

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
DIVISION OF SPENT FUEL STORAGE AND TRANSPORTATION

SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT
AND DRAFT FINDING OF NO SIGNIFICANT IMPACT
RELATED TO THE CONSTRUCTION AND OPERATION OF THE
DIABLO CANYON INDEPENDENT SPENT FUEL STORAGE INSTALLATION

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FOR THE DIABLO CANYON
INDEPENDENT SPENT FUEL STORAGE INSTALLATION

1.0 INTRODUCTION

The staff of the U.S. Nuclear Regulatory Commission (NRC) has prepared this supplement to the Environmental Assessment (EA) and draft finding of no significant impact (FONSI) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI), at the direction of the Commission, in response to the June 2006 decision by the United States Court of Appeals for the Ninth Circuit [*San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9th Cir. 2006)]. This supplement to the EA addresses the environmental impacts from potential terrorist acts directed at the Diablo Canyon ISFSI.

1.1 Description of the Proposed Action

By letter dated December 21, 2001, the Pacific Gas and Electric Company (PG&E) submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. In accordance with the National Environmental Policy Act (NEPA), the NRC staff issued an EA for this action on October 24, 2003, in conformance with NRC requirements specified in 10 CFR 51.21 and 51.30, and the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." The Commission defines an EA in 10 CFR 51.14(a), as a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a FONSI. A FONSI, in turn, is defined as a concise public document that briefly states the reasons why an action will not have a significant effect on the human environment and therefore does not require the preparation of an environmental impact statement [10 CFR 51.14(a)]. Based on the above EA, NRC also issued a FONSI for this action on October 24, 2003.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR Part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant (DCPP) in an ISFSI at the site for a term of 20 years. PG&E has begun construction of the Diablo Canyon ISFSI and currently plans to start transferring spent fuel to the ISFSI in mid-2008.

1.2 Purpose of this Supplement

In May 2002, during the NRC licensing review for the Diablo Canyon ISFSI, the San Luis Obispo Mothers for Peace (SLOMFP) and other citizens' groups petitioned NRC to hold a hearing to address a number of contentions. One of these contentions argued that NRC must consider terrorist acts in assessing the environmental impacts of the ISFSI, in order to comply with NEPA. On December 2, 2002, NRC's Atomic Safety and Licensing Board (ASLB) denied this contention and referred it to the Commission for review. On January 23, 2003, the Commission affirmed the ASLB's denial of the terrorism contention.

After the March 2004 issuance of the Part 72 license for the Diablo Canyon ISFSI, SLOMFP and other parties filed a petition for review in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision, dated June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9th Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission issued Memorandum and Order on February 26, 2007, directing the NRC staff to prepare a revised EA addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack.

1.3 Purpose and Need for the Proposed Action

The DCP, owned and operated by PG&E, consists of two Westinghouse-type pressurized water reactor units, each rated at a nominal 1,100 Megawatts-electric; each unit has its own spent fuel storage pool. The Diablo Canyon ISFSI is needed to provide additional spent fuel storage capacity to ensure that the two DCP units can continue to generate electricity beyond the time when the storage capacity of the spent fuel pools is reached. The additional temporary spent fuel storage capacity provided by the proposed ISFSI will enable PG&E to operate both units until the current operating licenses expire (September 2021 for Unit 1, and April 2025 for Unit 2).

2.0 SUMMARY OF DIABLO CANYON ISFSI EA

On October 24, 2003, the NRC staff issued the EA and FONSI for the construction and operation of the Diablo Canyon ISFSI.

2.1 Summary of Impacts Considered in the EA

In the EA, the NRC staff concluded that the construction, operation, and decommissioning of the Diablo Canyon ISFSI will not result in a significant impact on the environment. In reaching this conclusion, the staff considered the impacts from normal operations and from postulated accidents. The staff determined that construction impacts of the ISFSI will be minor, and limited to the small area of the ISFSI site and the excavated-material disposal sites.

The staff also determined that there will be no significant radiological nor non-radiological environmental impacts from routine operation of the ISFSI. The ISFSI is a passive facility; no liquid or gaseous effluents will be released from the storage casks during normal operations. The dose rates to members of the public during normal operations will be limited by the design of the spent fuel storage casks, so that the cumulative dose to an offsite individual will be a small fraction of the 100 millirem estimated annual dose received from naturally occurring terrestrial and cosmic radiation in the vicinity of the DCP. The impacts from decommissioning the ISFSI, which will not occur until the spent fuel is removed, were determined to be much less than the minor impacts of construction and operation.

For hypothetical accidents, the calculated dose to an individual at the nearest site boundary was found to be well below the 5 rem limit for accidents set forth in 10 CFR 72.106(b) and in the U.S.

Environmental Protection Agency's protective action guidelines. The NRC staff did not consider the potential impacts of terrorist acts on the ISFSI in the initial EA.

