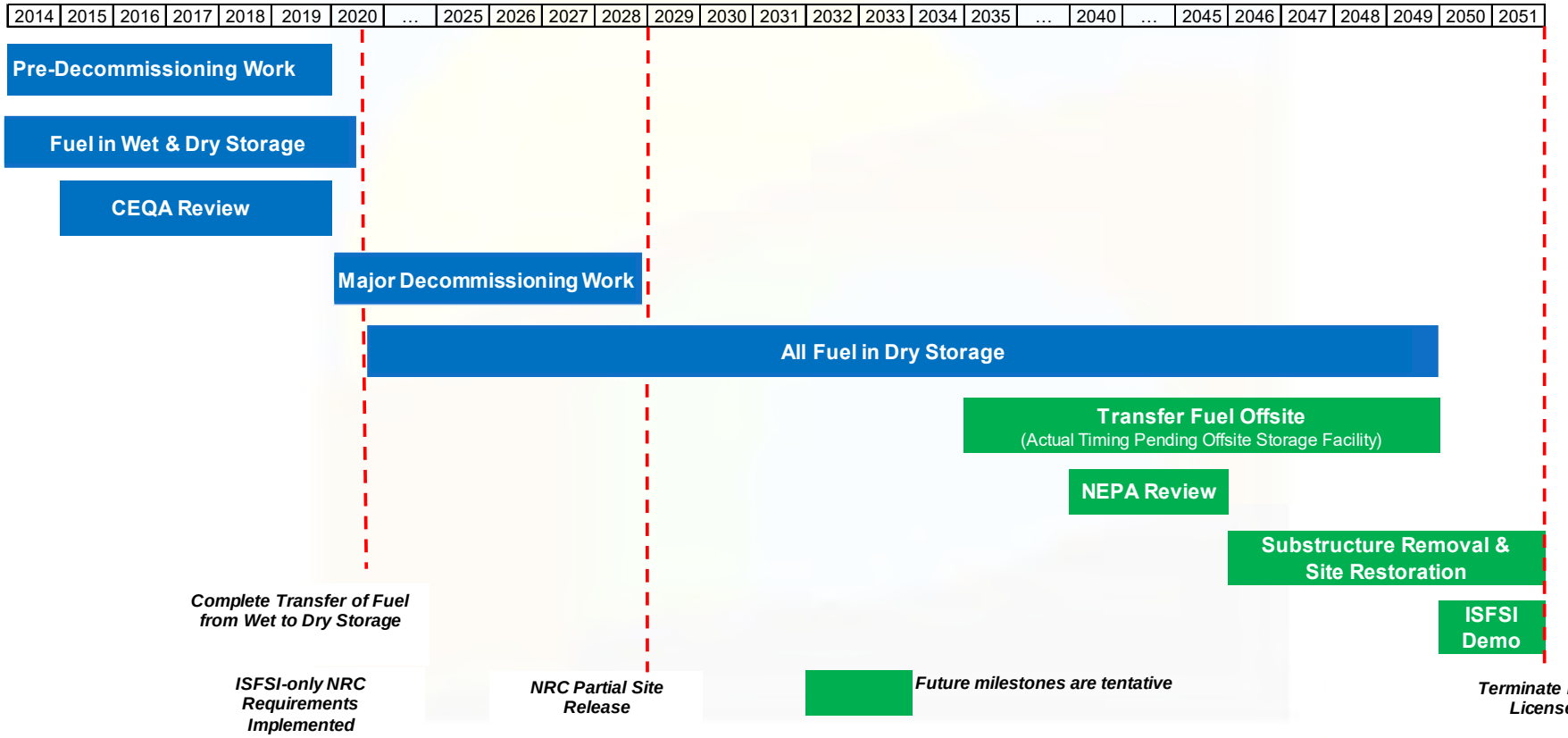
Schedule

Decommissioning San Onofre Nuclear Generating Station

Safety | Stewardship | Engagement

Decommissioning Plan

SONGS Decommissioning Plan



Attachment 6

Adjusted Total Amounts Requested to Date Including Previous Advice Letters

Adjusted Total Amounts Requested To Date Including Previous Advice Letters
(Dollars In Millions)

		2013 - 2020													
		100% Share (2014$)					100% Share (Nominal)				SCE Share (Nominal)				
	Major Project	Requested In Previous Advice Letters	2018 Underrun[1]	2018 Final Escalation Adjustment	2020 Forecast	Adjusted Total Requested To Date	Requested In Previous Advice Letters	2018 Underrun[1]	2020 Forecast	Adjusted Total Requested To Date	Requested In Previous Advice Letters	2018 Underrun[1]	2020 Forecast	Adjusted Total Requested To Date
1	**Major Projects (Distributed)**													
2	Historical Site Assessment /Characterization	$ 6.2	$ -	$ -	$ -	$ 6.2	$ 6.4	$ -	$ -	$ 6.4	$ 4.8	$ -	$ -	$ 4.8
3	Legacy Radwaste Disposal	20.0	-	-	-	20.0	20.2	-	-	20.2	15.2	-	-	15.2
4	Project Governance and Admin	54.4	-	-	-	54.4	55.2	-	-	55.2	43.2	-	-	43.2
5	Regulatory Compliance	4.9	-	-	-	4.9	4.9	-	-	4.9	3.7	-	-	3.7
6	Transition Modifications - Phase 1	1.1	-	-	-	1.1	1.1	-	-	1.1	0.8	-	-	0.8
7	Security Programs	7.5	-	-	-	7.5	7.5	-	-	7.5	5.7	-	-	5.7
8	DGC RFP & Prep	13.8	-	-	-	13.8	14.3	-	-	14.3	10.8	-	-	10.8
9	Transition Modifications - Phase 2	5.0	-	-	-	5.0	5.2	-	-	5.2	3.9	-	-	3.9
10	Spent Fuel Islanding	8.4	-	-	-	8.4	8.5	-	-	8.5	6.5	-	-	6.5
11	Cyber Security Modifications	9.4	-	-	-	9.4	9.6	-	-	9.6	7.3	-	-	7.3
12	Phase 2 Regulatory Compliance	3.8	(0.1)	(0.0)	-	3.7	4.1	(0.1)	-	4.0	3.0	(0.1)	-	2.9
13	**Completed Projects Subtotal**	**$ 134.5**	**$ (0.1)**	**$ (0.0)**	**$ -**	**$ 134.4**	**$ 137.0**	**$ (0.1)**	**$ -**	**$ 136.9**	**$ 104.9**	**$ (0.1)**	**$ -**	**$ 104.8**
14														
15	Initial D&D Activities	$ [redacted]	(6.9)	$ (0.0)	$ 19.5	$ [redacted]	[redacted]	$ (7.5)	$ 22.7	$ [redacted]	[redacted]	$ (5.7)	$ 17.1	$ [redacted]
16	Internals and Vessel Segmentation		(9.8)	(0.0)	21.8			(10.7)	25.4			(8.1)	19.2	
17	Steam Generator Removal		-	-	46.1			-	53.7			-	40.7	
18	Non-Essential System Removal		-	-	17.8			-	20.7			-	15.7	
19	Removal of Spent Fuel Systems/ Equipment		-	-	0.3			-	0.3			-	0.3	
20	Containment Building Demo		-	-	14.1			-	16.4			-	12.4	
21	Initial Plant Building Demo		-	-	11.0			-	12.7			-	9.6	
22	Building Decontamination		-	-	-			-	-			-	-	
23	Final Plant Building Demo		0.4	(0.0)	-			0.4	-			0.3	-	
24	Final Survey/License Reduction		0.1	0.0	2.4			0.1	2.8			0.1	2.2	
25	D&D Waste		-	-	98.3			-	114.3			-	86.6	
26	**Decontamination, Demolition, & Disposal Subtotal**		**(16.2)**	**$ 0.0**	**$ 231.3**			**$ (17.7)**	**$ 269.0**			**$ (13.4)**	**$ 203.8**	
27														
28	ISFSI		(24.8)	(0.1)	65.4			(26.5)	75.8			(20.1)	57.5	
29	**ISFSI Subtotal**		**(24.8)**	**$ (0.1)**	**$ 65.4**			**$ (26.5)**	**$ 75.8**			**$ (20.1)**	**$ 57.5**	
30														
31	ISFSI CDP Settlement	$ 5.1	$ (2.1)	$ (0.0)	$ 1.7	$ 4.7	$ 5.6	$ (2.3)	$ 2.0	$ 5.3	$ 4.3	$ (1.8)	$ 1.5	$ 4.0
32	Coastal Development Permit Extensions	-	-	-	0.3	0.3	-	-	0.4	0.4	-	-	0.3	0.3
33	ISFSI Aging Management	13.2	(1.4)	0.0	4.9	16.7	14.6	(1.5)	5.7	18.8	11.1	(1.1)	4.3	14.3
34	GTCC Waste Storage	14.0	0.1	0.0	13.8	27.9	15.7	0.1	16.0	31.8	11.9	0.1	12.2	24.2
35	Siren Removals	-	-	-	0.0	0.0	-	-	0.1	0.1	-	-	0.0	0.0
36	NIA Sump Modifications	-	-	-	-	-	-	-	-	-	-	-	-	-
37	CEQA	10.2	(2.2)	0.0	-	8.0	10.8	(2.4)	-	8.4	8.2	(1.8)	-	6.4
38	NEPA	4.0	(1.1)	(0.0)	0.5	3.4	4.2	(1.2)	0.5	3.5	3.2	(0.9)	0.3	2.6
39	Mesa Turnover	14.7	(0.4)	0.0	5.4	19.7	15.6	(0.4)	6.3	21.5	11.7	(0.3)	4.8	16.2
40	DCE Updates	-	-	-	0.3	0.3	-	-	0.3	0.3	-	-	0.2	0.2
41	**Other Major Projects Subtotal**	**$ 61.2**	**$ (7.1)**	**$ (0.0)**	**$ 26.9**	**$ 81.0**	**$ 66.5**	**$ (7.7)**	**$ 31.3**	**$ 90.1**	**$ 50.4**	**$ (5.8)**	**$ 23.6**	**$ 68.2**
42														
43	**Total Major Projects (Distributed)**	**$ 846.8**	**$ (48.2)**	**$ (0.1)**	**$ 323.6**	**$ 1,122.1**	**$ 905.7**	**$ (52.0)**	**$ 376.1**	**$ 1,229.8**	**$ 686.1**	**$ (39.4)**	**$ 284.9**	**$ 931.6**
44														
45	**Undistributed**													
46	Labor-Staffing	$ 643.2	$ (29.5)	$ 0.0	$ 81.8	$ 695.5	$ 675.8	$ (32.0)	$ 95.1	$ 738.9	$ 513.1	$ (24.2)	$ 72.1	$ 561.0
47	Non-Labor	361.3	(14.0)	(0.0)	47.7	395.0	373.1	(14.7)	54.2	412.6	286.8	(11.0)	41.2	317.0
48	Service Level Agreements	44.6	(3.3)	0.0	8.7	50.0	47.8	(3.5)	9.6	53.9	37.0	(2.3)	7.3	42.0
49														
50	**Total Undistributed**	**$ 1,049.1**	**$ (46.8)**	**$ 0.0**	**$ 138.2**	**$ 1,140.5**	**$ 1,096.7**	**$ (50.2)**	**$ 158.9**	**$ 1,205.4**	**$ 836.9**	**$ (37.5)**	**$ 120.6**	**$ 920.0**
51														
52	**Grand Total**	**$ 1,895.9**	**$ (95.0)**	**$ (0.1)**	**$ 461.8**	**$ 2,262.6**	**$ 2,002.4**	**$ (102.2)**	**$ 535.0**	**$ 2,435.2**	**$ 1,523.0**	**$ (76.9)**	**$ 405.5**	**$ 1,851.6**

Note:
(1) The 2018 underrun per Advice Letter 3988-E has been re-organized to match the categorization of costs in this Advice Letter, which is consistent with the major project framework.

Attachment 7

Forecasted Escalation and De-Escalation Factors

Forecasted Escalation And De-Escalation Factors

	Escalation Factors							
Year[(1)]	Labor	Material	Other	Contract	Burial	Overheads	Contingency	IMM
2015-A	1.0210	1.0063	1.0063	1.0210	1.0012	1.0210	1.0063	1.0063
2016-A	1.0427	1.0154	1.0154	1.0427	1.0140	1.0427	1.0154	1.0154
2017-A	1.0683	1.0318	1.0318	1.0683	1.0357	1.0683	1.0318	1.0318
2018-A	1.0997	1.0521	1.0521	1.0997	1.0610	1.0997	1.0521	1.0521
2019-F	1.1298	1.0772	1.0772	1.1298	1.0818	1.1298	1.0772	1.0772
2020-F	1.1681	1.1045	1.1045	1.1681	1.1041	1.1681	1.1045	1.1045

	De-Escalation Factors							
Year[(1)]	Labor	Material	Other	Contract	Burial	Overhead	Contingency	IMM
2015-A	0.9794	0.9938	0.9938	0.9794	0.9988	0.9794	0.9938	0.9938
2016-A	0.9591	0.9848	0.9848	0.9591	0.9862	0.9591	0.9848	0.9848
2017-A	0.9361	0.9691	0.9691	0.9361	0.9655	0.9361	0.9691	0.9691
2018-A	0.9093	0.9505	0.9505	0.9093	0.9425	0.9093	0.9505	0.9505
2019-F	0.8851	0.9283	0.9283	0.8851	0.9244	0.8851	0.9283	0.9283
2020-F	0.8561	0.9054	0.9054	0.8561	0.9057	0.8561	0.9054	0.9054

Note:

(1) "-F" indicates the escalation factors are forecasted for the given year. "-A" denotes actual factors. The 2018 Escalation Factors have been updated since the last Advice Letter filing (Advice Letter 3988-E on April 15, 2019) to reflect the final 2018 escalation factors. The relevant US Bureau of Labor indices, which are the basis for the escalation factors, were not published when Advice Letter 3988-E was filed and therefore forecasted escalation factors were used. The US Bureau of Labor indices needed to determine the final 2018 escalation factors were made available in May of 2019. See Attachment 8 for the cost impact associated with the change from the forecasted to actual escalation factors.

Attachment 8

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs in 2014$

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project	Description	[A] AL 3988-E 2018 Recorded	[B] 2018 SLA Allocation[1]	[C] Final Escalation Factor Adjustment[2]	[D=A+B+C] Final 2018 Recorded
1	LT-2-D-2.17	Historical Site Assessment /Characterization	Perform Historic Site Assessment and Site Characterization	$ -	$ -	$ -	$ -
2	**Historical Site Assessment/Characterization Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
3							
4	LT-2-D-2.16	Legacy Radwaste Disposal	Disposition of Legacy Wastes	-	-	-	-
5	LT-1-D-1.05	Legacy Radwaste Disposal	Disposition of Legacy Waste	-	-	-	-
6	**Legacy Radwaste Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
7							
8	SR-1-D-14.04	Project Governance and Admin	Fuel Cancellation Expense	-	-	-	-
9	**Project Governance and Admin Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
10							
11	LT-2-D-2.02	Regulatory Compliance	Prepare Post-Shutdown QA Plan	-	-	-	-
12	LT-2-D-2.03	Regulatory Compliance	Prepare Post-Shutdown Security Plan	-	-	-	-
13	LT-2-D-2.04	Regulatory Compliance	Prepare Post-Shutdown Fire Protection Plan	-	-	-	-
14	LT-2-D-2.06	Regulatory Compliance	Prepare Preliminary Defueled Technical Specifications	-	-	-	-
15	LT-2-D-2.08	Regulatory Compliance	Implement Technical Specification Modifications	-	-	-	-
16	LT-2-D-2.09	Regulatory Compliance	Prepare Post-Shutdown Emergency Preparedness Plan	-	-	-	-
17	LT-2-D-2.11	Regulatory Compliance	Prepare Post-Shutdown Decommissioning Activities Report (PSDAR)	-	-	-	-
18	LT-2-D-2.12	Regulatory Compliance	Post-Shutdown Decommissioning Activities Report (PSDAR) - NRC Review	-	-	-	-
19	LT-2-D-2.14	Regulatory Compliance	Prepare Decommissioning Cost Estimate (DCE)	-	-	-	-
20	SNF-1-D-7.03	Regulatory Compliance	Post Fukushima Modifications - Unit 2	-	-	-	-
21	SNF-2-D-FLEX	Regulatory Compliance	Flex Initiative	-	-	-	-
22	SNF-2-D-8.02	Regulatory Compliance	Decay Heat Analysis	-	-	-	-
23	SNF-2-D-8.03	Regulatory Compliance	Zirconium Fire/ Shine Analysis	-	-	-	-
24	SNF-2-D-8.05	Regulatory Compliance	Prepare Irradiated Fuel Management Plan & NRC Review	-	-	-	-
25	**Regulatory Compliance Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
26							
27	LT-2-D-2.31	Transition Modifications - Phase 1	Transition Project Modifications	-	-	-	-
28	**Transition Modifications - Phase 1 Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
29							
30	SNF-1-D-7.01	Security Programs	Security Shutdown Strategy	-	-	-	-
31	SNF-2-D-8.01	Security Programs	Security Shutdown Strategy	-	-	-	-
32	**Security Programs Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
33							
34	LT-2-D-2.22	DGC RFP & Prep	Select Decommissioning General Contractor (DGC)	-	-	-	-
35	**DGC RFP & Preps Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
36							
37	LT-2-D-LOED	Transition Modifications - Phase 2	Large Organism Exclusion Device Modification	-	-	-	-
38	LT-3-D-RecB	Transition Modifications - Phase 2	Records Backlog	-	-	-	-
39	LT-3-D-S&S	Transition Modifications - Phase 2	Simplification & Streamlining Project	-	-	-	-
40	LT-D-SPV	Transition Modifications - Phase 2	Special Purpose Vehicle Support	-	-	-	-
41	**Transition Modifications - Phase 2 Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

