RAS E-439

UNITED STATES NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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In re:

License Renewal Application Submitted by

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. Docket Nos. 50-247-LR; 50-286-LR

ASLBP No. 07-858-03-LR-BD01

DPR-26, DPR-64

January 24, 2011

STATE OF NEW YORK MOTION FOR LEAVE TO FILE TIMELY AMENDED BASES TO CONTENTION 17A (NOW TO BE DESIGNATED CONTENTION 17B)

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OFFICE OF SECRETARY RULEMAKINGS AND ADJUDICATIONS STAFF

Office of the Attorney General for the State of New York The Capitol State Street Albany, New York 12224

TEMPLATE - SECYLOYI

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STATE OF NEW YORK MOTION FOR LEAVE TO FILE TIMELY AMENDED BASES TO CONTENTION 17A (NOW TO BE DESIGNATED CONTENTION 17B)

INTRODUCTION

Pursuant to 10 C.F.R. § 2.309(f)(2) the State of New York seeks leave to file the attached Contention 17B, which contains amended bases.¹ These amendments are a direct result of the issuance by the Commission, on December 23, 2010, of amendments to 10 C.F.R. § 51.23(old),² Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation & Waste Confidence Decision Update (75 Fed. Reg. 81032-076) [Att. 9].³ The bases are timely and arise out of new information not previously available that is materially different than previously available information. These amended bases also comply with the requirements of 10 C.F.R. § 2.309(f)(1).

THE NEW BASES COMPLY WITH THE REQUIREMENTS OF 10 C.F.R. § 2.309(f)(2)

Prior to December 23, 2010, the binding rule for all nuclear power plant relicensing proceedings provided that (1) a permanent waste repository would be available for high level nuclear waste by 2025 and (2) as a generic matter, spent fuel could be stored at a reactor site for 30 years after shutdown without any significant safety or environmental problems. *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3), ASLBP No. 07-858-03-LR-BD01 (ML091670435), Order (Ruling on New York State's New and Amended

¹ The only change in the Contention is to change "DSEIS" to "FSEIS."

² To avoid confusion and because the new Waste Confidence Rule does not take effect until January 24, 2011 (75 Fed. Reg. 81032), citations to the rule will indicate whether the "old" version or the "new" version is being referenced.

³ The citation "[Att.___]" refers to the Attachments accompanying this motion and the declaration of AAG John Sipos.

Contentions) June 16, 2009 ("Amended Contentions Order") at 16, and Memorandum and Order (Denying Entergy's Motion for the Summary Disposition of NYS Contention 17/17A) ASLBP No. 07-858-03-LR-BD01 (ML101120094) at 13-14 ("we emphasized that the Waste Confidence Rule remains a binding regulation unless and until the Commission takes action to modify or withdraw it. Accordingly, for the time being, New York may rely on the timetable set in the Waste Confidence Rule for disposal of waste"). However, the new Waste Confidence Rule has changed the context of this Contention 17A by removing any date certain by which a high level waste repository will be available and substituting the finding that it will be ready "when necessary." 10 C.F.R. § 51.23(a) (new).

This change in § 51.23 (new) means that it cannot be assumed that spent fuel generated at Indian Point will be gone by 2025, the date by which the Commission had concluded that a high level waste repository would be available. Thus, for the first time, there is every reason to believe that spent fuel will remain at the Indian Point site following plant shutdown for an indefinite period.⁴ As a result, and as more fully explained in the January 24, 2011 Declaration of Dr. Stephen Sheppard, the Indian Point site will likely become a high level nuclear waste storage facility for a substantial period of time after it ceases to be an operating nuclear power plant site. Converting the Indian Point site from a productive industrial site into a waste storage site has important, and as yet unexamined, implications for the value of land adjacent to the Indian Point site. This information was not previously available, although the State of New York believed it was essentially known when the Commission announced that many of the bases upon

⁴ In the Waste Confidence Decision Update the Commission emphasizes that it is not endorsing the idea of indefinite storage of spent fuel at reactor sites (75 Fed. Reg. at 81035) but it is also not providing a date by which such spent fuel can be removed. Thus, it must be assumed

which the findings in § 51.23 were no longer valid. Because the Board did not agree and rejected proposed New York State Contention 34 (Amended Contention Order at 16), the information that spent fuel will likely remain at the site long after the plant is shutdown is newly available.

This new information is materially different than the information previously available because now Indian Point can become a high level nuclear waste storage area for an indefinite period after plant shutdown whereas that possibility had been ruled out by the previous Waste Confidence findings.

Finally, this Motion for Leave to File is timely pursuant to the terms of the Board's Scheduling Order. *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3) ASLBP No. 07-858-03-LR-BD01, Scheduling Order (July 1, 2010) at 6 ("A motion and proposed new contention specified in the preceding paragraph shall be deemed timely under 10 C.F.R. § 2.309(f)(2)(iii) if it is filed within thirty (30) days of the date when the new and material information on which it is based first becomes available"). The Commission announced the new version of § 51.23 and issued its new Waste Confidence Decision Update on December 23, 2010 and made the rule change effective on January 24, 2011. 75 Fed. Reg. 81032.