2.2 Summary of Alternatives Considered in the EA

The alternatives PG&E considered, and the NRC staff addressed in its EA, included the shipment of spent fuel offsite, other methods to increase on-site spent fuel storage capacity, and the no-action alternative. In the first category, the alternatives of shipping spent fuel from Diablo Canyon to a permanent Federal Repository, to a reprocessing facility, or to a privately owned spent fuel storage facility were determined to be non-viable alternatives, since no such facilities are currently available in the United States, and shipping the spent fuel overseas is impractical in light of the political, legal, and logistical uncertainties, and the high cost. Shipping the DCPD spent fuel to another nuclear power plant was also determined to be a non-viable alternative, because the receiving utility would have to be licensed to store the DCPD spent fuel, and it is unlikely that another utility would be willing to accept it, in light of its own limitations on spent fuel storage capacity.

Other on-site storage alternatives PG&E considered included increasing the capacity of the existing spent fuel pools by reracking or spent fuel rod consolidation, or construction of a new spent fuel storage pool. These alternatives were considered impractical, because of the high costs associated with necessary plant modifications or new construction, coupled with the significantly higher occupational exposures that would result from the extensive fuel-handling operations necessary to support these alternatives.

The no-action alternative could result in the extended or permanent shutdown of both DCPD units many years before the expiration date of their current operating licenses, once the current capacities of the units' spent fuel pools are reached. The electrical generation capacity lost would most likely be replaced by fossil-fueled plants, which could result in greater environmental impacts and higher costs for electricity. In the short-term, the shutdown of the DCPD would have a negative impact on the local economy and infrastructure. For these reasons, the no-action alternative was not considered a practical alternative.

In the EA, the Commission concluded that there are no significant environmental impacts associated with the proposed Diablo Canyon ISFSI, and other alternatives were not pursued because of significantly higher costs, additional occupational exposures, and the unavailability of off-site storage options. In this supplement to the EA, the NRC staff has considered potential terrorist acts against the ISFSI, and after such consideration, has concluded that the construction and operation of the ISFSI will not result in a significant effect on the human environment.

3.0 NRC SECURITY REQUIREMENTS FOR ISFSIS

NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) the continual evaluation of the threat environment by NRC, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of dry cask storage systems, which provides substantial resistance to penetration; and (4) NRC

security assessments of the potential consequences of terrorist attacks against ISFSIs, that inform the decisions made regarding the types and level of protective measures. Over the past 20 years, there have been no known or suspected attempts to sabotage, or to steal, spent fuel from spent fuel casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, NRC is continually reevaluating the threat environment, to determine whether any specific threat to ISFSIs exists.

3.1 General Security Considerations

In response to terrorist attacks in New York and Washington, DC, on September 11, 2001, and to intelligence information subsequently obtained, the U.S. government initiated nation-wide measures to reduce the threat of terrorism. These measures included numerous security enhancements to prevent terrorists from gaining control of commercial aircraft, such as: (1) more stringent screening of airline passengers and baggage by the Transportation Security Administration; (2) the increased presence of Federal air marshals on many flights; (3) improved training of flight crews; and (4) hardening of aircraft cockpits. Additional measures have been imposed on foreign passenger carriers and domestic and foreign cargo carriers, as well as charter aircraft. Beyond these measures directed at reducing the potential for terrorists to gain control of an aircraft, the Federal government has greatly improved the sharing of intelligence information and the coordination of response actions among Federal, State, and local agencies. NRC has been an active participant in these efforts; it now has regular and frequent communications with other Federal, State, and local government agencies and industry representatives, to discuss and evaluate the current threat environment, to assess the adequacy of security measures implemented at licensed facilities, and, when necessary, to recommend additional actions.

NRC expanded its existing Threat Advisory System after the September 11, 2001, terrorist attacks, to include a broader range of licensees, including ISFSI licensees. NRC has incorporated the threat condition levels used in the Department of Homeland Security's Homeland Security Advisory System into its own Threat Advisory System. The NRC threat assessment staff reviews, analyzes, coordinates, and disseminates threat and intelligence information relevant to its licensees, at both strategic and tactical levels. The threat assessment staff also serves as NRC's liaison and coordination staff with other organizations and agencies, including the intelligence and law enforcement communities. Through these improved coordination and communication functions, NRC is able to efficiently develop and transmit advisories to the appropriate licensees, who are then able to take prompt action. Thus, the broad actions taken by the Federal government and the specific actions taken by NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities.

3.2 Requirements for ISFSIs

NRC has historically considered the potential impacts of terrorist acts in the development and implementation of its 10 CFR Part 73 security requirements. NRC's strategy for protecting public health and safety and the environment focuses on ensuring that its safety and security requirements, as implemented by licensees, in combination with the design features of dry cask storage systems, are effective in protecting against successful terrorist attacks on ISFSIs.