				[A]	[B]	[C]	[D=A+B+C]
	DCE No.	Major Project	Description	AL 3988-E 2018 Recorded	2018 SLA Allocation[1]	Final Escalation Factor Adjustment[2]	Final 2018 Recorded
42							
43	LT-2-D-2.26	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 2	-	-	-	-
44	LT-2-D-2.27	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 3	-	-	-	-
45	**Spent Fuel Islanding Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
46							
47	SNF-1-D-7.05	Cyber Security Modifications	Cyber Security Modifications	-	-	-	-
48	**Cyber Security Modifications Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
49							
50	LT-3-D-DCE	Phase 2 Regulatory Compliance	DCE Update	0.2	-	(0.0)	0.2
51	LT-2-D-2.07	Phase 2 Regulatory Compliance	Prepare Defueled Safety Analysis Report (DSAR)	-	-	-	-
52	**Phase 2 Regulatory Compliance Subtotal**			**$ 0.2**	**$ -**	**$ (0.0)**	**$ 0.2**
53							
54	LT-2-D-2.18	Initial D&D Activities	Planning & Design For Cold and Dark	-	-	-	[redacted]
55	LT-2-D-2.19	Initial D&D Activities	Implement Cold and Dark (Repower Site)	[redacted]	-	-	[redacted]
56	LT-2-D-2.20	Initial D&D Activities	Install 12 kV Service Line to Power Temp Power Ring	[redacted]	-	-	[redacted]
57	LT-2-D-2.21	Initial D&D Activities	Drain & De-Energize Non-Essential Systems (DEC Process)	[redacted]	-	-	[redacted]
58	LT-2-D-2.29	Initial D&D Activities	Implement Control Room Modifications (Command Center Relocation)	[redacted]	-	-	[redacted]
59	LT-3-D-3.10	Initial D&D Activities	Modify Containment Access- Unit 2	[redacted]	-	-	[redacted]
60	LT-3-D-3.12	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 2	[redacted]	-	-	[redacted]
61	LT-3-D-3.13	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 2	[redacted]	-	-	[redacted]
62	LT-3-D-3.11	Initial D&D Activities	Modify Containment Access- Unit 3	[redacted]	-	-	[redacted]
63	LT-3-D-3.14	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 3	[redacted]	-	-	[redacted]
64	LT-3-D-3.15	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 3	[redacted]	-	-	[redacted]
65	LT-3-D-3.01	Initial D&D Activities	Prepare Integrated Work Sequence and Schedule for Decommissioning	[redacted]	(0.1)	(0.0)	[redacted]
66	LT-4-D-4.02	Initial D&D Activities	Install GARDIAN System	[redacted]	-	-	[redacted]
67	LT-3-D-3.17	Initial D&D Activities	Prepare Activity Specifications - U2	[redacted]	-	-	[redacted]
68	LT-3-D-3.02	Initial D&D Activities	Prepare Detailed Work Procedures and Activity Specifications for Decommissioning	[redacted]	-	-	[redacted]
69	LT-3-D-DGC_BUR	Initial D&D Activities	Waste Contracts	[redacted]	(0.4)	(0.0)	[redacted]
70	LT-4-D-4.14	Initial D&D Activities	Remove and Dispose of Legacy Class B and C Waste - Unit 2	[redacted]	(0.1)	(0.0)	[redacted]
71	LT-4-D-4.15	Initial D&D Activities	Remove and Dispose of Legacy Class B and C Waste - Unit 3	[redacted]	(0.1)	(0.0)	[redacted]
72	**Initial D&D Activities Subtotal**			**$** [redacted]	**$ (0.8)**	**$ (0.0)**	**$** [redacted]
73							
74	LT-3-D-3.23	Internals and Vessel Segmentation	Finalize Internals and Vessel Segmenting Details - Unit 2	[redacted]	0.1	0.0	[redacted]
75	LT-3-D-3.26	Internals and Vessel Segmentation	Finalize Internals and Vessel Segmenting Details - Unit 3	[redacted]	(0.1)	(0.0)	[redacted]
76	LT-3-D-3.24	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 2	[redacted]	(0.1)	(0.0)	[redacted]
77	LT-3-D-3.27	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 3	[redacted]	-	-	[redacted]
78	LT-3-D-3.22	Internals and Vessel Segmentation	Test Special Cutting and Handling Equipment and Train Operators	[redacted]	-	-	[redacted]
79	**Internals and Vessel Segmentation Subtotal**			**$** [redacted]	**$ (0.1)**	**$ (0.0)**	**$** [redacted]
80							

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

				[A]	[B]	[C]	[D=A+B+C]
	DCE No.	Major Project	Description	AL 3988-E 2018 Recorded	2018 SLA Allocation[1]	Final Escalation Factor Adjustment[2]	Final 2018 Recorded
81	LT-4-D-4.33	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 2		-	-	
82	LT-4-D-4.35	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 3		-	-	
83	**Steam Generator Removal Subtotal**			**$**	**$ -**	**$ -**	**$**
84							
85	SR-4-D-17.17	Initial Plant Building Demo	Demolish Condensate Building and Transformer Pads - Unit 2		-	-	
86	SR-4-D-17.01	Initial Plant Building Demo	Procure Clean Building Demolition Equipment		-	-	
87	SR-4-D-17.30	Initial Plant Building Demo	Demolish Auxiliary Radwaste Building - Common		-	-	
88	SR-4-D-17.32	Initial Plant Building Demo	Remove Systems and Demolish Make-Up Demineralizer Structures		-	-	
89	SR-4-D-17.33	Initial Plant Building Demo	Install Concrete Plugs in Intake and Discharge Structures		-	-	
90	**Initial Plant Building Demo Subtotal**			**$**	**$ -**	**$ -**	**$**
91							
92	LT-5-D-5.05	Building Decontamination	Decon Turbine Building - Unit 3		-	-	
93	LT-5-D-5.10	Building Decontamination	Decon Turbine Building - Unit 2		-	-	
94	**Building Decontamination Subtotal**			**$**	**$ -**	**$ -**	**$**
95							
96	LT-4-D-4.23	Final Plant Building Demo	Asbestos Abatement and Hazardous Waste Disposal for Essential Systems		-	(0.0)	
97	**Final Plant Building Demo Subtotal**			**$**	**$ -**	**$ (0.0)**	**$**
98							
99	LT-4-D-4.39	Final Survey/License Reduction	Prepare License Termination Plan		-	-	
100	SR-3-D-16.02	Final Survey/License Reduction	Subsurface Structure Removal Engineering Planning and Design		(0.0)	0.0	
101	**Final Survey/License Reduction Subtotal**			**$**	**$ (0.0)**	**$ 0.0**	**$**
102							
103	LT-D-WPTT	D&D Waste	Waste Taxes (Pass Through)		-	-	
104	LT-D-BUR	D&D Waste	Waste Disposal		-	-	
105	**D&D Waste Subtotal**			**$**	**$ -**	**$ -**	**$**
106							
107	**Decontamination, Demolition, & Disposal Subtotal**			**$**	**$ (0.8)**	**$ 0.0**	**$**
108							
109	SNF-1-D-7.02	ISFSI	Holtec Long Lead Items and Areva Contract Closure		(0.1)	(0.0)	
110	SNF-2-D-8.07	ISFSI	ISFSI Pad Study		-	-	
111	SNF-2-D-8.08	ISFSI	Design ISFSI Expansion, Fuel Inspection, and Oversight		(0.2)	(0.0)	
112	SNF-2-D-8.09	ISFSI	Construct ISFSI Expansion		(0.3)	(0.0)	
113	SNF-2-D-8.10	ISFSI	Fabrication of Spent Fuel Canisters - Unit 2		(0.4)	(0.0)	
114	SNF-2-D-8.11	ISFSI	Fabrication of Spent Fuel Canisters - Unit 3		(0.4)	(0.0)	
115	SNF-2-D-8.12	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 2		(0.5)	(0.0)	
116	SNF-2-D-8.13	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 3		(0.5)	(0.0)	
117	**ISFSI Subtotal**			**$**	**$ (2.5)**	**$ (0.1)**	**$**
118							
119	**ISFSI Subtotal**			**$**	**$ (2.5)**	**$ (0.1)**	**$**
120							

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project	Description	[A] AL 3988-E 2018 Recorded	[B] 2018 SLA Allocation[1]	[C] Final Escalation Factor Adjustment[2]	[D=A+B+C] Final 2018 Recorded
121	SNF-2-D-CDP	ISFSI CDP Settlement	ISFSI CDP Settlement	0.4	-	(0.0)	0.3
122	**ISFSI Coastal Development Permit Settlement Subtotal**			**$ 0.4**	**$ -**	**$ (0.0)**	**$ 0.3**
123							
124	SNF-2-D-AM Areva	ISFSI Aging Management	Areva ISFSI Relicensing	1.8	(0.1)	0.0	1.7
125	SNF-2-D-AM Holtec1	ISFSI Aging Management	Holtec ISFSI I&M Program Development	0.8	(0.0)	(0.0)	0.8
126	**ISFSI Aging Management Subtotal**			**$ 2.6**	**$ (0.1)**	**$ 0.0**	**$ 2.5**
127							
128	SNF-2-D-GTCC	GTCC Waste Storage	GTCC Waste Storage	0.1	(0.0)	0.0	0.1
129	**GTCC Waste Storage Subtotal**			**$ 0.1**	**$ (0.0)**	**$ 0.0**	**$ 0.1**
130							
131	SNF-D-NIA Sump	NIA Sump Modifications	NIA Sump Modifications	-	-	-	-
132	**NIA Sump Modifications Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
133							
134	SR-3-D-16.05	CEQA	Obtain CEQA Permit & Approvals	1.3	(0.1)	0.0	1.2
135	**CEQA Subtotal**			**$ 1.3**	**$ (0.1)**	**$ 0.0**	**$ 1.2**
136							
137	SR-3-D-16.03	NEPA	Initial Real Estate Authorization Renewal and Plant Easement	0.3	-	(0.0)	0.3
138	**NEPA Subtotal**			**$ 0.3**	**$ -**	**$ (0.0)**	**$ 0.3**
139							
140	SR-1-D-14.02	Mesa Turnover	Disposition Hazardous Waste from Mesa Site	-	-	-	-
141	SR-2-D-15.09	Mesa Turnover	Mesa Buildings - Demo, Maintenance	0.4	(0.0)	0.0	0.4
142	SR-2-D-15.02	Mesa Turnover	Obtain Required Permits - Mesa	-	-	-	-
143	SR-1-D-14.01	Mesa Turnover	Mesa Site Phase I and II Site Assessment and Lease Surrender	1.9	(0.1)	0.0	1.8
144	SR-1-D-14.03	Mesa Turnover	Mesa Site Characterization Survey	-	-	-	-
145	**Mesa Turnover Subtotal**			**$ 2.3**	**$ (0.1)**	**$ 0.0**	**$ 2.2**
146							
147	**Other Major Projects Subtotal**			**$ 7.0**	**$ (0.3)**	**$ (0.0)**	**$ 6.7**
148							
149	**Major Projects (Distributed) Subtotal**			**$ 67.3**	**$ (3.6)**	**$ (0.1)**	**$ 63.6**
150							
151	LT-U-1.01	Undistributed - Labor-Staffing	Utility Staff	15.5	(1.1)	(0.0)	14.4
152	SNF-U-2.01	Undistributed - Labor-Staffing	Utility Staff	12.9	(0.9)	(0.0)	11.9
153	SR-U-3.01	Undistributed - Labor-Staffing	Utility Staff	-	-	-	-
154	**Utility Staff Subtotal**			**$ 28.4**	**$ (2.0)**	**$ (0.0)**	**$ 26.4**
155							
156	LT-U-1.03	Undistributed - Labor-Staffing	Security Force	1.2	(0.1)	(0.0)	1.1
157	SNF-U-2.04	Undistributed - Labor-Staffing	Security Force	17.9	(1.0)	0.0	17.0
158	SR-U-3.02	Undistributed - Labor-Staffing	Security Force	-	-	-	-
159	**Security Force Subtotal**			**$ 19.2**	**$ (1.0)**	**$ 0.0**	**$ 18.1**
160							

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project	Description	[A] AL 3988-E 2018 Recorded	[B] 2018 SLA Allocation[1]	[C] Final Escalation Factor Adjustment[2]	[D=A+B+C] Final 2018 Recorded
161	LT-U-1.11	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing	[redacted]	(0.8)	(0.0)	[redacted]
162	SR-U-3.08	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing		-	-	
163	**Decommissioning General Contractor Subtotal**			**$**	**$ (0.8)**	**$ (0.0)**	**$**
164							
165	LT-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		(0.1)	(0.0)	
166	SNF-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		(0.1)	(0.0)	
167	SR-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation		(0.0)	(0.0)	
168	**Short-Term Incentive Compensation Subtotal**			**$**	**$ (0.2)**	**$ (0.0)**	**$**
169							
170	**Undistributed - Labor-Staffing Subtotal**			**$ 65.3**	**$ (4.0)**	**$ 0.0**	**$ 61.3**
171							
172	LT-U-1.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	-	-	-	-
173	SNF-U-2.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	0.0	(0.0)	(0.0)	0.0
174	**Utility Staff Health Physics Supplies Subtotal**			**$ 0.0**	**$ (0.0)**	**$ (0.0)**	**$ 0.0**
175							
176	LT-U-1.04	Undistributed - Non-Labor	Security Related Expenses	0.1	(0.0)	0.0	0.1
177	SNF-U-2.05	Undistributed - Non-Labor	Security Related Expenses	0.4	(0.0)	0.0	0.3
178	SR-U-3.03	Undistributed - Non-Labor	Security Related Expenses	-	-	-	-
179	**Security Related Expenses Subtotal**			**$ 0.5**	**$ (0.0)**	**$ 0.0**	**$ 0.5**
180							
181	LT-U-1.05	Undistributed - Non-Labor	Insurance	(5.9)	0.3	(0.0)	(5.6)
182	LT-U-1.14	Undistributed - Non-Labor	Workers Compensation Insurance	0.9	(0.0)	0.0	0.8
183	SNF-U-2.06	Undistributed - Non-Labor	Insurance	(2.4)	0.1	(0.0)	(2.2)
184	SR-U-3.04	Undistributed - Non-Labor	Insurance	-	-	-	-
185	**Insurance Subtotal**			**$ (7.4)**	**$ 0.4**	**$ (0.0)**	**$ (7.0)**
186							
187	LT-U-1.06	Undistributed - Non-Labor	Site Lease and Easement Expenses	2.1	(0.1)	0.0	2.0
188	SR-U-3.05	Undistributed - Non-Labor	Site Lease and Easement Expenses	(0.0)	0.0	(0.0)	(0.0)
189	**Site Lease and Easement Expenses Subtotal**			**$ 2.1**	**$ (0.1)**	**$ 0.0**	**$ 2.0**
190							
191	LT-U-1.07	Undistributed - Non-Labor	NRC Fees	0.8	(0.0)	0.0	0.7
192	SNF-U-2.08	Undistributed - Non-Labor	NRC Fees	0.2	(0.0)	0.0	0.2
193	**NRC Fees Subtotal**			**$ 1.0**	**$ (0.1)**	**$ 0.0**	**$ 0.9**
194							
195	LT-U-1.08	Undistributed - Non-Labor	Contracted Services	6.0	(0.4)	(0.0)	5.6
196	SNF-U-2.11	Undistributed - Non-Labor	Contracted Services	7.4	(0.5)	(0.0)	7.0
197	SR-U-3.06	Undistributed - Non-Labor	Contracted Services	0.3	(0.0)	(0.0)	0.3
198	SR-U-Bank	Undistributed - Non-Labor	Bank Fees And Interest	(0.1)	0.0	(0.0)	(0.1)
199	SR-U-Inv Adj	Undistributed - Non-Labor	Vendor Invoice Adjustment	(0.0)	0.0	(0.0)	(0.0)
200	**Contracted Services Subtotal**			**$ 13.7**	**$ (0.9)**	**$ (0.0)**	**$ 12.8**