Accompanying this Motion for Leave is the State of New York's Request for a Determination That The Proposed Amended Bases for Contention 17A Are Not Barred by 10 C.F.R. § 51.23(b), or That Exemption from the Requirements of 10 C.F.R. § 51.23(b) Should Be Granted, or That New York State Has Made a Prima Facie Case That § 51.23(b) Should Be Waived as Applied to New York State Contention 17B. That pleading is also timely because to

that the wastes will be there indefinitely - *i.e.* without a definite termination of such storage.

the extent New York State seeks a waiver of portions of § 51.23(b) (new) the only applicable timeliness standard is that it be "reasonable." *Tennessee Valley Authority* (Watts Bar Unit 2) LBP-10-12 at 14 ("There being no NRC regulation that governs the timing of waiver petitions, we agree with SACE that the appropriate standard for determining whether a waiver petition is timely is reasonableness"). Filing for a waiver of the provisions of a new regulation as applied to new contention bases within 30 days of when the new regulation was adopted and on the same day as the timely filing of the proposed new contention bases are filed is inherently timely.

THE NEW BASES COMPLY WITH THE REQUIREMENTS OF 10 C.F.R. § 2.309(f)(1)

1. The Bases Are Within the Scope of License Renewal

New York State Contention 17A claims that:

the DSEIS Fails to Address the Impact of the Continued Operation of IP2 and IP3 for Another 20 Years on Offsite Land Use, Including Real Estate Values in the Surrounding Area in Violation of 10 C.F.R. §§ 51.71(a), 51.71(d), 51.95(c)(1), and 51.95(c)(4).

This contention and its bases have already been admitted by the Board. Entergy Nuclear

Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3), Memorandum and Order

(Ruling on Petitions to Intervene and Requests for Hearing) LBP-08-13 at 82-83, 68 NRC 43

(July 31, 2008) and Order (Ruling on New York State's New and Amended Contentions) (June

16, 2009) at 8. The proposed amended bases modify the reasons why license renewal will have a

substantial adverse impact on offsite land use value and local tax revenues. Thus, the State's

additional bases, which continue the challenge to the environmental impact statement, remain

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within the scope of this license renewal proceeding.

2. The Issues Raised Are Material to the Findings that the NRC Must Make to Support the Action that is Involved in this Proceeding

The NRC must ascertain the site specific socioeconomic impacts of license renewal and the socioeconomic costs and benefits of the no action alternative. 10 C.F.R. § 51.10(a); NUREG 1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants ("GEIS") at 4-109; 10 C.F.R. Part 51, Table B-1 of Appendix B of Subpart A. Offsite impacts on land value and tax revenue from such land are material to this relicensing proceeding, because, if the State is correct in its contention, the NRC must consider, but has not adequately considered, these impacts in determining whether to approve the proposed action and in evaluating the no action alternative. The State has demonstrated in the new bases, which are supported by the January 24, 2011 Report of Dr. Stephen Sheppard ("4th Sheppard Report") [Att. 15], that these offsite impacts are substantial. 4th Sheppard Report at 1, 6. The magnitude of the adverse offsite impact on land value and local taxes of license renewal could be as much as \$237,000,000. *Id.* at 1, 6.

3. Adequate Bases Have Been Provided For the Contention

The State of New York today seeks leave to present additional bases in further support of a previously-admitted contention. These additional bases are detailed and exceed the regulatory requirement in 10 C.F.R. § 2.309(f)(1)(ii) for a "brief explanation" of the bases. The additional bases evaluate a number of possible scenarios which may arise as a result of license renewal based on the uncertainties created by the recent amendments to 10 C.F.R. § 51.23. These bases are in addition to the bases previously accepted when Contention NYS-17 was admitted.

4. A Concise Statement of Facts and Expert Opinion Support the Contention

Dr. Sheppard has offered his expert opinion that there are substantial offsite adverse impacts on land value and tax revenues that will occur if license renewal is permitted. He has supported his opinion with references to published, peer-reviewed literature that find that the presence of the kind of disamenity created by an operating nuclear power plant and by the storage of high level nuclear waste does depress local land values and, concomitantly, the tax revenues from such land. He also demonstrates that these effects increase with time and that license renewal will extend the period during which such effects will occur by at least 30 years.

5. A Genuine Dispute Exists on a Material Issue of Law or Fact

The State of New York has provided sufficient information that a genuine dispute exists with regard to several material issues of fact including: (1) whether extending the operating life of Indian Point will perpetuate depressed land values and reduced tax revenues and (2) the potential magnitude of these depressed land values. There are also material disputes of law including: (1) whether the FSEIS is required to consider the adverse impact on offsite land values and tax revenues from license renewal; (2) whether the FSEIS has provided sufficient analysis of this issue; and (3) whether all or any part of the bases are precluded by 10 C.F.R. § 51.23(b).