NRC security requirements for ISFSIs are directed at assuring that terrorists cannot successfully carry out an attack against an ISFSI. These requirements, which apply to on-site security

measures, are part of a multi-layered Federal security strategy that also consists of on-going threat assessment, in coordination with other Federal agencies, and measures to identify and preempt potential terrorist attacks. NRC reviews and approves facility security plans, in evaluating the adequacy of these on-site measures. As part of the licensing review for the Diablo Canyon ISFSI, the NRC staff evaluated and approved revisions to the Diablo Canyon site security plan that incorporated features of the proposed ISFSI. In that review, transmitted by letter dated February 4, 2004, the NRC staff determined that the proposed security plan revisions and facility design features met the requirements of Part 73, "Physical Protection of Plants and Materials," which were the same requirements for ISFSIs that were in effect before September 11, 2001. The details of specific security measures for each facility are designated as Safeguards Information, in accordance with Section 147 of the Atomic Energy Act and 10 CFR 73.21, and, for that reason, cannot be released to the public. However, key features of the security programs for ISFSIs include: (1) physical barriers; (2) surveillance; (3) intrusion detection; (4) a response to intrusions; and (5) offsite assistance from local law enforcement agencies, as necessary.

After the September 11 terrorist attacks, the Commission initiated prompt and comprehensive actions to address both immediate and longer-term security measures for NRC-regulated facilities. In the months immediately after the attacks, the Commission issued numerous safeguards and threat advisories to its licensees, to strengthen licensees' capabilities and readiness to respond to a potential attack on a nuclear facility. As part of the longer-term efforts, NRC conducted a comprehensive review of the Agency's security program. This review examined specific threats, such as a land-based vehicle bomb, ground assault with the use of an insider, and water-borne assaults, which have led to the imposition of additional requirements, through orders and rules, affecting many categories of licensees, including ISFSIs.

On October 16, 2002, the Commission issued orders to all licensees of operating ISFSIs to make mandatory the voluntary actions taken by those licensees in response to the Commission's advisories, and to implement additional security enhancements identified in NRC's ongoing comprehensive review of its safeguards and security programs and requirements. This same order, imposing additional security measures, was issued to PG&E, for the Diablo Canyon ISFSI, on May 5, 2005. These measures, which are to be fully implemented before the initial movement of spent fuel to the ISFSI, include: (1) increased security patrols; (2) augmented security forces and weapons; (3) additional security posts; (4) heightened coordination with local law enforcement and military authorities; (5) enhanced screening of personnel; and (6) additional limitations on vehicular access. Collectively, these measures further reduce the already low probability of a successful terrorist attack on an ISFSI, by establishing a substantial deterrent to an attack; by providing high assurance that an attempted attack could be detected and effectively resisted; and by mitigating the extent of damage and the potential radiological consequences if an attack were successful.

Based on its ongoing consideration of safeguards and security requirements, its review of information provided by the intelligence community, and the implementation of additional security measures at the Nation's ISFSIs, the Commission has high assurance that public health and safety and the environment, and the common defense and security, continue to be adequately protected in the current threat environment.

4.0 CONSIDERATION OF ENVIRONMENTAL (RADIOLOGICAL) IMPACTS FROM

TERRORIST ACTS

The NRC staff has considered the potential radiological impacts of terrorist acts on spent fuel storage casks, even though the staff considers the probability of a malevolent act against an ISFSI that results in a significant radiological event to be very low. By design, dry cask storage systems are highly resistant to penetration. To be licensed or certified by NRC, these systems must meet stringent requirements for structural, thermal, shielding, and criticality performance, and confinement integrity, for normal and accident events. Consequently, spent fuel storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of a tornado-generated missile such as a 4000-pound automobile at 126 miles per hour. For the Diablo Canyon ISFSI, these design features include the massive HI-STORM 100SA storage casks, which are made of inner and outer cylindrical carbon steel shells, filled with 30 inches of concrete, and weighing up to 170 tons when fully loaded with spent fuel. Each cask surrounds an internal multi-purpose canister, which safely confines the spent fuel in a completely sealed, welded stainless steel cylinder. The spent fuel is further protected by the metallic zircaloy cladding surrounding the fuel pellets in each fuel rod of a spent fuel assembly. Finally, the nuclear fuel itself is in the form of solid ceramic pellets of uranium dioxide; this means that a large amount of the radioactive material would remain in solid form and not be dispersed beyond the immediate vicinity of the ISFSI, even if a terrorist act were successful in breaching the multiple layers of protection. Also, the location and low profile of the ISFSI make it a difficult target for a large commercial airliner. Based on these facts, NRC has determined that the current design features and additional security measures in place provide high assurance that the spent fuel stored in an ISFSI is adequately protected.

Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, NRC recognizes that, under general credible threat conditions, although the probability of such an attack is believed to be low, it cannot be reliably quantified. NRC has adopted an approach that focuses on ensuring that the safety and security requirements, and other security measures, are adequate and effective in countering and mitigating the effects of terrorist attacks against dry cask storage systems. To provide high assurance that a terrorist act will not lead to significant radiological consequences, NRC has analyzed plausible threat scenarios and required enhanced security measures to protect against the threats, and has developed emergency planning requirements, which could mitigate potential consequences for certain scenarios. As stated above, all these actions have been taken without regard to the probability of an attack. This protective strategy reduces the risk from a terrorist attack to an acceptable level.

Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool, to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs. Initially, NRC screened threat scenarios to determine plausibility. For those scenarios deemed plausible, NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. In addition, NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts. NRC then looked at the combined effect of the attractiveness and the consequence analyses, to determine whether additional security measures for ISFSIs were necessary.

In conducting the security assessments for ISFSIs, NRC chose several spent fuel storage cask

designs that were representative of most currently NRC-certified designs. Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants. The resulting generic assessments formed the basis for NRC's conclusion that there was no need for further security measures at ISFSIs beyond those currently required by regulation and imposed by orders issued after September 11, 2001.

The NRC staff reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI. Based on this comparison, the staff determined that the assumptions used in these generic security assessments, regarding the storage cask design, the source term (amount of radioactive material released), and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual conditions at the Diablo Canyon ISFSI. In fact, because of the specific characteristics of the spent fuel authorized for storage at the Diablo Canyon ISFSI (lower burnup fuel), and the greater degree of dispersion of airborne radioactive material likely to occur at the site, any dose to affected residents nearest to the Diablo Canyon site will tend to be much lower than the doses calculated for the generic assessments. Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios discussed above – would likely be below 5 rem. In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all. In some situations, emergency planning actions could provide an additional measure of protection to help mitigate the consequences, in the unlikely event that an attack were attempted at the Diablo Canyon ISFSI.

5.0 AGENCIES AND PERSONS CONSULTED

No additional discussions or consultations with outside agencies or persons have been conducted in the development of this draft supplement to the EA. Comments submitted in response to the issuance of this draft supplement will be considered by the NRC staff in preparation of the final supplement to the EA.

6.0 CONCLUSION

The NRC staff concludes that the construction, operation, and decommissioning of the Diablo Canyon ISFSI, even when potential terrorist attacks on the facility are considered, will not result in a significant effect on the human environment. NRC security requirements, imposed through regulations and orders, and implemented through the licensee's security plans, in combination with the design requirements for dry cask storage systems, provide adequate protection against successful terrorist attacks on ISFSIs. Therefore, a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur.

7.0 DRAFT FINDING OF NO SIGNIFICANT IMPACT

The environmental impacts of the proposed action, namely, the approval of a site-specific license to build and operate an ISFSI, to be located on the site of the DCP, in San Luis Obispo County, California, have been reviewed in accordance with the requirements of 10 CFR Part 51. As set forth in the Supplement to the Environmental Assessment above (which this draft finding

incorporates by reference), NRC has considered the potential for terrorist attacks on the facility, and has determined that the storage of spent nuclear fuel at the Diablo Canyon ISFSI will not have a significant effect on the quality of the human environment, based on the facility design features and the mitigative security measures incorporated as part of the NRC licensing action and in response to NRC security orders. These design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a non-significant risk level. Therefore, in accordance with 10 CFR 51.33, NRC issues this draft FONSI.

A Notice of availability of this supplement to the EA and draft FONSI will be published in the *Federal Register*. The *Federal Register* notice will include a request for comments on the proposed action and on the draft finding within thirty (30) days of publication. Pursuant to 10 CFR 51.33(e), a final determination to prepare an environmental impact statement or a final FONSI for the proposed action shall not be made until the last day of the public comment period has expired.

Documents related to this action, including the Diablo Canyon ISFSI EA and FONSI, and the Diablo Canyon ISFSI license, are available electronically at NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the Diablo Canyon ISFSI EA is ML032970337, and for the ISFSI license and related documents, the number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail, to pdr@nrc.gov. These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents for a fee.

8.0 REFERENCES

1. U.S. Nuclear Regulatory Commission. *Environmental Assessment and Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (TAC NO.L23399)*. October 24, 2003. NRC ADAMS Accession No. ML032970337.
2. U.S. Nuclear Regulatory Commission. *Issuance of Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation (TAC NO.L23399)*. March 22, 2004. NRC ADAMS Accession No. ML040780107.
3. Diablo Canyon Independent Spent Fuel Storage Installation License Application - Environmental Report, PG&E. December 2001 and Amendment 1, October 2002. NRC ADAMS Accession Nos. ML020180196, ML020180173, and ML022950304 (p.150-186).