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project	Description	[A] AL 3988-E 2018 Recorded	[B] 2018 SLA Allocation[1]	[C] Final Escalation Factor Adjustment[2]	[D=A+B+C] Final 2018 Recorded
201							
202	LT-U-1.09	Undistributed - Non-Labor	DAW Disposal	-	-	-	-
203	SNF-U-2.12	Undistributed - Non-Labor	DAW Disposal	-	-	-	-
204	**DAW Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
205							
206	LT-U-1.10	Undistributed - Non-Labor	Energy	2.6	(0.1)	0.0	2.5
207	SNF-U-2.13	Undistributed - Non-Labor	Energy	0.7	(0.0)	0.0	0.7
208	SR-U-3.07	Undistributed - Non-Labor	Energy	-	-	-	-
209	**Energy Subtotal**			**$ 3.4**	**$ (0.2)**	**$ -**	**$ 3.2**
210							
211	LT-U-1.15	Undistributed - Non-Labor	Community Engagement Panel	0.6	(0.0)	(0.0)	0.5
212	SNF-U-2.25	Undistributed - Non-Labor	Community Engagement Panel	-	-	-	-
213	SR-U-3.21	Undistributed - Non-Labor	Community Engagement Panel	-	-	-	-
214	**Community Engagement Panel Subtotal**			**$ 0.6**	**$ (0.0)**	**$ (0.0)**	**$ 0.5**
215							
216	LT-U-1.17	Undistributed - Non-Labor	Association Fees and Expenses	0.4	(0.0)	(0.0)	0.3
217	SNF-U-2.26	Undistributed - Non-Labor	Association Fees and Expenses	-	-	-	-
218	SR-U-3.17	Undistributed - Non-Labor	Association Fees and Expenses	-	-	-	-
219	**Association Fees and Expenses Subtotal**			**$ 0.4**	**$ (0.0)**	**$ (0.0)**	**$ 0.3**
220							
221	LT-U-1.18	Undistributed - Non-Labor	Water	0.1	(0.0)	0.0	0.1
222	SNF-U-2.18	Undistributed - Non-Labor	Water	0.2	(0.0)	0.0	0.2
223	SR-U-3.13	Undistributed - Non-Labor	Water	-	-	-	-
224	**Water Subtotal**			**$ 0.2**	**$ (0.0)**	**$ 0.0**	**$ 0.2**
225							
226	LT-U-1.19	Undistributed - Non-Labor	Tools and Equipment	0.0	(0.0)	(0.0)	0.0
227	**Tools and Equipment Subtotal**			**$ 0.0**	**$ (0.0)**	**$ (0.0)**	**$ 0.0**
228							
229	LT-U-1.20	Undistributed - Non-Labor	Information Technology	1.9	(0.1)	0.0	1.8
230	LT-U-1.21	Undistributed - Non-Labor	Telecommunications	-	-	-	-
231	LT-U-1.22	Undistributed - Non-Labor	Personal Computers	(0.0)	0.0	(0.0)	(0.0)
232	SNF-U-2.20	Undistributed - Non-Labor	Information Technology	1.8	(0.1)	0.0	1.7
233	SNF-U-2.22	Undistributed - Non-Labor	Personal Computers	(0.0)	0.0	(0.0)	(0.0)
234	SR-U-3.15	Undistributed - Non-Labor	Information Technology	-	-	-	-
235	**Information Technology Subtotal**			**$ 3.7**	**$ (0.2)**	**$ 0.0**	**$ 3.5**
236							
237	LT-U-1.24	Undistributed - Non-Labor	Environmental Permits and Fees	0.3	(0.0)	0.0	0.3
238	SNF-U-2.27	Undistributed - Non-Labor	Environmental Permits and Fees	-	-	-	-
239	SR-U-3.23	Undistributed - Non-Labor	Environmental Permits and Fees	-	-	-	-
240	**Environmental Permits and Fees Subtotal**			**$ 0.3**	**$ (0.0)**	**$ 0.0**	**$ 0.3**

2018 Final Escalation Factor & SLA Adjustment – Updated Advice Letter 3988-E 2018 Recorded Costs In 2014$
(2014 Dollars in Millions, 100% Level)

	DCE No.	Major Project	Description	[A] AL 3988-E 2018 Recorded	[B] 2018 SLA Allocation(1)	[C] Final Escalation Factor Adjustment(2)	[D=A+B+C] Final 2018 Recorded
241							
242	LT-U-1.25	Undistributed - Non-Labor	Decommissioning Advisor	0.9	(0.0)	0.0	0.8
243	SNF-U-2.28	Undistributed - Non-Labor	Decommissioning Advisor	-	-	-	-
244	SR-U-3.22	Undistributed - Non-Labor	Decommissioning Advisor	-	-	-	-
245	**Decommissioning Advisor Subtotal**			**$ 0.9**	**$ (0.0)**	**$ 0.0**	**$ 0.8**
246							
247	LT-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.9	(0.1)	0.0	0.9
248	SNF-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.2	(0.0)	(0.0)	0.2
249	SR-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.1	(0.0)	0.0	0.1
250	**Third-Party Legal Subtotal**			**$ 1.2**	**$ (0.1)**	**$ 0.0**	**$ 1.1**
251							
252	LT-U-CO	Undistributed - Non-Labor	DGC Executive Oversight Committee	-	-	-	-
253	**DGC Executive Oversight Committee Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
254							
255	SNF-U-2.09	Undistributed - Non-Labor	Emergency Preparedness Fees	1.8	(0.1)	0.0	1.7
256	**Emergency Preparedness Fees Subtotal**			**$ 1.8**	**$ (0.1)**	**$ 0.0**	**$ 1.7**
257							
258	SNF-U-AM Holtec	Undistributed - Non-Labor	Holtec ISFSI Aging Management	-	-	-	-
259	**Aging Management Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**
260							
261	SR-U-3.11	Undistributed - Non-Labor	Severance	11.2	(0.6)	(0.0)	10.6
262	**Severance Subtotal**			**$ 11.2**	**$ (0.6)**	**$ (0.0)**	**$ 10.6**
263							
264	**Undistributed - Non-Labor Subtotal**			**$ 33.4**	**$ (1.9)**	**$ (0.0)**	**$ 31.5**
265							
266	LT-U-SLA	Service Level Agreement	Service Level Agreements	-	5.2	0.0	5.2
267	SNF-U-SLA	Service Level Agreement	Service Level Agreements	-	4.5	0.0	4.5
268	SR-U-SLA	Service Level Agreement	Service Level Agreements	-	-	-	-
269	**Undistributed - Service Level Agreement Subtotal**			**$ -**	**$ 9.6**	**$ 0.0**	**$ 9.6**
270							
271	**Undistributed Subtotal**			**$ 98.7**	**$ 3.7**	**$ 0.0**	**$ 102.4**
272							
273	**Total**			**$ 166.0**	**$ -**	**$ (0.1)**	**$ 165.9**

General Notes:

(A) Totals may not reconcile due to rounding.

(B) Amounts with $0.0 or $(0.0) indicate that costs are included in the category but are $0 when rounded to the nearest hundred thousand. $ - indicates that no costs are included in the category.

Notes:

(1) In Advice Letter AL 3988-E, Service Level Agreement (SLA) costs were allocated proportionately to each line item. In the 2017 DCE, a separate line item for Service Level Agreements was created; therefore, the SLA costs that were previously allocated have been moved to the SLA line items.

(2) The 2018 Escalation Factors have been updated since the last Advice Letter (Advice Letter 3988-E on April 15, 2019) to reflect final 2018 escalation factors. The relevant US Bureau of Labor indices, which are the basis of escalation factors, were not published when Advice Letter 3988-E was filed and therefore forecasted escalation factors were used. The US Bureau of Labor indices needed to determine the final 2018 escalation factors were made available in May of 2019.

Attachment 9

SCE Trust Fund Disbursement Amounts Requested, Approved, and Withdrawn

SCE Trust Fund Disbursement Amounts Requested, Approved, And Withdrawn As Of September 30, 2019 (Nominal Dollars In Millions, SCE Share)						
Year	**Advice Letter Number**	**Requested Amount**	**Adjusted Requested Amount**	**Approved Amount**	**Prior Year Adjustments Approved in 2015**	**Trust Withdrawn Amount**
2013	3193-E	$ 180.3	$ 180.3	$ 180.3	$ 4.5	$ 184.8
2014	3193-E	159.7	159.7	159.7	5.2	164.9
2015	3285-E	236.7	236.7	236.7	-	215.3
Prior Year Adj.	3285-E	9.7	9.7	9.7	Above	-
2016	3307-E	228.8	228.8	228.8	-	151.0
2017	3535-E	302.7	302.7	302.7	-	233.3
2018	3697-E	215.8	215.8	215.8	-	134.4
2019	3903-E	341.3	341.3	341.3	-	126.3
2020		405.5	405.5		-	-
Total		**$ 2,080.5**	**$ 2,080.5**	**$ 1,675.0**		**$ 1,210.0**

Liquidation Value As Of September 30, 2019			
Unit	**Qualified Trust**	**Non-Qualified Trust**	**Total Trust**
Unit 2	$ 1,123.2	$ 7.0	$ 1,130.2
Unit 3	1,333.7	6.9	1,340.6
Total	**$ 2,456.9**	**$ 13.9**	**$ 2,470.8**

Note:

2015 Request includes $9.7 for 2013-2014 Adjustments

2013 Adjustment is $4.5

2014 Adjustment is $5.2

Total Adjustment $9.7

Attachment 10

2017 DCE Waste Disposal Adjustment

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

				2020 Cash Flow			Total 2017 DCE		
				[A]	[B]	[C=A+B]	[D]	[E]	[F=D+E]
	DCE No.	Major Project	Description	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE
1	LT-2-D-2.17	Historical Site Assessment /Characterization	Perform Historic Site Assessment and Site Characterization	$ -	$ -	$ -	$ 6.2	$ -	$ 6.2
2	**Historical Site Assessment/Characterization Subtotal**			**$ -**	**$ -**	**$ -**	**$ 6.2**	**$ -**	**$ 6.2**
3									
4	LT-2-D-2.16	Legacy Radwaste Disposal	Disposition of Legacy Wastes	-	-	-	11.6	-	11.6
5	LT-1-D-1.05	Legacy Radwaste Disposal	Disposition of Legacy Waste	-	-	-	8.4	-	8.4
6	**Legacy Radwaste Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ 20.0**	**$ -**	**$ 20.0**
7									
8	SR-1-D-14.04	Project Governance and Admin	Fuel Cancellation Expense	-	-	-	54.4	-	54.4
9	**Project Governance and Admin Subtotal**			**$ -**	**$ -**	**$ -**	**$ 54.4**	**$ -**	**$ 54.4**
10									
11	LT-2-D-2.02	Regulatory Compliance	Prepare Post-Shutdown QA Plan	-	-	-	0.4	-	0.4
12	LT-2-D-2.03	Regulatory Compliance	Prepare Post-Shutdown Security Plan	-	-	-	0.1	-	0.1
13	LT-2-D-2.04	Regulatory Compliance	Prepare Post-Shutdown Fire Protection Plan	-	-	-	0.0	-	0.0
14	LT-2-D-2.06	Regulatory Compliance	Prepare Preliminary Defueled Technical Specifications	-	-	-	0.3	-	0.3
15	LT-2-D-2.08	Regulatory Compliance	Implement Technical Specification Modifications	-	-	-	0.1	-	0.1
16	LT-2-D-2.09	Regulatory Compliance	Prepare Post-Shutdown Emergency Preparedness Plan	-	-	-	1.7	-	1.7
17	LT-2-D-2.11	Regulatory Compliance	Prepare Post-Shutdown Decommissioning Activities Report (PSDAR)	-	-	-	0.2	-	0.2
18	LT-2-D-2.12	Regulatory Compliance	Post-Shutdown Decommissioning Activities Report (PSDAR) - NRC Review	-	-	-	0.2	-	0.2
19	LT-2-D-2.14	Regulatory Compliance	Prepare Decommissioning Cost Estimate (DCE)	-	-	-	1.2	-	1.2
20	SNF-1-D-7.03	Regulatory Compliance	Post Fukushima Modifications - Unit 2	-	-	-	0.1	-	0.1
21	SNF-2-D-FLEX	Regulatory Compliance	Flex Initiative	-	-	-	0.2	-	0.2
22	SNF-2-D-8.02	Regulatory Compliance	Decay Heat Analysis	-	-	-	0.2	-	0.2
23	SNF-2-D-8.03	Regulatory Compliance	Zirconium Fire/ Shine Analysis	-	-	-	0.1	-	0.1
24	SNF-2-D-8.05	Regulatory Compliance	Prepare Irradiated Fuel Management Plan & NRC Review	-	-	-	0.0	-	0.0
25	**Regulatory Compliance Subtotal**			**$ -**	**$ -**	**$ -**	**$ 4.9**	**$ -**	**$ 4.9**
26									
27	LT-2-D-2.31	Transition Modifications - Phase 1	Transition Project Modifications	-	-	-	1.1	-	1.1
28	**Transition Modifications - Phase 1 Subtotal**			**$ -**	**$ -**	**$ -**	**$ 1.1**	**$ -**	**$ 1.1**
29									
30	SNF-1-D-7.01	Security Programs	Security Shutdown Strategy	-	-	-	2.9	-	2.9
31	SNF-2-D-8.01	Security Programs	Security Shutdown Strategy	-	-	-	4.5	-	4.5
32	**Security Programs Subtotal**			**$ -**	**$ -**	**$ -**	**$ 7.5**	**$ -**	**$ 7.5**
33									
34	LT-2-D-2.22	DGC RFP & Prep	Select Decommissioning General Contractor (DGC)	-	-	-	13.8	-	13.8
35	**DGC RFP & Preps Subtotal**			**$ -**	**$ -**	**$ -**	**$ 13.8**	**$ -**	**$ 13.8**
36									
37	LT-2-D-LOED	Transition Modifications - Phase 2	Large Organism Exclusion Device Modification	-	-	-	1.3	-	1.3
38	LT-3-D-RecB	Transition Modifications - Phase 2	Records Backlog	-	-	-	1.9	-	1.9
39	LT-3-D-S&S	Transition Modifications - Phase 2	Simplification & Streamlining Project	-	-	-	1.3	-	1.3
40	LT-D-SPV	Transition Modifications - Phase 2	Special Purpose Vehicle Support	-	-	-	0.4	-	0.4
41	**Transition Modifications - Phase 2 Subtotal**			**$ -**	**$ -**	**$ -**	**$ 5.0**	**$ -**	**$ 5.0**
42									
43	LT-2-D-2.26	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 2	-	-	-	4.2	-	4.2
44	LT-2-D-2.27	Spent Fuel Islanding	Install Spent Fuel Pool System Modifications - Unit 3	-	-	-	4.2	-	4.2
45	**Spent Fuel Islanding Subtotal**			**$ -**	**$ -**	**$ -**	**$ 8.4**	**$ -**	**$ 8.4**
46									
47	SNF-1-D-7.05	Cyber Security Modifications	Cyber Security Modifications	-	-	-	9.4	-	9.4
48	**Cyber Security Modifications Subtotal**			**$ -**	**$ -**	**$ -**	**$ 9.4**	**$ -**	**$ 9.4**
49									
50	LT-3-D-DCE	Phase 2 Regulatory Compliance	DCE Update	-	-	-	1.5	-	1.5
51	LT-2-D-2.07	Phase 2 Regulatory Compliance	Prepare Defueled Safety Analysis Report (DSAR)	-	-	-	2.0	-	2.0
52	**Phase 2 Regulatory Compliance Subtotal**			**$ -**	**$ -**	**$ -**	**$ 3.5**	**$ -**	**$ 3.5**
53									
54	LT-2-D-2.18	Initial D&D Activities	Planning & Design For Cold and Dark	[redacted]					
55	LT-2-D-2.19	Initial D&D Activities	Implement Cold and Dark (Repower Site)						

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

	DCE No.	Major Project	Description	2020 Cash Flow [A] 2017 DCE	[B] Waste Disposal Adjustment	[C=A+B] Adjusted 20	Total 2017 DCE [D] 2017 DCE	[E] Waste Disposal A	[F=D+E] Adjusted 20
56	LT-2-D-2.20	Initial D&D Activities	Install 12 kV Service Line to Power Temp Power Ring	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
57	LT-2-D-2.21	Initial D&D Activities	Drain & De-Energize Non-Essential Systems (DEC Process)						
58	LT-2-D-2.29	Initial D&D Activities	Implement Control Room Modifications (Command Center Relocation)						
59	LT-3-D-3.10	Initial D&D Activities	Modify Containment Access- Unit 2						
60	LT-3-D-3.12	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 2						
61	LT-3-D-3.13	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 2						
62	LT-3-D-3.11	Initial D&D Activities	Modify Containment Access- Unit 3						
63	LT-3-D-3.14	Initial D&D Activities	Remove and Dispose of Missile Shields - Unit 3						
64	LT-3-D-3.15	Initial D&D Activities	Remove and Dispose of Reactor Head - Unit 3						
65	LT-3-D-3.01	Initial D&D Activities	Prepare Integrated Work Sequence and Schedule for Decommissioning						
66	LT-4-D-4.02	Initial D&D Activities	Install GARDIAN System						
67	LT-3-D-3.17	Initial D&D Activities	Prepare Activity Specifications - U2						
68	LT-3-D-3.02	Initial D&D Activities	Prepare Detailed Work Procedures and Activity Specifications for Decommissioning						
69	LT-3-D-DGC_BUR	Initial D&D Activities	Waste Contracts						
70	LT-D-FRASB	Initial D&D Activities	Removal of Friable Asbestos						
71	**Initial D&D Activities Subtotal**			$	$	$	$	$	$
72									
73	LT-3-D-3.23	Internals and Vessel Segmentation	Finalize Internals and Vessel Segmenting Details - Unit 2						
74	LT-3-D-3.24	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 2						
75	LT-3-D-3.27	Internals and Vessel Segmentation	Segment, Package and Dispose of Reactor Internals - Unit 3						
76	LT-3-D-3.22	Internals and Vessel Segmentation	Test Special Cutting and Handling Equipment and Train Operators						
77	**Internals and Vessel Segmentation Subtotal**			$	$	$	$	$	$
78									
79	LT-4-D-4.33	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 2						
80	LT-4-D-4.35	Steam Generator Removal	Remove and Dispose of Steam Generators - Unit 3						
81	**Steam Generator Removal Subtotal**			$	$	$	$	$	$
82									
83	LT-4-D-4.06	Non-Essential System Removal	Remove, Package and Dispose of Non-Essential Systems - Unit 2						
84	LT-4-D-4.09	Non-Essential System Removal	Remove, Package and Dispose of Non-Essential Systems - Unit 3						
85	**Non-Essential System Removal Subtotal**			$	$	$	$	$	$
86									
87	LT-4-D-4.27	Large Component Removal	Reactor Vessel Insulation Removal and Disposal - Unit 2						
88	LT-4-D-4.31	Large Component Removal	Reactor Vessel Insulation Removal and Disposal - Unit 3						
89	LT-4-D-4.36	Large Component Removal	Remove and Dispose of Pressurizer - Unit 3						
90	**Large Component Removal Subtotal**			$	$	$	$	$	$
91									
92	SR-4-D-17.05	Removal of Spent Fuel Systems/ Equipment	Remove Protected Area Security Fencing						
93	**Removal of Spent Fuel Systems/ Equipment Subtotal**			$	$	$	$	$	$
94									
95	SR-4-D-17.07	Containment Building Demo	Detension and Remove Unit 3 Containment Building Tendons						
96	SR-4-D-17.15	Containment Building Demo	Detension and Remove Unit 2 Containment Building Tendons						
97	**Containment Building Demo Subtotal**			$	$	$	$	$	$
98									
99	SR-4-D-17.17	Initial Plant Building Demo	Demolish Condensate Building and Transformer Pads - Unit 2						
100	SR-4-D-17.01	Initial Plant Building Demo	Procure Clean Building Demolition Equipment						
101	SR-4-D-17.30	Initial Plant Building Demo	Demolish Auxiliary Radwaste Building - Common						
102	SR-4-D-17.32	Initial Plant Building Demo	Remove Systems and Demolish Make-Up Demineralizer Structures						
103	SR-4-D-17.33	Initial Plant Building Demo	Install Concrete Plugs in Intake and Discharge Structures						
104	**Initial Plant Building Demo Subtotal**			$	$	$	$	$	$
105									
106	LT-5-D-5.05	Building Decontamination	Decon Turbine Building - Unit 3						
107	LT-5-D-5.10	Building Decontamination	Decon Turbine Building - Unit 2						
108	**Building Decontamination Subtotal**			$	$	$	$	$	$
109									
110	LT-4-D-4.23	Final Plant Building Demo	Asbestos Abatement and Hazardous Waste Disposal for Essential Systems						
111	**Final Plant Building Demo Subtotal**			$	$	$	$	$	$

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

	DCE No.	Major Project	Description	2020 Cash Flow [A] 20	[B] Waste Disposal Adjustment	[C=A+B] Adjusted 20	Total 2017 DCE [D] 2017 DCE	[E] Waste Disposal Adjustment	[F=D+E] Adjusted 2017 DCE
112									
113	LT-4-D-4.39	Final Survey/License Reduction	Prepare License Termination Plan						
114	SR-3-D-16.02	Final Survey/License Reduction	Subsurface Structure Removal Engineering Planning and Design						
115	**Final Survey/License Reduction Subtotal**			**$**	**$**	**$**	**$**	**$**	
116									
117	LT-D-WPTT	D&D Waste	Waste Taxes (Pass Through)						
118	LT-D-BUR	D&D Waste	Waste Disposal						
119	**D&D Waste Subtotal**			**$**	**$**	**$**	**$**	**$**	
120									
121	**Decontamination, Demolition, & Disposal Subtotal**			**$**	**$**	**$**	**$**	**$**	
122									
123	SNF-1-D-7.02	ISFSI	Holtec Long Lead Items and Areva Contract Closure						
124	SNF-2-D-8.07	ISFSI	ISFSI Pad Study						
125	SNF-2-D-8.08	ISFSI	Design ISFSI Expansion, Fuel Inspection, and Oversight						
126	SNF-2-D-8.09	ISFSI	Construct ISFSI Expansion						
127	SNF-2-D-8.10	ISFSI	Fabrication of Spent Fuel Canisters - Unit 2						
128	SNF-2-D-8.11	ISFSI	Fabrication of Spent Fuel Canisters - Unit 3						
129	SNF-2-D-8.12	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 2						
130	SNF-2-D-8.13	ISFSI	Load Fuel Canisters and Fuel Transfer Operations - Unit 3						
131	**ISFSI Subtotal**			**$**	**$**	**$**	**$**	**$**	
132									
133	**ISFSI Subtotal**			**$**	**$**	**$**	**$**	**$**	
134									
135	SNF-2-D-CDP	ISFSI CDP Settlement	ISFSI CDP Settlement	-	-	-	4.3	-	4.3
136	**ISFSI Coastal Development Permit Settlement Subtotal**			**$ -**	**$ -**	**$ -**	**$ 4.3**	**$ -**	**$ 4.3**
137									
138	SNF-2-D-EP Areva	Coastal Development Permit Extensions	Coastal Development Permit Extensions	0.4	-	0.4	1.9	-	1.9
139	**Coastal Development Permit Extensions Subtotal**			**$ 0.4**	**$ -**	**$ 0.4**	**$ 1.9**	**$ -**	**$ 1.9**
140									
141	SNF-2-D-AM Areva	ISFSI Aging Management	Areva ISFSI Relicensing	2.4	-	2.4	14.1	-	14.1
142	SNF-2-D-AM Holtec1	ISFSI Aging Management	Holtec ISFSI I&M Program Development	4.1	-	4.1	16.7	-	16.7
143	**ISFSI Aging Management Subtotal**			**$ 6.5**	**$ -**	**$ 6.5**	**$ 30.8**	**$ -**	**$ 30.8**
144									
145	SNF-2-D-GTCC	GTCC Waste Storage	GTCC Waste Storage	7.7	-	7.7	26.6	-	26.6
146	**GTCC Waste Storage Subtotal**			**$ 7.7**	**$ -**	**$ 7.7**	**$ 26.6**	**$ -**	**$ 26.6**
147									
148	SNF-D-SIREN	Siren Removals	Siren Removals	-	-	-	-	-	-
149	**Siren Removal Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
150									
151	SNF-D-NIA Sump	NIA Sump Modifications	NIA Sump Modifications	0.4	-	0.4	1.1	-	1.1
152	**NIA Sump Modifications Subtotal**			**$ 0.4**	**$ -**	**$ 0.4**	**$ 1.1**	**$ -**	**$ 1.1**
153									
154	SR-3-D-16.05	CEQA	Obtain CEQA Permit & Approvals	-	-	-	7.9	-	7.9
155	**CEQA Subtotal**			**$ -**	**$ -**	**$ -**	**$ 7.9**	**$ -**	**$ 7.9**
156									
157	SR-3-D-16.03	NEPA	Initial Real Estate Authorization Renewal and Plant Easement	1.6	-	1.6	14.4	-	14.4
158	**NEPA Subtotal**			**$ 1.6**	**$ -**	**$ 1.6**	**$ 14.4**	**$ -**	**$ 14.4**
159									
160	SR-1-D-14.02	Mesa Turnover	Disposition Hazardous Waste from Mesa Site	-	-	-	0.2	-	0.2
161	SR-2-D-15.09	Mesa Turnover	Mesa Buildings - Demo, Maintenance	1.0	-	1.0	9.5	-	9.5
162	SR-2-D-15.02	Mesa Turnover	Obtain Required Permits - Mesa	-	-	-	0.1	-	0.1
163	SR-1-D-14.01	Mesa Turnover	Mesa Site Phase I and II Site Assessment and Lease Surrender	1.3	-	1.3	8.5	-	8.5
164	SR-1-D-14.03	Mesa Turnover	Mesa Site Characterization Survey	-	-	-	0.1	-	0.1
165	**Mesa Turnover Subtotal**			**$ 2.3**	**$ -**	**$ 2.3**	**$ 18.4**	**$ -**	**$ 18.4**
166									

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

	DCE No.	Major Project	Description	2020 Cash Flow [A] 2017 DCE	2020 Cash Flow [B] Waste Disposal Adjustment	2020 Cash Flow [C=A+B] Adjusted 2017 DCE	Total 2017 DCE [D] 2017 DCE	Total 2017 DCE [E] Waste Disposal Adjustment	Total 2017 DCE [F=D+E] Adjusted 2017 DCE
167	LT-D-DCE2	DCE Updates	DCE Update 2020	0.3	-	0.3	0.3	-	0.3
168	**DCE Updates Subtotal**			**$ 0.3**	**$ -**	**$ 0.3**	**$ 0.3**	**$ -**	**$ 0.3**
169									
170	**Other Major Projects Subtotal**			**$ 19.2**	**$ -**	**$ 19.2**	**$ 105.7**	**$ -**	**$ 105.7**
171									
172	**Major Projects (Distributed) Subtotal**			**$ 88.1**	**$ -**	**$ 88.1**	[redacted]		
173									
174	LT-U-1.01	Undistributed - Labor-Staffing	Utility Staff	18.9	-	18.9	308.3	-	308.3
175	SNF-U-2.01	Undistributed - Labor-Staffing	Utility Staff	5.2	-	5.2	295.4	-	295.4
176	SR-U-3.01	Undistributed - Labor-Staffing	Utility Staff	0.3	-	0.3	109.4	-	109.4
177	**Utility Staff Subtotal**			**$ 24.4**	**$ -**	**$ 24.4**	**$ 713.1**	**$ -**	**$ 713.1**
178									
179	LT-U-1.03	Undistributed - Labor-Staffing	Security Force	-	-	-	6.7	-	6.7
180	SNF-U-2.04	Undistributed - Labor-Staffing	Security Force	2.7	-	2.7	212.0	-	212.0
181	SR-U-3.02	Undistributed - Labor-Staffing	Security Force	-	-	-	-	-	-
182	**Security Force Subtotal**			**$ 2.7**	**$ -**	**$ 2.7**	**$ 218.7**	**$ -**	**$ 218.7**
183									
184	LT-U-1.11	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing	[redacted]					
185	SNF-U-2.14	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing						
186	SR-U-3.08	Undistributed - Labor-Staffing	Decommissioning General Contractor Staffing						
187	**Decommissioning General Contractor Subtotal**								
188									
189	LT-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation						
190	SNF-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation						
191	SR-U-RS	Undistributed - Labor-Staffing	Short-Term Incentive Compensation						
192	**Short-Term Incentive Compensation Subtotal**								
193									
194	**Undistributed - Labor-Staffing Subtotal**			**$ 47.3**	**$ -**	**$ 47.3**	**$ 1,244.7**	**$ -**	**$ 1,244.7**
195									
196	LT-U-1.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	-	-	-	1.1	-	1.1
197	SNF-U-2.02	Undistributed - Non-Labor	Utility Staff Health Physics Supplies	0.0	-	0.0	2.5	-	2.5
198	**Utility Staff Health Physics Supplies Subtotal**			**$ 0.0**	**$ -**	**$ 0.0**	**$ 3.7**	**$ -**	**$ 3.7**
199									
200	LT-U-1.04	Undistributed - Non-Labor	Security Related Expenses	-	-	-	0.7	-	0.7
201	SNF-U-2.05	Undistributed - Non-Labor	Security Related Expenses	0.1	-	0.1	10.6	-	10.6
202	SR-U-3.03	Undistributed - Non-Labor	Security Related Expenses	-	-	-	0.6	-	0.6
203	**Security Related Expenses Subtotal**			**$ 0.1**	**$ -**	**$ 0.1**	**$ 11.8**	**$ -**	**$ 11.8**
204									
205	LT-U-1.05	Undistributed - Non-Labor	Insurance	0.5	-	0.5	19.7	-	19.7
206	LT-U-1.14	Undistributed - Non-Labor	Workers Compensation Insurance	-	-	-	0.4	-	0.4
207	SNF-U-2.06	Undistributed - Non-Labor	Insurance	1.1	-	1.1	38.5	-	38.5
208	SR-U-3.04	Undistributed - Non-Labor	Insurance	0.0	-	0.0	5.0	-	5.0
209	**Insurance Subtotal**			**$ 1.6**	**$ -**	**$ 1.6**	**$ 63.7**	**$ -**	**$ 63.7**
210									
211	LT-U-1.06	Undistributed - Non-Labor	Site Lease and Easement Expenses	-	-	-	4.4	-	4.4
212	SR-U-3.05	Undistributed - Non-Labor	Site Lease and Easement Expenses	2.3	-	2.3	47.1	-	47.1
213	**Site Lease and Easement Expenses Subtotal**			**$ 2.3**	**$ -**	**$ 2.3**	**$ 51.5**	**$ -**	**$ 51.5**
214									
215	LT-U-1.07	Undistributed - Non-Labor	NRC Fees	0.3	-	0.3	11.5	-	11.5
216	SNF-U-2.08	Undistributed - Non-Labor	NRC Fees	0.3	-	0.3	19.7	-	19.7
217	**NRC Fees Subtotal**			**$ 0.6**	**$ -**	**$ 0.6**	**$ 31.2**	**$ -**	**$ 31.2**
218									
219	LT-U-1.08	Undistributed - Non-Labor	Contracted Services	4.7	-	4.7	100.2	-	100.2
220	SNF-U-2.11	Undistributed - Non-Labor	Contracted Services	1.7	-	1.7	99.1	-	99.1
221	SR-U-3.06	Undistributed - Non-Labor	Contracted Services	0.1	-	0.1	26.1	-	26.1

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

				2020 Cash Flow			Total 2017 DCE		
				[A]	[B]	[C=A+B]	[D]	[E]	[F=D+E]
	DCE No.	Major Project	Description	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE
222	SR-U-Bank	Undistributed - Non-Labor	Bank Fees And Interest	-	-	-	(0.1)	-	(0.1)
223	SR-U-Inv Adj	Undistributed - Non-Labor	Vendor Invoice Adjustment	-	-	-	(0.2)	-	(0.2)
224	**Contracted Services Subtotal**			**$ 6.4**	**$ -**	**$ 6.4**	**$ 225.2**	**$ -**	**$ 225.2**
225									
226	LT-U-1.09	Undistributed - Non-Labor	DAW Disposal	-	-	-	0.0	-	0.0
227	SNF-U-2.12	Undistributed - Non-Labor	DAW Disposal	-	-	-	0.0	-	0.0
228	**DAW Disposal Subtotal**			**$ -**	**$ -**	**$ -**	**$ 0.0**	**$ -**	**$ 0.0**
229									
230	LT-U-1.10	Undistributed - Non-Labor	Energy	3.8	-	3.8	49.9	-	49.9
231	SNF-U-2.13	Undistributed - Non-Labor	Energy	0.8	-	0.8	18.4	-	18.4
232	SR-U-3.07	Undistributed - Non-Labor	Energy	0.2	-	0.2	16.4	-	16.4
233	**Energy Subtotal**			**$ 4.8**	**$ -**	**$ 4.8**	**$ 84.7**	**$ -**	**$ 84.7**
234									
235	LT-U-1.15	Undistributed - Non-Labor	Community Engagement Panel	0.4	-	0.4	7.6	-	7.6
236	SNF-U-2.25	Undistributed - Non-Labor	Community Engagement Panel	0.1	-	0.1	2.7	-	2.7
237	SR-U-3.21	Undistributed - Non-Labor	Community Engagement Panel	0.0	-	0.0	2.1	-	2.1
238	**Community Engagement Panel Subtotal**			**$ 0.5**	**$ -**	**$ 0.5**	**$ 12.5**	**$ -**	**$ 12.5**
239									
240	LT-U-1.17	Undistributed - Non-Labor	Association Fees and Expenses	0.4	-	0.4	4.9	-	4.9
241	SNF-U-2.26	Undistributed - Non-Labor	Association Fees and Expenses	0.1	-	0.1	2.3	-	2.3
242	SR-U-3.17	Undistributed - Non-Labor	Association Fees and Expenses	0.0	-	0.0	1.4	-	1.4
243	**Association Fees and Expenses Subtotal**			**$ 0.6**	**$ -**	**$ 0.6**	**$ 8.6**	**$ -**	**$ 8.6**
244									
245	LT-U-1.18	Undistributed - Non-Labor	Water	0.3	-	0.3	4.2	-	4.2
246	SNF-U-2.18	Undistributed - Non-Labor	Water	0.1	-	0.1	9.1	-	9.1
247	SR-U-3.13	Undistributed - Non-Labor	Water	0.0	-	0.0	3.3	-	3.3
248	**Water Subtotal**			**$ 0.4**	**$ -**	**$ 0.4**	**$ 16.5**	**$ -**	**$ 16.5**
249									
250	LT-U-1.19	Undistributed - Non-Labor	Tools and Equipment	-	-	-	0.0	-	0.0
251	**Tools and Equipment Subtotal**			**$ -**	**$ -**	**$ -**	**$ 0.0**	**$ -**	**$ 0.0**
252									
253	LT-U-1.20	Undistributed - Non-Labor	Information Technology	0.6	-	0.6	18.4	-	18.4
254	LT-U-1.21	Undistributed - Non-Labor	Telecommunications	-	-	-	2.3	-	2.3
255	LT-U-1.22	Undistributed - Non-Labor	Personal Computers	-	-	-	0.0	-	0.0
256	SNF-U-2.20	Undistributed - Non-Labor	Information Technology	0.1	-	0.1	5.6	-	5.6
257	SNF-U-2.22	Undistributed - Non-Labor	Personal Computers	-	-	-	0.0	-	0.0
258	SR-U-3.15	Undistributed - Non-Labor	Information Technology	0.0	-	0.0	5.5	-	5.5
259	**Information Technology Subtotal**			**$ 0.7**	**$ -**	**$ 0.7**	**$ 31.9**	**$ -**	**$ 31.9**
260									
261	LT-U-1.24	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	-	0.0	3.8	-	3.8
262	SNF-U-2.27	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	-	0.0	1.1	-	1.1
263	SR-U-3.23	Undistributed - Non-Labor	Environmental Permits and Fees	0.0	-	0.0	1.8	-	1.8
264	**Environmental Permits and Fees Subtotal**			**$ 0.0**	**$ -**	**$ 0.0**	**$ 6.7**	**$ -**	**$ 6.7**
265									
266	LT-U-1.25	Undistributed - Non-Labor	Decommissioning Advisor	0.5	-	0.5	7.9	-	7.9
267	SNF-U-2.28	Undistributed - Non-Labor	Decommissioning Advisor	0.1	-	0.1	0.3	-	0.3
268	SR-U-3.22	Undistributed - Non-Labor	Decommissioning Advisor	0.0	-	0.0	1.7	-	1.7
269	**Decommissioning Advisor Subtotal**			**$ 0.6**	**$ -**	**$ 0.6**	**$ 9.9**	**$ -**	**$ 9.9**
270									
271	LT-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.8	-	0.8	9.4	-	9.4
272	SNF-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.2	-	0.2	10.1	-	10.1
273	SR-U-Legal	Undistributed - Non-Labor	Third-Party Legal	0.0	-	0.0	4.3	-	4.3
274	**Third-Party Legal Subtotal**			**$ 1.1**	**$ -**	**$ 1.1**	**$ 23.8**	**$ -**	**$ 23.8**
275									

2017 DCE Waste Disposal Adjustment
(2014 Dollars In Millions, 100% Level)

				2020 Cash Flow			Total 2017 DCE		
				[A]	[B]	[C=A+B]	[D]	[E]	[F=D+E]
	DCE No.	Major Project	Description	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE	2017 DCE	Waste Disposal Adjustment	Adjusted 2017 DCE
276	LT-U-CO	Undistributed - Non-Labor	DGC Executive Oversight Committee	0.3	-	0.3	2.9	-	2.9
277	**DGC Executive Oversight Committee Subtotal**			**$ 0.3**	**$ -**	**$ 0.3**	**$ 2.9**	**$ -**	**$ 2.9**
278									
279	SNF-U-2.09	Undistributed - Non-Labor	Emergency Preparedness Fees	1.8	-	1.8	48.3	-	48.3
280	**Emergency Preparedness Fees Subtotal**			**$ 1.8**	**$ -**	**$ 1.8**	**$ 48.3**	**$ -**	**$ 48.3**
281									
282	SNF-U-AM Holtec	Undistributed - Non-Labor	Holtec ISFSI Aging Management	0.1	-	0.1	11.2	-	11.2
283	**Aging Management Subtotal**			**$ 0.1**	**$ -**	**$ 0.1**	**$ 11.2**	**$ -**	**$ 11.2**
284									
285	SR-U-CEQA-RPT	Undistributed - Non-Labor	CEQA Reporting	-	-	-	-	-	-
286	**CEQA Reporting Subtotal**			**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
287									
288	SR-U-3.11	Undistributed - Non-Labor	Severance	-	-	-	121.0	-	121.0
289	**Severance Subtotal**			**$ -**	**$ -**	**$ -**	**$ 121.0**	**$ -**	**$ 121.0**
290									
291	**Undistributed - Non-Labor Subtotal**			**$ 22.1**	**$ -**	**$ 22.1**	**$ 765.2**	**$ -**	**$ 765.2**
292									
293	LT-U-SLA	Service Level Agreement	Service Level Agreements	6.9	-	6.9	76.1	-	76.1
294	SNF-U-SLA	Service Level Agreement	Service Level Agreements	1.5	-	1.5	45.9	-	45.9
295	SR-U-SLA	Service Level Agreement	Service Level Agreements	0.4	-	0.4	46.2	-	46.2
296	**Undistributed - Service Level Agreement Subtotal**			**$ 8.8**	**$ -**	**$ 8.8**	**$ 168.2**	**$ -**	**$ 168.2**
297									
298	**Undistributed Subtotal**			**$ 78.2**	**$ -**	**$ 78.2**	**$ 2,178.2**	**$ -**	**$ 2,178.2**
299									
300	**Total**			**$ 166.3**	**$ -**	**$ 166.3**	[redacted]		
301									
302	**Other DCE Costs**								
303									
304	**Total DCE**						**$ 4,478.6**	**$ -**	**$ 4,478.6**

General Notes:

(A) Totals may not reconcile due to rounding.

(B) Amounts with $0.0 or $(0.0) indicate that costs are included in the category but are $0 when rounded to the nearest hundred thousand. $ - indicates that no costs are included in the category.

(C) The 2017 DCE allocated waste disposal milestones associated with the Decommissioning General Contract to various line items in the DCE. After the DCE was submitted, it was determined that waste disposal costs should be tracked as a separate line item within its own Major Project. Therefore, the waste disposal costs that were previously allocated have been moved to the Waste Disposal line item (LT-D-BUR).

Attachment 11

Status Report for Projected 2021 NDCTP Completed Projects

Status Report for Projected 2021 NDCTP Completed Projects

Major Project	DCE Line Item	Description	Overall Major Project Status
ISFSI - 2021 NDCTP (2018-2020)			
ISFSI	SNF-1-D-7.02	Holtec Long Lead Items and Areva Contract Closure	• The 2017 DCE forecasted the ISFSI project would be completed by June 2019. Fuel Transfer operations restarted on July 15, 2019, following August 2018 loading event. FTO is now expected to be completed in 2020. • By the end of 2019, SCE estimates that 45 of 73 canisters will have been loaded in the ISFSI. • Fabrication of all spent fuel canisters is completed.
ISFSI	SNF-2-D-8.07	ISFSI Pad Study	
ISFSI	SNF-2-D-8.08	Design ISFSI Expansion, Fuel Inspection, and Oversight	
ISFSI	SNF-2-D-8.09	Construct ISFSI Expansion	
ISFSI	SNF-2-D-8.10	Fabrication of Spent Fuel Canisters - Unit 2	
ISFSI	SNF-2-D-8.11	Fabrication of Spent Fuel Canisters - Unit 3	
ISFSI	SNF-2-D-8.12	Load Fuel Canisters and Fuel Transfer Operations - Unit 2	
ISFSI	SNF-2-D-8.13	Load Fuel Canisters and Fuel Transfer Operations - Unit 3	
Initial D&D Activities - 2021 NDCTP (2018-2020)			
Initial D&D Activities	LT-2-D-2.18	Planning & Design For Cold and Dark	• The 2017 DCE estimated Initial D&D Activities would be completed in July 2019. It is now expected to be completed by the end of 2020. The change in the forecast completion date is due to the environmental permitting delay and the receipt of a Coastal Development Permit and is not expected to impact the decommissioning project completion date. • Activities related to Cold and Dark have been completed, which includes all "LT-2-D" DCE line numbers. • DCE line items LT-3-D-3.01 (Prepare Integrated Work Sequence and Schedule for Decommissioning) and LT-3-D-DGC_BUR (Waste Contracts) are completed. • SDS is working on planning and engineering activities related to the Units 2 and 3 containment access modifications, missile shield and reactor head removal.
Initial D&D Activities	LT-2-D-2.19	Implement Cold and Dark (Repower Site)	
Initial D&D Activities	LT-2-D-2.20	Install 12 kV Service Line to Power Temp Power Ring	
Initial D&D Activities	LT-2-D-2.21	Drain & De-Energize Non-Essential Systems (DEC Process)	
Initial D&D Activities	LT-2-D-2.29	Implement Control Room Modifications (Command Center Relocation)	
Initial D&D Activities	LT-3-D-3.10	Modify Containment Access- Unit 2	
Initial D&D Activities	LT-3-D-3.12	Remove and Dispose of Missile Shields - Unit 2	
Initial D&D Activities	LT-3-D-3.13	Remove and Dispose of Reactor Head - Unit 2	
Initial D&D Activities	LT-3-D-3.11	Modify Containment Access- Unit 3	
Initial D&D Activities	LT-3-D-3.14	Remove and Dispose of Missile Shields - Unit 3	
Initial D&D Activities	LT-3-D-3.15	Remove and Dispose of Reactor Head - Unit 3	
Initial D&D Activities	LT-3-D-3.01	Prepare Integrated Work Sequence and Schedule for Decommissioning	
Initial D&D Activities	LT-4-D-4.02	Install GARDIAN System	
Initial D&D Activities	LT-3-D-3.17	Prepare Activity Specifications - U2	
Initial D&D Activities	LT-3-D-DGC_BUR	Waste Contracts	
Phase 2 Regulatory Compliance - 2021 NDCTP (2018-2020)			
Phase 2 Regulatory Compliance	LT-3-D-DCE	2017 DCE Update	• 2017 DCE was completed in March 2018 and submitted to the California Public Utility Commission for review.
Phase 2 Regulatory Compliance	LT-2-D-2.07	Prepare Defueled Safety Analysis Report (DSAR)	• The DSAR was completed and provided to the NRC in late 2016.
CEQA - 2021 NDCTP (2018-2020)			
CEQA	SR-3-D-16.05	Obtain CEQA Permit & Approvals	• Environmental Impact Report was certified by the California State Lands Commission (CSLC) in March 2019. • California Coastal Commission (CCC) issued SCE a Coastal Development Permit (CDP) on October 21, 2019. • SCE and SDS are preparing required mitigation plans to meet the CSLC and CCC conditions. Expected approval in December 2019. • Receipt of the CDP is a critical activity, as it allows the DGC to commence with physical D&D of SONGS.
Cyber Security Modifications - 2021 NDCTP (2018-2020)			
Cyber Security Modifications	SNF-1-D-7.05	Cyber Security Modifications	•Requirements based on 10 C.F.R. § 73.54 •Project is completed and will be reviewed in 2021 NDCTP.
ISFSI Coastal Development Permit Settlement - 2021 NDCTP (2018-2020)			
ISFSI CDP Settlement	SNF-2-D-CDP	ISFSI CDP Settlement	• Expert Team was identified and retained. • Engagement of outside experts to develop SONGS Strategic Plan for Relocation of Spent Fuel to Offsite Storage Facility is underway.
DCE Updates - 2021 NDCTP (2018-2020)			
DCE Updates	LT-D-DCE2	DCE Update	• SCE's next SONGS DCE has not started, and will likely not begin until 2020.

Note: The Unit 1 RV Disposal is also scheduled to be completed in 2020

EXHIBIT 5

No. 19-72670

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

IN RE PUBLIC WATCHDOGS,
Petitioners,
v.
UNITED STATES
NUCLEAR REGULATORY
COMMISSION,
Respondent.

SOUTHERN CALIFORNIA EDISON COMPANY,

Proposed Intervenor

On Petition for Writ of Mandamus to the United States Nuclear Regulatory Commission

SOUTHERN CALIFORNIA EDISON COMPANY'S ANSWER TO EMERGENCY PETITION FOR WRIT OF MANDAMUS (AGENCY ACTION UNREASONABLY DELAYED)

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TABLE OF AUTHORITIES

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Cases

Statutes

Other Authorities

Glossary of Terms

Term	Abbreviation
2015 amendments to Songs Unit 2 Facility Operating License (Amendment No. 230) and SONGS Unit 3 Facility Operating License (Amendment No. 223)	2015 License Amendment
10 CFR 2.206 Petition submitted by Public Watchdogs	2.206 Petition or NRC Petition
Declaration of Douglas R. Bauder	Bauder Decl.
California Coastal Commission	CCC
Coastal Development Permit	CDP
Certificate of Compliance	CoC
Storing spent nuclear fuel in sealed, cylindrical, stainless-steel canisters	Dry Storage
Public Watchdogs' Emergency Petition for Writ of Mandamus	Emergency Petition
Holtec International	Holtec
Holtec International's HI-STORM UMAX Canister Storage System	Holtec System
Independent Spent Fuel Storage Installation	ISFSI
Multi-Purpose Canister	MPC
Nuclear Regulatory Commission	NRC
Facility Operating Licenses for SONGS	Part 50 Licenses
Public Watchdogs v. United States, et al., Case No. 17-cv-2323-JLS (BGS) filed November 15, 2017	Public Watchdogs I
Public Watchdogs v. Southern California Edison Company et al., 19-cv-1635-JLS (MSB) filed August 29, 2019	Public Watchdogs II
Public Watchdogs	Petitioner
Southern California Edison	SCE
Nuclear Waste Technical Review Board Report entitled "Preparing for	September 2019 Report

Term	Abbreviation
Nuclear Waste Transportation: Technical Issues that Need to Be Addressed in Preparing for a Nationwide Effort to Transport Spent Nuclear Fuel and High-Level Radioactive Waste"	
San Onofre Nuclear Generating Station	SONGS
Storing spent nuclear fuel in pools of water	Wet Storage

INTRODUCTION

Petitioner Public Watchdogs requests an "emergency" writ of mandamus from this Court directing the NRC to issue an order requiring SCE to "immediately suspend decommissioning operations" at SONGS. Petitioner suggests that a "recalcitrant" NRC has somehow "filibustered" by failing to act on an administrative petition filed by Petitioner on September 24, 2019. With ongoing oversight by the NRC, SCE has been utilizing an onsite dry storage facility for spent nuclear fuel at SONGS since 2004, and it is currently transferring spent nuclear fuel from wet storage into an NRC-approved dry storage system. An injunction will cause SCE (and its ratepayers) to incur millions of dollars per month in costs certain to be suffered if the decommissioning of the nuclear plant is delayed.[1] Moreover, as the federal agency specially mandated for reviewing and approving nuclear-related issues, the NRC is uniquely and appropriately situated to determine the proper means and methods for storing spent nuclear fuel at commercial nuclear reactors within its jurisdiction, and Petitioner has offered no proof that the NRC's administrative actions have been (or will be) arbitrary or capricious. In short, Petitioner has offered no legal or factual justification for the mandamus petition it seeks.

The petition at bar is a thinly disguised request ***for an injunction*** to enjoin the transfer of spent fuel and the demolition of SONGS notwithstanding the NRC's highly

[1] Because it will suffer material financial harm if an injunction is issued, SCE has a significant stake in the outcome of the petition at bar.

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specialized review and oversight of nuclear related activities at SONGS. Because injunctive relief is an extraordinary remedy, Petitioner must show: (a) it is "indisputably clear" that it is entitled to the relief it seeks (an order compelling the NRC to immediately enjoin the transfer of nuclear fuel at SONGS and to adopt a different plan for storing nuclear fuel other than that approved by the NRC), and (b) that an injunction is "necessary or appropriate in aid" of this Court's jurisdiction. For a number of reasons, the petition fails this standard and should be denied.

First, Petitioner cannot show that the NRC has "delayed unreasonably" in acting on the administrative petition presently before the NRC. As such, Petitioner is not entitled to the relief it seeks.[2]

Second, Petitioner has failed to show that it is entitled to the relief it seeks from the NRC—much less that it is "indisputably clear." Petitioner has made no showing of a right to challenge the NRC's decisions in enforcement actions pertaining to the transfer of spent nuclear fuel. Because enforcement action by the NRC is discretionary, the NRC's enforcement decisions are generally unreviewable.

Third, even if the NRC's enforcement decisions regarding SONGS' spent fuel transfer operations were reviewable at this time (which they are not), Petitioner's right

[2] The 36-page Petition violates Circuit Rule 21-1(c) (30-page limit on mandamus petitions). Petitioner's failure to articulate and address the appropriate standard for the relief it seeks in the Petition, as well as its refusal to conform to formatting rules, warrants dismissal of this Petition. *N/S Corp. v. Liberty Mut. Ins. Co.*, 127 F.3d 1145, 1146 (9th Cir. 1997).

to relief is not "indisputably clear" because the NRC Petition is untimely. Petitioner filed its NRC petition challenging the 2015 License Amendment and the Holtec System on September 24, 2019—four years after the NRC granted a 2015 License Amendment that relates (in part) to the storage of spent fuel at SONGS, and more than two years after the NRC certified the Holtec System in January of 2017 (codified by NRC regulations after publication in the Federal Register). Under 28 U.S.C § 2344, Petitioner had 60 days from the date of issuance of the 2015 License Amendment and the Holtec System CoCs, respectively, to bring a challenge before this Court. It did not. As discussed below at pages 8-22, the NRC has, with due diligence, been exercising its regulatory authority over the dry storage of spent fuel at SONGS for more than a decade. The NRC's regular, active, and extensive oversight of the storage of spent fuel at SONGS, and its lengthy review and approval of the storage systems used at SONGS, demonstrates that the NRC has been neither arbitrary nor capricious. Content to sit on its hands for years without a whisper of complaint to the NRC, Petitioner now rushes into this Court seeking emergency relief because the NRC has not yet issued a decision on the administrative petition filed on *September 24, 2019*.

Finally, Petitioner cannot demonstrate its "indisputable" right to relief because the NRC's determination of nuclear safety issues is owed unique and substantial deference. The NRC has reviewed and evaluated all the issues raised here by Petitioner. The NRC has: 1) investigated the safety of the geographic location of

SONGS (*infra* 8-9); 2) evaluated and certified the Holtec System for dry storage of spent fuel at nuclear plant sites in the United States (such as SONGS) (*infra* 12-18); 3) investigated and evaluated the August 2018 incident and SCE's corrective actions (*infra* 20-21); 4) evaluated the safety of the canisters with the shim pin design Petitioner challenges (*infra* 21-22); and 5) evaluated the safety of purportedly scratched canisters (*infra* 22). There is no basis for the extraordinary relief.[3]

JURISDICTION AND VENUE

Although SCE contends that Petitioner is not entitled to the relief it seeks, SCE does not contest that this Court has jurisdiction to consider whether the NRC has unreasonably delayed in acting on the September 24, 2019 administrative petition, and jurisdiction to determine whether an injunction should be issued to preserve the status quo in aid of the Court's jurisdiction.[4] SCE also does not contest that venue is proper.

STANDING

Although SCE contends that Petitioner lacks standing to seek any relief against SCE because Petitioner has suffered no particularized injury or harm, SCE does not contest Petitioner's standing to bring its Emergency Petition.

ISSUE PRESENTED

Whether it is "indisputably clear" that Petitioner is entitled to an order from the

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[3] Finally, an immediate injunction is not necessary; the wet pools in Units 2 and 3 will remain operative at least through Summer 2020.

[4] *FTC v. Dean Foods Co.*, 384 U.S. 597, 604 (1966); *Confederated Tribes v. Bonneville Power Admin.*, 342 F.3d 924, 930 (9th Cir. 2003).

NRC halting all decommissioning activities at SONGS such that this Court should issue an injunction notwithstanding that (1) the NRC has and continues to exercise timely and effective oversight of the storage of spent nuclear fuel at SONGS, and (2) SCE and its ratepayers will incur millions of dollars in expenses each month that its transfer of spent fuel from wet storage into dry storage is delayed?

LEGAL STANDARD

"The writ of mandamus is a drastic and extraordinary remedy reserved for really extraordinary causes." *United States v. United States Dist. Court*, 884 F.3d 830, 834 (9th Cir. 2018) (citation omitted). "[O]nly exceptional circumstances…will justify the invocation of this extraordinary remedy." *Id.* (citations omitted). Injunctive relief under the All Writs Act is to be issued "sparingly and only in the most critical and exigent circumstances." *Brown v. Gilmore*, 533 U.S. 1301, 1303 (2001) (Rehnquist, W., in chambers) (citation omitted). "Under the All Writs Act, a court may issue an injunction only where it is 'necessary or appropriate in aid' of the court's jurisdiction, 28 U.S.C. § 1651(a), and 'the legal rights at issue are indisputably clear.'" *Makekau v. Hawaii*, 2019 U.S. App. LEXIS 35363, at *9 (__F.3d __) (9th Cir. Nov. 26, 2019) (citation omitted).

RELEVANT PROCEDURAL BACKGROUND

Petitioner's concocted "emergency" ignores the procedural history of this dispute. Petitioner failed to file an administrative petition with the NRC challenging

the NRC's actions until September 24, 2019. Petitioner filed its untimely NRC Petition approximately five years after SCE submitted the Post-Shutdown Decommissioning Activities Report ("PSDAR") to the NRC (Emergency Petition at 8); four years after the NRC granted a 2015 License Amendment that, according to Petitioner, permits SCE to store spent fuel at SONGS (*id*. at 17); two years after Petitioner initiated a lawsuit in the Southern District of California seeking to halt the transfer and storage of spent fuel at SONGS ("*Public Watchdogs I*"); and more than 18 months after the most recent spent fuel transfers began on February 2018.[5] Petitioner also failed to exhaust its administrative remedies before the NRC in a timely manner, and waited to take any action whatsoever until dozens of canisters had already been safely secured in an onsite ISFSI[6] under NRC oversight.

A. <u>Petitioner Files Its First Unsuccessful Lawsuit in 2017.</u>

Petitioner initiated *Public Watchdogs I* in November 2017 naming the NRC, SCE and others as defendants. *Public Watchdogs I* at Dkt. 1. In that case, Petitioner alleged that dry storage of spent fuel at SONGS threatens a nuclear disaster. *See e.g., id*. at 16. In its first lawsuit, Petitioner challenged the NRC's licensing, oversight and

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[5] SCE has safely stored spent fuel at SONGS since 2004 in accordance with NRC regulations. With the NRC's ongoing oversight, SCE continues to move spent nuclear fuel from wet storage pools into dry storage canisters certified by the NRC. Bauder Decl. at ¶67.

[6] The NRC defines an ISFSI as "[a] complex designed and constructed for the interim storage of spent nuclear fuel; solid, reactor-related, greater than Class C waste; and other associated radioactive materials." https://www.nrc.gov/reading-rm/basic-ref/glossary/independent-spent-fuel-storage-installation-isfsi.html

enforcement of nuclear storage at SONGS, and the NRC's certification and safety of the Holtec System. *Public Watchdogs I* at Dkt. 25 at 6, 8. In response to motions to dismiss, the District Court dismissed Petitioner's complaint for lack of standing (with leave to amend). *Public Watchdogs I* at Dkt. 24. Petitioner filed an amended complaint on September 28, 2018, and defendants again moved to dismiss. *Public Watchdogs I* at Dkts. 25, 34, 35. Before the District Court ruled on the motions to dismiss, Petitioner dismissed its amended complaint. Dkt. 50.

B. Petitioner Files Its Second Unsuccessful Lawsuit In 2019.

On August 29, 2019, Petitioner filed a second lawsuit ("*Public Watchdogs II*"). In *Public Watchdogs II,* Petitioner again challenged the same SCE actions and NRC decisions complained of in the first lawsuit. *Public Watchdogs II* at Dkt. 38 (First Amended Complaint). In *Public Watchdogs* II, Petitioner moved for a preliminary injunction suspending the decommissioning of SONGS Units 2 and 3, and the transfer of the spent fuel from wet storage into dry storage. *Ibid*. The defendants (including SCE) opposed Petitioner's motion for injunctive relief, and also moved to dismiss Petitioner's amended complaint. *Public Watchdogs II* at Dkts. 36, 37, 41, 42, 47. On December 3, 2019, the Court dismissed the amended complaint (with prejudice) and denied Petitioner's motion for preliminary injunction. *Public Watchdogs II* at Dkt. 60.

C. Petitioner Files a 2.206 Petition with the NRC on September 24, 2019

On September 24, 2019 (the same day it filed its amended complaint in *Public*

Watchdogs II) Petitioner filed a 2.206 Petition with the NRC, again challenging the Holtec System and the 2015 License Amendment. Emergency Petition at Add. 6-8. On October 21, while the motions to dismiss in *Public Watchdogs II* were still pending, Petitioner filed the emergency petition at bar which challenges (again) the Holtec System and the 2015 License Amendment.

THE RELEVANT FACTS

A. <u>The Decommissioning of SONGS Requires the Transfer of Spent Fuel Into Dry Storage.</u>

SONGS is a nuclear power plant in the process of "decommissioning." Bauder Decl. at ¶¶ 17-18.[7] Originally, three nuclear power reactors (known as Units 1, 2 and 3) were constructed and operated at SONGS pursuant to Construction Permits and Operating Licenses issued by the NRC in accordance with 10 C.F.R. Part 50. *Id*. at ¶¶ 12-16. Each Unit had a Part 50 License granted by the NRC which authorized SCE to operate each Unit and to possess and store nuclear materials, including spent fuel, in accordance with NRC regulations. *Ibid*. The lengthy application process for the Part 50 Licenses (and amendments thereto) includes safety reviews and environmental

[7] Because the Emergency Petition relates to an administrative proceeding pending before the NRC, and because the NRC has not ruled in that matter, Petitioner offers very little in the way of an administrative record. SCE submits Mr. Bauder's declaration as an exhibit to fill in the gaps in the record. Federal Ninth Circuit Civil Appellate Practice ¶ 13:279 (Rutter Group 2019) ("[R]elevant evidence outside the district court record may be presented by means of declarations included as Exhibits."); *id*. at ¶ 13:309 ("if other documents will help the court understand the case, real parties should include them as exhibits to the answer.").

reviews by the NRC. *Id*. at ¶¶ 13, 19-21. In connection with the Part 50 License applications, the NRC evaluated (among other things) the characteristics of the SONGS site, including surrounding population, seismology, meteorology, geology, and hydrology. *Ibid*. The NRC concluded, after its review, that spent fuel can be safely transferred from the wet pools and safely dry-stored stored onsite. *Id*. at ¶ 13-15, 19-21, 31.

(1) <u>Spent Fuel Has Been Safely Dry Stored at SONGS for More than a Decade.</u>

SONGS Unit 1 was permanently shut down in 1992. Spent fuel[8], once removed from the Unit 1 reactor after being used to generate electricity, was first stored in spent fuel pools (referred to as "wet storage"). *Id*. at ¶ 17. The pools provide radiation shielding and cooling.[9] *Id*. at ¶ 32. Because the pools are a part of the Unit 1 buildings, the spent fuel stored in the Unit 1 pool had to be removed before Unit 1 could be demolished. *Id*. at ¶ 17. The Unit 1 fuel was transferred to an ISFSI beginning in 2004 where it is "dry stored" ("Dry storage" involves storing spent fuel in sealed, cylindrical,

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[8] By way of background, spent nuclear fuel in commercial reactors like those at SONGS is made up of solid, cylindrical pellets of uranium dioxide (slightly larger than the eraser on a No. 2 pencil). Bauder Decl. at ¶ 30. The nuclear fuel pellets are stacked inside of sealed hollow metal tubes, several feet long and the tubes are bound together, forming fuel assemblies. *Ibid*.

[9] The original NRC evaluation of the SONGS site is significant because of the characteristics of the "wet storage" Petitioner apparently prefers (Emergency Petition at 36). Although wet storage is a safe means of storing spent fuel, the dry storage systems used at SONGS offer even more robust protection against extreme environmental events (such as earthquakes). Bauder Decl. at¶¶ 45-46.

stainless-steel canisters that are stored in the concrete and steel ISFSI structure—where air, not water, provides the cooling, and the concrete and steel provide the radiation shielding.) *Id*. at ¶¶ 17, 26, 34.

As such, for more than a decade SCE has safely dry-stored spent fuel at SONGS in an NRC approved ISFSI. *Id*. at ¶ 26. The California Coastal Commission, which regulates the safety of the non-radiological aspects of the decommissioning project such as the physical construction of the ISFSI and the demolition of SONGS, first approved the physical construction of the SONGS ISFSI in February 2000. *Ibid*. Subject to NRC regulations, in 2004 SCE transferred Unit 1 spent fuel into the onsite ISFSI. *Ibid*. In 2007, SCE began dry storing in the ISFSI the spent fuel from Units 2 and 3. *Id*. at ¶ 27. As confirmed via regular monitoring, the radiation emitted from the ISFSI is very low and detectable only by very sensitive radiation-detection instruments. *Id*. at ¶ 29. There has never been a release of radioactive materials in excess of federal regulatory limits from the SONGS ISFSI or any other ISFSI at other plant sites. *Ibid*.

(2) <u>Petitioner Unreasonably Delayed in Filing its NRC Petition.</u>

Petitioner can offer no reasonable justification for its delays in challenging the NRC's approval of the 2015 License Amendments, or the Holtec System CoCs. Power generation at SONGS Units 2 and 3 ceased in 2012. *Id*. at ¶¶ 21-22, 38-40. On July 17, 2015, the NRC issued the 2015 License Amendment that included site specific

safety evaluations by the NRC. *Id*. at ¶¶19-22; Emergency Petition at Add. 277-357. After completing its review of SCE's 2015 license amendment application and its safety evaluation, the NRC concluded that all regulatory requirements had been met.[10] *Ibid*. Petitioner's claim that there was no "meaningful public participation" in the 2015 License Amendments review (Emergency Petition at 17) is not accurate. The amendment review process that resulted in the 2015 License Amendments was open to public comment and intervention pursuant to 10 C.F.R. § 50.91 and 10 C.F.R. § 2.309. Petitioner did not comment, intervene or otherwise participate in the administrative amendment review process. *Id*. at ¶22.

(3) <u>Unit 2 and 3 Wet Pools will be Operable through Summer 2020.</u>

Petitioner claims that if this Court does not act instantly, SCE will immediately demolish the wet pools used to store spent fuel onsite thereby preventing SCE from moving the spent fuel from dry storage back into the wet pools. Emergency Petition at 3, 16. Petitioner is simply wrong. The pools will be retired only after they are emptied of spent fuel, which will not likely occur until summer 2020.[11] Only after

[10] In October 2015, the Coastal Commission approved construction that expanded the ISFSI to provide space so that spent fuel from Units 2 and 3 could be stored in the Holtec System. Bauder Decl. at ¶¶ 28, 48. The Commission's evaluation considered the effects of groundwater and seawater. *Ibid*.

[11] On October 17, 2019 the California Coastal Commission issued a Coastal Development Permit (dated October 21) in response to SCE's application for the "demolition" Coastal Development Permit, filed in February 2019, supported by a Final Environmental Impact Report. *Id* at 24 (Exhibits 6 and 7). The current projection is that Unit 2 and 3 spent fuel pools will have the last fuel assemblies

being retired can the pools then be demolished. Bauder Decl. at ¶¶ 33, 35, 42. Consequently, the NRC has several months to provide a reasoned response to the NRC Petition before the pools will be inoperable. If the petition at bar is granted, the decommissioning will be delayed without justification, and the spent fuel will be thrust in limbo (40-plus Unit 2 and 3 canisters will remain in the ISFSI and the remaining spent fuel will be left in the wet pools). The delay would also cost a minimum of $3,000,000 per month, and this cost would be borne by SCE's ratepayers (customers). *Id*. at ¶¶76-78.

B. <u>The NRC Comprehensively Regulates Storage Of Spent Nuclear Fuel at SONGS.</u>

The NRC has comprehensive authority over all things nuclear, including the safe storage of spent nuclear fuel in spent fuel pools, and the transfer of that fuel into dry storage canisters that are held in an onsite ISFSI.[12] The NRC extensively reviews and regulates the storage of spent nuclear fuel. Bauder Decl. at ¶ 10; 10 C.F.R. Parts 50 and 72 *et seq*. The NRC has exclusive authority to license the spent fuel dry storage technology, and to regulate where and how that technology is used at reactor sites, including the loading, storage and maintenance of spent fuel storage systems. *Id*. at ¶¶ 11, 37, 43-47, 49. Specifically, the NRC regulates and licenses dry canister storage

removed in July or August 2020. *Ibid*.

[12] *See*, *e.g.* Bauder Decl. at ¶¶ 9-13, 19-22, 36-38, 43-47; *see also* Atomic Energy Act §§ 101-103, 161, 182, 186, 42 U.S.C. §§ 2131-2133, 2201, 2232, 2236.

systems, including the Holtec System used at SONGS, by issuing CoCs under 10 CFR Part 72. *Id.* at ¶¶ 37, 43. Pursuant to the NRC's Part 72 certification process, before it issues a CoC, the NRC conducts a detailed review and analysis of the safety and operational characteristics of the canister system, including design analysis for structural, thermal, radiation shielding, nuclear criticality, material content confinement, and accident conditions. *See Id.* at ¶ 36*;* 10 C.F.R. § 72.236 (listing licensing requirements for storage of spent fuel.). Before a dry canister technology can be used to store spent fuel, it must receive a CoC from the NRC, which is only granted to technology that meets NRC's requirements (or the site must obtain a site-specific license, also from the NRC).[13] 10 C.F.R. § 72.214 (listing approved spent fuel storage systems); 10 C.F.R. § 72.236 (listing licensing requirements for storage of spent fuel.); Bauder Decl. at ¶ 37. Nuclear power reactor licensees are authorized by the NRC to

[13] By NRC regulation, storage canisters must among other things: (1) shield people and the environment from radiation; (2) allow for the retrieval of the spent fuel, if necessary for later transfer to a different storage facility; and (3) resist natural threats such as earthquakes, tornadoes, floods, and temperature extremes. Safety of Spent Fuel Storage" NUREG/BR-052, dated April 2017, at 1-2, available at https://www.nrc.gov/docs/ML1710/ML17108A306.pdf. In reviewing applications for CoCs, the NRC conducts technical evaluations in several areas, including: (1) canister materials (for example, the materials must meet durability requirements regarding the rate of degradation over time); (2) the structural design in order to confirm the canisters will be durable and stable enough to perform safety functions under normal conditions and during accidents, natural events, and other abnormal conditions; (3) confinement (e.g., design must prevent release of radioactive material and keep fuel in a stable protected environment); and (4) radiation shielding (e.g., designs must meet regulatory limits on radiation doses at site boundaries under both normal and accident conditions). *See id.* at 4-11. The NRC will approve only those systems that meet its requirements and can perform safely. *Id.* at 3.

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store spent fuel onsite in dry storage systems certified by the NRC via a CoC. *See* 10 C.F.R. § 72.210 and §72.212 (holding that Part 50 licensees must "[e]nsure that each cask used by the general licensee conforms to the terms, conditions, and specifications of a CoC or an amended CoC listed in § 72.214.").

As part of this oversight and regulation, NRC inspectors conduct routine and responsive inspections at SONGS (often unannounced), including the oversight and inspection of the loading, transfer and storage of spent fuel. Bauder Decl. at ¶11. The NRC has the sole authority to take enforcement action to determine whether SCE personnel and contractors are complying with NRC regulations, including radiation-safety requirements, licensing requirements, and quality assurance programs. *Ibid.*

(1) <u>Advantages of the Multi-Purpose Canister Dry Storage Systems Licensed By The NRC.</u>

Despite Petitioner's unsupported claims of the purported advantages of wet storage of spent fuel, dry storage has certain advantages over wet storage (indeed, there have been congressional efforts to require rapid transition of spent fuel from wet to dry storage). Bauder Decl. at ¶34. Wet storage pools require infrastructure support, connection to a power grid to provide electrical cooling and continued water pressure, and extensive operational and security personnel oversight. *Id.* at ¶¶ 33, 45. Dry storage is more passive, requires less oversight and does not need the same infrastructure support. *Id.* at ¶¶ 34, 45. Dry storage of spent fuel in ISFSIs offers additional protection such as being able to withstand higher seismic activity and

providing greater security against "hostile acts." *Ibid.*

The U.S. Department of Energy has guided the nuclear industry toward MPC technology as the standard. *Id*. at ¶ 41. It found MPC technology to be "most suitable" amongst the design concepts that it considered. *Ibid.* The clear majority of the approximately 3,000 dry storage canisters used at ISFSIs in the United States are Transnuclear ("TN") or Holtec designed MPCs, including the MPCs used at SONGS. *Ibid*.

Another key advantage of the MPC design is that it alleviates the need to re-handle spent fuel beyond the initial canister loading from the reactor's spent fuel pool; spent fuel can be transported inside the sealed canister. *Id*. at ¶¶ 34, 41, 52-53. MPCs (such as the Holtec MPCs that Petitioner challenges in this case) can be removed from an ISFSI and placed directly into a transportation cask, for transportation to a different site. *Ibid*. During transport the sealed MPC is never opened; it is instead placed in another container, giving multiple levels of protection and minimizing potential for adverse impacts. *Id*. at ¶¶ 52-53.

(2) <u>The NRC Licensed Holtec System.</u>

a) The Holtec System has Features Which Make it More Robust than Wet Pools for Storing Spent Fuel at SONGS.

Petitioner's assertion that SCE selected the Holtec System without "adequately considering the grave risks or reasonable alternatives" is inaccurate. Emergency Petition at 36. SCE specifically selected the Holtec System to store Unit 2 and 3 spent

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fuel because it has advantages that are appropriate for the physical and environmental characteristics at SONGS.[14] *Id.* at ¶¶ 34-36, 45-46. Although wet storage is safe, the Holtec System overall offers more robust protection. The Holtec System has capabilities that exceed minimum standards required by the NRC, and, in comparison to wet pools, has features that provide greater protection in the event of extreme events such as earthquakes--the "MSE" in the "HI-STORM UMAX Version MSE" system used at SONGS means "most severe earthquake." *Ibid.*

In sum, the Holtec System used at SONGS was designed to maintain the long-term integrity of the multi-purpose canisters with consideration for the conditions present at SONGS—including the marine environment, tsunami risk, seismic risk, and other potential site-specific conditions. *Id*. at ¶ 46. The NRC diligently reviewed the Holtec System before licensing it for dry storage of spent fuel. Petitioner's unsupported assertion that the Holtec system "is not properly intended to serve their intended purposes" (Emergency Petition at 2) is unsupported by any evidence, and is just flat wrong. The Holtec System received CoCs from the NRC that are codified and

[14] Petitioner's characterization of the Holtec System as "thin-walled" (Emergency Petition at 12) betrays a misunderstanding of the technical details of the System. The Holtec System provides multiple robust levels of protection. In the Holtec System, spent fuel is stored in a honeycomb array of sub-compartments that comprise a fuel basket, within the cylindrical multi-purpose canister, closed with a welded round top lid. Bauder Decl. at ¶44. The loaded Holtec canisters are then transported and stored in a vertical position, in underground metal vaults that are arranged in an engineered, reinforced-concrete monolith. *Ibid*. The vaults are sealed at the bottom to prevent ingress of any groundwater in the MPC storage cavity from the surrounding subgrade. *Ibid*.

is expressly authorized to be used for spent fuel storage at 10 C.F.R. § 72.214. *Id*. at ¶¶ 36, 37, 43. The CoCs were issued concurrently with a related Final Safety Analysis Report authored by the NRC which "certif[ied] that the [Holtec System's] storage design…meets the applicable safety standards set forth in 10 C.F.R. Part 72.") *Id*. at ¶ 46, Exhibit 15 at 1.

b) The Holtec Canisters Have a Minimum Design Life of 60 Years.

Contrary to Petitioner's claims that the Holtec System is not suited for its intended purpose, the Holtec canisters have a minimum design life of 60 years. *Id*. at ¶ 49. Here, Holtec obtained a CoC for 20 years. *Ibid.* After 20 years, the CoC may be renewed by the NRC in increments of up to 40-years-per-renewal under 10 C.F.R. § 72.240. *Ibid.* Requests for renewal must include a description of an ISFSI aging management program, which must be implemented at SONGS. *Ibid.* The renewal process maintains the NRC's regulatory control throughout the duration of the storage of the spent fuel in the Holtec System. The renewal process also makes sense from a safety perspective as in-the-field data gathered during the first 20-year period is required to be used to inform the application for renewal and the aging management program. *Ibid*; 10 C.F.R. § 72.240(c).

c) The Spent Fuel Can Be Retrieved from the ISFSI.

Contrary to Petitioner's assertion, the Holtec canisters are not "buried." Emergency Petition at ¶ 2. The canisters rest in the vaults and may be removed using

a crane similar to that used to place the canisters in the vaults. Bauder Decl. at ¶¶ 48, 50-53. Demonstration of the ability to remove the canisters via this method was required as part of the CoC approval of the Holtec technology. *Id*. at ¶51. Consistent with the discussion of MPCs above, the canisters can be removed and placed into a transportation container which can then be moved offsite.[15] *Id*. at ¶52.

d) Moving Spent Fuel into MPCs and into Dry Storage is the First Step in Moving the Spent Fuel Offsite.

Because of SCE's efforts, and the approvals of the NRC, SCE is now in an excellent position to transport spent fuel from SONGS to an off-site storage facility once space becomes available. As the September 2019 Nuclear Waste Technical Review Board Report (Emergency Petition at 13)[16] states:

> For a small portion of the existing packaged waste (e.g., certain commercial SNF in NRC-approved, dual-purpose [storage and transportation] canisters), few technical issues remain unresolved. For example, barring unforeseen problems, certain types of commercial spent fuel likely could be shipped within a year or two of resolving institutional issues, such as determining a destination and obtaining funding. (September 2019 Report at Executive Summary xxvii.)

[15] The transportation container is Holtec's HI-STAR 190 Transportation Cask, which is also licensed by the NRC per 10 C.F.R. Part 71. *Id*. at ¶47.

[16] Petitioner mischaracterizes the September 19 Report when it argues that SONGS canisters will not be ready to be moved until 2100. The cited portion of the September 2019 Report addresses the removal of <u>all</u> SNF from <u>all</u> nuclear power plants in the U.S generally. The Report makes no specific reference to SONGS, the spent fuel stored there, or the Holtec System in issue in this action. September 2019 Report at 77.

Regarding the canisters at SONGS (and 14 other shutdown commercial nuclear sites), the Report notes that the canisters will be ready for transportation as soon as the DOE is ready for them:

> [A]t the 15 commercial nuclear sites considered to be shutdown sites as of April 2019, all dry-storage canister types in use are welded canister types that are approved by the NRC for both storage and transportation…these canisters could be ready to be transported by DOE early when the national transportation campaign begins.

Id. at 73. Every canister at SONGS should qualify for offsite transport by the end of 2030. Bauder Decl. at ¶ 54.[17]

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[17] SCE has been working diligently at finding an offsite location to accept the spent fuel once it is ready to be shipped. SCE has retained an "Experts Team" of consultants, including a former Chairman of the NRC, a former director of the U.S. Department of Energy's Office of Policy, participants in the President's Blue Ribbon Commission on America's Nuclear Future, and other experts including the consultants North Wind, Inc. and Dr. Ernest J. Moniz (former U.S. Secretary of Energy) to develop a strategic plan to explore alternatives to relocate SONGS spent fuel to a licensed off-site storage or disposal facility. Bauder Decl. at ¶ 56. Further, Petitioner's contention that SCE has "engaged in a sustained campaign of obfuscation and secrecy" is wrong (Mandamus at 36). SCE has committed itself to full transparency to the public during. *Id.* at ¶ 57. This policy of full transparency includes community outreach, and regular meetings that are open to the public where the public's issues and concerns are addressed by knowledgeable SCE representatives and expert third-party guest speakers. *Ibid.*This policy of full transparency includes SCE posting regular reports regarding 1) the status of the fuel transfer from wet to dry storage; and 2) the status of efforts to explore relocating SONGS spent fuel to a licensed off-site facility—both reports can be found at https://www.songscommunity.com/used-nuclear-fuel/used-fuel-reports. *Ibid.*

(3) <u>Continuing NRC Oversight at SONGS.</u>

a) Extensive NRC Review of the August 2018 Event

Petitioner grossly mischaracterizes an August 2018 event at SONGS (Emergency Petition at 24) despite the fact that the NRC fully reviewed that event. On August 3, 2018, a Holtec MPC became misaligned while being lowered into its storage position in the storage vault within the ISFSI, coming to rest on a shield ring. *Id*. at ¶ 58. Onsite personnel realigned the canister and safely lowered it to its intended position at the bottom of the storage vault in less than an hour of the initial misalignment. *Id*. at ¶ 59. The event did not result in a release of radioactive materials, did not result in a canister drop, and did not cause any damage to the MPC, the vault or the ISFSI. *Id*. at ¶ 60. NRC analysis concluded that even if the canister had dropped (it did not), there was no danger of radioactive materials escaping. *Id*. at ¶ 61. SCE discussed the event with the NRC the next business day, suspended the transfer of spent fuel until the NRC was satisfied that the causes of the event were addressed, and under the NRC's regulatory oversight, numerous corrective actions (new training, better equipment in the form of new cameras, monitors, safety shackles, sensors and alarms) were implemented. *Id*. at ¶¶62-65. Ultimately, the NRC found in its July 9, 2019 Report that "**<u>licensee's evaluations and corrective actions taken in the areas of licensee oversight, procedures, training, equipment, corrective action program, and reportability were appropriate to prevent recurrence</u>**." *Id*. ¶65 Exhibit 24 at 3. (emphasis added). Transfers only resumed in the aftermath once the "**<u>NRC [was]</u>**

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satisfied with the corrective actions taken in response to the August 3, 2018, event and ha[d] no objection to the resumption of fuel transfer operations." *Id*. at ¶ 66 Exhibit 26. (emphasis added).

The NRC has made a number of announced and unannounced inspections since the resumption of spent fuel transfers. *Id*. at ¶68. On November 22, 2019, the NRC released a follow up report documenting its finding arising from "unannounced inspections of the dry cask storage activities" held from July to September 2019. *Id*. at Exhibit 27 at Executive Summary 1. The NRC "observed and confirmed that [SCE] completed all required corrective actions from [SCE's] causal evaluations to return to fuel loading operations" and "**NRC inspectors verified that the corrective actions implemented were effective to ensure the safe transfer of spent fuel to the site's ISFSI**." *Ibid*. (emphasis added)

b) The Shim Pin "Issue" does not Support the Writ.

Petitioner's writ is based in part, on an allegation that certain Holtec canisters use a defective "shim pin" design. Emergency Petition at 18. Petitioner conspicuously fails to mention that there are only four loaded MPCs in the SONGS ISFSI with shims supported by shim standoff pins (the first four canisters loaded into the ISFSI). Bauder Decl. at ¶ 69. No other canisters loaded or scheduled to be loaded into the ISFSI have this shim pin design. *Ibid*.

Further, the NRC is aware that four of the canisters in the ISFSI have this shim

pin design. Applying its expertise and discretion, the NRC decided that no further action by SCE was required and that the four canisters could safely remain in storage. The NRC reviewed the issue and concluded after a comprehensive analysis that for the four loaded canisters with that design "all predicted results would remain below the described limits in the final safety analysis report with acceptable margin" and concluded "loaded MPCs would continue to be in a safe condition during the entire licensed period of storage." *Id*. at ¶72, Exhibit 28. at 2; *see also id*. at ¶¶ 70-71. The NRC's independent assessment into these canisters found that "the previously loaded casks do not present a threat to public health and safety." *Id*. at 73, Exhibit. 29 at 1.

c) Investigation of "Scratches."

The NRC (and SCE, along with an independent expert that it hired) have investigated the "scratches" referenced by Petitioners on the exterior of some Holtec canisters. *Id*. at ¶¶ 74-75. The NRC concluded that the scratches do not adversely compromise or affect the structural integrity of the MPCs. *Ibid*. SCE's investigation, which the NRC affirmed, concluded the deepest scratch that could be imparted on a canister if subject to scratching in the same location on the canister during both insertion and then a subsequent withdrawal of the canister and co-located with pre-existing manufacturing artifacts, with a 95 percent probability and 95 percent confidence, was 0.0584 inches, which is below the American Society of Mechanical Engineers ("ASME") Code's limit of 10 percent (0.0625 inches). *Id*. at ¶74.

LEGAL ARGUMENT

A. <u>Petitioner Cannot Meet its Burden to Obtain Injunctive Relief.</u>

Petitioner's writ of mandamus contains several mischaracterizations and constitutes a thinly-guised request for a writ of injunction under the All Writs Act 28 U.S.C. § 1651(a). Although styled as a writ for administrative mandamus, Petitioners writ does not ask this Court to direct the NRC to issue a final order by a certain date.[18] Instead, Petitioner requests that this Court "compel[] a recalcitrant…NRC to immediately suspend decommissioning operations at San Onofre Nuclear Generating Station" in order to preserve the status quo.[19] *See, e.g.* Emergency Petition at 1, 3-4. Consequently, the "TRAC" factors discussed by Petitioner (Emergency Petition at 30-36) are irrelevant as the relief Petitioner seeks has nothing to do with compelling a final order from the NRC. *See e.g. Ry. Labor Executives' Assoc. v. U.S. R. Ret. Bd.*, 842 F.2d 466, 475 (1988) (Finding the TRAC factors "inapposite" because "the Association does not seek to compel agency action unreasonably withheld; rather, it is seeking to modify final action already taken by the Board[.]") (Even if they were

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[18] *Telecomm. Research & Action Ctr. v. Fed. Communications Comm'n*, 750 F.2d 70 (D.C. Cir. 1984), *In re Pesticide Action Network*, 798 F.3d at 813 (9th Cir. 2015), *Pub. Citizen Health Research Grp. v. Auchter*, 702 F.2d 1150, 1154 (D.C. Cir. 1983), *Envtl. Def. Fund, Inc. v. Hardin*, 428 F.2d 1093, 1099 (D.C. Cir. 1970), *Pub. Citizen Health Research Grp. v. Comm'r, Food & Drug Admin.*, 740 F.2d 21, 34 (D.C. Cir. 1984), *In re California Power Exch. Corp.*, 245 F.3d 1110 (9th Cir. 2001), *In re A Community Voice*, 878 F.3d 779 (9th Cir. 2017).

[19] In effect, the petition seeks to nullify the California Coastal Commission's permit to demolish the wet storage pools (the demolition will be halted for as long as the fuel remains in the wet pools).

considered, Petitioner cannot show **any** unreasonable delay in the NRC not yet issuing a final order on Petitioner's flagrantly tardy (*supra* 5-8, 10-11)—and likely time-bared—(*infra* 27-28) petition; especially as the wet storage pools will remain operable until summer 2020 (*supra* 11). *California Power Exch. Corp*., 245 F.3d 1110, 1125 (9th Cir. 2001) ("cases in which courts have afforded relief have involved **delays of years, not months**.") (emphasis added))[20]

Instead, the proper vehicle to preserve the status quo while the NRC considers Petitioner's 2.206 Petition is a request for a writ of injunction. *Simmons v. Ark. Power & Light Co*., 655 F.2d 131, 134 n.5. (8th Cir. 1981) ("if appellants' rights are in jeopardy during the time which the case is under agency consideration, they may seek action directly by the Court of Appeals under the All Writs Act, 28 U.S.C. § 1651(a)."); *Susquehanna Valley All. v. Three Mile Island Nuclear Reactor*, 619 F.2d 231, 237 (3d Cir. 1980) ("the All Writs Act… section 1651(a) authorized courts of appeals to issue preliminary injunctions preserving the status quo, pending final agency action[.]"). Such an injunction is appropriate only if the legal rights at issue are "**'indisputably clear**" and it is "necessary or appropriate in aid" of the court's jurisdiction. *Makekau*, 2019 U.S. App. LEXIS 35363, at *9.

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[20] *SF Chptr. of A. Philip Randolph Inst. v. United States EPA*, 2008 U.S. Dist. LEXIS 27794, at *12-13 (N.D. Cal. Mar. 28, 2008) (["the matter was remanded to the EPA in September of 2007, just ten days before Plaintiffs filed their complaint…The EPA's delay does not qualify, as a matter of law, as unreasonable.")

(1) <u>Petition Has Not Attempted to Meet the Requirements for Obtaining an Injunction Under the All Writs Act.</u>

Petitioner makes no attempt to satisfy the requirements for a writ of injunction. This is reason enough to deny this petition. For example, in *Ohio Citizens for Responsible Energy, Inc. v. Nuclear Regulatory Com*., Petitioner sought a stay of "the full-power operation of the Perry Nuclear Power Plant" while its challenge to the NRC was considered by the Sixth Circuit. *Ohio Citizens for Responsible Energy, Inc. v. Nuclear Regulatory Com*., 479 U.S. 1312, 1312 (1986) (Scalia, A., in chambers). Justice Scalia rejected the request because of applicant's failure to explicitly seek the relief under the All Writs Act:

> What the applicant would require in order to achieve the substantive relief that it seeks is an original writ of injunction, pursuant to the All Writs Act, 28 U. S. C. § 1651(a)… I will not consider counsel to have asked for such extraordinary relief where, as here, he has neither specifically requested it nor addressed the peculiar requirements for its issuance.

Id. at 1313-14. In the case at bar, Petitioner has neither specifically requested a writ of injunction, nor addressed the peculiar requirements for its issuance.

(2) <u>Petitioner's Right to Relief is hardly "Indisputably Clear."</u>

Petitioner's effort to side-step the "indisputably clear" standard required for injunctive relief is an apparent concession that Petitioner cannot meet that standard. "Indisputably" means just that, there can be **<u>no dispute</u>** that Petitioner is entitled to relief from this Court in connection with an NRC final decision on the administrative

petition filed in late September 2019. The "indisputably clear" standard is such that even a well-reasoned dissenting opinion in the appellate court, or divergent opinions among courts on a relevant issue, would be sufficient to defeat a claim for injunctive relief. *Brown*, 533 U.S. at 1303 ("Whatever else may be said about the issues and equities in this case, the rights of the applicants are not 'indisputably clear.' The pros and cons of the applicants claim on the merits are fully set forth in the majority and dissenting opinions in the Court of Appeals."); *Hobby Lobby Stores, Inc. v. Sebelius*, 568 U.S. 1401, 1403-04, (2012) (Sotomayor, S., in chambers)("[W]hatever the ultimate merits of the applicants' claims, their entitlement to relief is not 'indisputably clear'… lower courts have diverged on whether to grant temporary injunctive relief to similarly situated plaintiffs raising similar claims."); *see also Lux v. Rodrigues*, 561 U.S. 1306, 1307 (2010) (Roberts, C. J., in chambers ("[T]he courts of appeals appear to be reaching divergent results in this area…even if the reasoning in [Supreme Court authority] does support Lux's claim, it cannot be said that his right to relief is 'indisputably clear.'").

First, there is significant dispute about whether the NRC's final order on the NRC Petition would even be *reviewable* (it likely is not). A petition brought pursuant to 10 C.F.R. § 2.206 provides a mechanism by which members of the public may request initiation of an *enforcement action* to modify, suspend, or revoke a license, or for such other action as may be appropriate. *Fla. Power & Light Co. v. Lorion*, 470

U.S. 729, 731 (1985); *Eddleman v. Nuclear Regulatory Com.*, 825 F.2d 46, 48 (4th Cir. 1987). In *Heckler v. Chaney*, the Supreme Court held that an agency's refusal to take enforcement action requested by third parties is "committed to agency discretion" and "not subject to judicial review under the [Administrative Procedures Act]." 470 U.S. 821, 838 (1985); *see also* 5 U.S.C. § 701(a)(2). This Court has held an agency "decision not to take enforcement measures, like a prosecutor's decision not to indict, is one that is typically committed to the agency's absolute discretion." *Sierra Club v. Whitman*, 268 F.3d 898, 903 (9th Cir. 2001).

Numerous circuit courts also have held that NRC decisions rejecting third party requests for enforcement actions are not reviewable because of the unique expertise of the NRC and the broad discretion granted to it by Congress. *See e.g. Arnow v. NRC*, 868 F.2d 223, 234-235 (7th Cir. 1989) (finding that the NRC's rejection of plaintiff's claims that that "leak-rate testing of nuclear containments at a company's nuclear power plants had created an unsafe situation" was not reviewable because "Congress has entrusted the NRC with wide, unreviewable discretion in the area of agency enforcement."); *Mass. Public Interest Research Group, Inc. v. NRC*, 852 F.2d 9, 19 (1st Cir. 1988) (NRC decision not to take enforcement action against nuclear facility (keeping the plant shut down), despite petitioner's concerns relating to public health and safety, was not subject to review.).

Second, the Petitioner's 2.206 Petition is a challenge to prior final orders of the

NRC (the 2015 License Amendment and the 2017 certification of the Holtec System.). *See, e.g.* Emergency Petition at Add. 6-8. Under 28 U.S.C § 2344, Petitioner had 60 days from the date of issuance of these final orders to challenge the NRC in this Court. It did not do so. Instead, it was only after defendants in *Public Watchdogs II* raised jurisdictional issues that Petitioner finally filed its (untimely) 2.206 Petition. Petitioner's request for relief is time barred.[21]

Third, even if this Court opted to review the NRC's actions in approving the 2015 License Amendment, certifying the Holtec System, or deciding not to take an enforcement action against SCE in connection with the "near misses" described by Petitioner, Petitioner is nevertheless unable to demonstrate "indisputability" that the NRC acted "capriciously" or "arbitrarily" in denying Petitioner's request for relief. *Pub. Citizen v. NRC*, 573 F.3d 916, 923 (9th Cir. 2009) ("Under the Administrative Procedure Act, agency decisions may be set aside only if 'arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.") (citation omitted). Courts are most differential to the NRC's judgment in the complex area of nuclear safety:

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[21] *Confederated Tribes*, 342 F.3d at 930-31 (denying writ where "we had jurisdiction over the older decisions, but we lost this power when Petitioners failed to seek timely review."); *Sierra Club v. United States Nuclear Regulatory Com.*, 825 F.2d 1356, 1362-63 (9th Cir. 1987) ("petitioners could have sought appellate review from this court within sixty days pursuant to 28 U.S.C. § 2344 but did not.")

> [A] reviewing court must remember that the Commission is making predictions, within its area of special expertise, at the frontiers of science. When examining this kind of scientific determination, as opposed to simple findings of fact, a reviewing court must generally be at its most deferential.

Balt. Gas & Elec. Co. v. NRDC, 462 U.S. 87, 103 (1983).[22]

As discussed in detail above, the NRC has not acted arbitrarily or capriciously, as it has: 1) investigated and evaluated the safety of the geographic location of SONGS (*supra* 8-9); 2) evaluated the Holtec System specifically (and similar systems generally) for dry storage of spent fuel at all nuclear locations in the United States (including SONGS) (*supra* 12-18); 3) investigated and evaluated the August 2018 incident and SCE's remedial measures (*supra* 20-21); 4) evaluated the safety of the canisters with the shim pin design Petitioner challenges (*supra* 21-22); and 5) evaluated the safety of canisters that Petitioner alleged are scratched (*supra* 22). The NRC completed due diligence and applied its expertise, made technical determinations, and allowed the spent fuel transfer and storage to proceed because it determined it is safe to do so. Petitioner (relying here, and in the previous cases, on

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[22] *See also Silkwood v. Kerr-McGee Corp.,* 464 U.S. 238, 250 (1984) ("the [NRC] [is] more qualified to determine to determine what type of safety standard should be enacted in this complex area."); *Kelley v. Selin*, 42 F.3d 1501, 1521 (6th Cir. 1995) ("Specifically, the NRC found the alternative technologies for spent fuel storage to have been neither sufficiently demonstrated nor practicable for use under a general license provision. As noted above, this type of technical decision by the NRC, operating at the frontiers of science, is entitled to great deference by the courts.").

rhetoric and lawyer argument—not scientific, or any other kind of, evidence) disagrees with the NRC's determination. An opinion offered by lawyers and non-experts that there are better ways to store spent fuel at SONGS does not make the NRC's licensing and enforcement actions arbitrary or capricious, and it certainly does not make Petitioner's right to relief "undisputed."[23]

CONCLUSION

For all the reasons stated above, SCE respectfully requests that this Court deny Petitioner's Emergency Petition for Writ of Mandamus.

Dated: December 9, 2019

Respectfully submitted,

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[23] Petitioner has also put forward no viable argument that immediate injunctive relief is either necessary or appropriate to protect this Court's jurisdiction. As discussed above, the wet pools will be operable until summer 2020. *Supra* at 11.

<u>**CERTIFICATE OF COMPLIANCE**</u>

I certify that this brief complies with the requirements of Ninth Circuit Rules 21-2(c), and the requirements of Federal Rules of Appellate Procedure 32(a)(5) and 32(a)(6), because it is proportionately spaced serif font, has a typeface of 14 points, and does not exceed 30 pages.

Dated: December 9, 2019

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CERTIFICATE OF SERVICE

I hereby certify that on December 9, 2019, I electronically filed the foregoing with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit by using the appellate CM/ECF system.

I certify that all participants in the case are registered CM/ECF users and that service will be accomplished by the appellate CM/ECF system.

Dated: December 9, 2019

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TAB 6

EXHIBIT 6

PETITIONER'S MOTION FOR TEMPORARY INJUNCTIVE RELIEF PENDING JUDICIAL REVIEW

No. 20-70899

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

PUBLIC WATCHDOGS,
Petitioner,
v.
UNITED STATES NUCLEAR REGULATORY COMMISSION,
Respondent.

DECLARATION OF NINA J. BABIARZ IN SUPPORT OF MOTION FOR TEMPORARY INJUNCTIVE RELIEF

I, Nina J. Babiarz, hereby declare as follows:

1. I am a member and Board Treasurer of the board of directors for petitioner Public Watchdogs ("Petitioner"). I have personal knowledge of the facts stated herein. If called as a witness to testify, I could and would competently testify to those facts.

2. The Petitioner is a 501(c)(3) non-profit corporation that advocates for public safety by ensuring that government agencies and special interests comply with all applicable laws, including public-safety and environmental-protection laws, especially in the public-utilities industry.

3. I live in La Mesa, California, a community located about 70 miles from the San Onofre Nuclear Generating Station ("SONGS"). Due to my home's proximity to the SONGS facility, I would directly suffer immediate and irreparable harm if any of the storage canisters filled with spent nuclear fuel and buried at SONGS facility were to fail and release nuclear waste into the surrounding area.

4. In addition to my role as a member and Board Treasurer for Public Watchdogs, I also work full-time as an independent, self-employed transportation industry consultant. As part of that work, I regularly travel between my home in La Mesa, California and my clients in San Diego, Orange, and Los Angeles Counties. Due to the proximity of my business activities, I would directly suffer immediate and irreparable harm if any of the storage canisters filled with radioactive nuclear waste and buried at SONGS facility were to fail and release nuclear waste into surrounding areas. Additionally, because I represent 51 transit agencies, universities and community colleges in my professional capacity, I have serious concerns a radiological release will jeopardize the Interstate 5 (I-5) transportation corridor adjacent to the SONGS site as well as the LOSSAN rail corridor, the second busiest

in the United States, facilitating interstate and international commerce to the Ports of San Diego, Los Angeles, and Long Beach.

5. Other members of the Petitioner live within 50 miles of the SONGS facility and would suffer catastrophic consequences if nuclear waste was released into the environment from SONGS. Many of the Petitioner's members, myself included, regularly visit San Onofre State Beach to enjoy the beautiful sandstone bluffs and visit the rare, even endangered, wildlife that make the riparian and wetland habitats their home. Likewise, many of the Petitioner's members and I also enjoy the world-famous surfing areas that are found at the Beach. The release of nuclear waste into San Onofre State Beach would irreversibly destroy the habitats for these rare, endangered species and forever foreclose any enjoyment of the unique scenery and world-famous beaches.

6. The Respondent's arbitrary and dangerous policy regarding long-term storage and management of spent nuclear fuel poses serious public health and safety risks at SONGS, which are particularly injurious to the Petitioner, since our organization's mission is to ensure that government agencies and special interests comply with all applicable laws, including public-safety and environmental-protection laws.

7. The Respondent's arbitrary and dangerous policy is in violation of applicable laws and regulations, and allowing the SONGS licensees to proceed with a decommissioning plan based on demonstrably false assumptions would permit the exact type of public safety and environmental harms that the Petitioner was created to prevent.

8. The Respondent's refusal to acknowledge the dangers posed by the SONGS licensees decommissioning plan and its abdication of its legislative mandate to oversee nuclear activity at SONGS is a substantial factor in causing this harm.

9. Petitioner has not consented to the Respondent's approach to the decommissioning at SONGS, which is discussed in detail in the Petition. Instead, we have repeatedly requested that the Respondent intervene, enforce the federal laws and regulations governing nuclear energy, and prevent the SONGS licensees from going forward with their ill-conceived and poorly-executed decommission plans. However, the Respondent has steadfastly refused to reconsider its position.

10. As a result, an injunction is necessary to prevent immediate and irreversible harm to the Petitioner, its members (including myself),

and the community and vital transportation infrastructure of Southern California.

I, Nina J. Babiarz, declare under penalty of perjury under the laws of the State of California and the United States of America that the foregoing is true and correct.

Executed this 31th day of March, 2020.

Nina J. Babiarz