CONCLUSION

The State of New York respectfully requests that the Atomic Safety and Licensing Board admit the new bases for NYS Contention 17B.

Respectfully submitted,

som linchon s/ Susan L. Taylor

Dated: January 24, 2011

Assistant Attorney General

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John J. Sipos Assistant Attorney General Office of the Attorney General of the State of New York The Capitol Albany, New York 12224

-	List of Attachments to State of New York Motion for Leave to File Timely Amended Bases to Contention 17A (now to be designated Contention 17B)
Attachment 1	10 C.F.R. § 51.23 as it appeared in the January 2010 edition of the Code of Federal Regulations (referred to in the State's filing of today's date as "10 C.F.R. § 51.23 (old)").
Attachment 2	Volume 48 of the Federal Register, pages 22730-22733 (May 20, 1983), Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of the Reactors' Operating Licenses.
Attachment 3	excerpt from NUREG-0575, Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, Volume 1, (Aug. 1979) ML022550127 including pages 4-25 – 4-27.
Attachment 4	Volume 49 of the Federal Register, including pages 34658-34688 (Aug. 31, 1984), Waste Confidence Decision.
Attachment 5	Volume 53 of the Federal Register including pages 31651-31683 (Aug. 19, 1988), Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste.
Attachment 6	Volume 55 of the Federal Register, including pages 38472-38474 (Sept. 18, 1990), Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation.
Attachment 7	excerpt from the United States Department of Energy Final 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, Volume I – Impact Analysis, DOE/EIS-0250, February 2002, including pages 2-2 and 2-47.
Attachment 8	excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 2, (Enclosure 2 to NL-08-144), prepared by TLG Services, Inc. for Entergy Nuclear, October 2008, ML092260723, including pages 2-4, 9-11, 16-18, 25-27.
Attachment 9	Volume 75 of the Federal Register, pages 81032-81076, published December 23, 2010, Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation & Waste Confidence Decision Update.
Attachment 10	excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 3, Document E11-

List of Attachments to State of New York Motion for Leave to File Timely Amended Bases to Contention 17A (now to be designated Contention 17B)

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	1583-006, prepared by TLG Services, Inc. for Entergy Nuclear, December 2010, ML103550608, including pages 8-11.
Attachment 11	November 29, 2007 Declaration of Dr. Stephen C. Sheppard with accompanying report, <i>Potential Impacts of Indian Point Relicensing on Property Values</i> .
Attachment 12	February 26, 2009 Supplemental Declaration of Dr. Stephen C. Sheppard and accompanying report, <i>Potential Impacts of Indian Point Relicensing</i> with Delayed Site Reclamation.
Attachment 13	February 9, 2010 Supplemental Comments of the State of New York submitted by the Office of the Attorney General in NRC rulemaking proceeding RIN 3150-AI47, NRC-2008-0482, NRC-2008-0404 – Waste Confidence Decision Update and Consideration of Environmental Impacts of Temporary Storage of Spent of Spent Fuel After Cessation of Reactor Operation.
Attachment 14	March 15, 2010 Supplemental Declaration of Dr. Stephen C. Sheppard and accompanying report, <i>Determinants of Property Values</i>).
Attachment 15	January 24, 2011 Report of Dr. Stephen C. Sheppard in connection with Contention 17B.
Attachment 16	December 28, 2009 Letter from John P. Boska to Entergy Nuclear Operations, Inc. regarding IP2 decommissioning funding status report,

ML093450778.

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UNITED STATES NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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DPR-26, DPR-64

January 24, 2011

STATE OF NEW YORK'S REQUEST FOR A DETERMINATION THAT THE PROPOSED AMENDED BASES FOR CONTENTION 17A ARE NOT BARRED BY 10 C.F.R. § 51.23(b), OR THAT EXEMPTION FROM THE REQUIREMENTS OF 10 C.F.R. § 51.23(b) SHOULD BE GRANTED, OR THAT THE STATE HAS MADE A *PRIMA FACIE* CASE THAT § 51.23(b) SHOULD BE WAIVED AS APPLIED TO CONTENTION 17B

Office of the Attorney General for the State of New York The Capitol State Street Albany, New York 12224

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 Strict enforcement of the requirements of 10 C.F.R. § 51.23(b) (new) in this proceeding will not serve the purposes of the regulation and will exclude consideration of special circumstances not considered in the rulemaking
 The offsite land use impacts identified by Dr. Sheppard are unique to Indian Point and its unique location
3. The offsite land use impacts identified by Dr. Sheppard are significant and substantial
 The Commission has suggested that waiver of 10 C.F.R. § 51.23(b) (new) may be appropriate
CONCLUSION

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INTRODUCTION

This Board has already admitted NYS Contentions 17 and 17A, which challenge the adequacy of the Environmental Report and the Draft Supplemental Environmental Impact Statement ("DSEIS") because of their failure to consider the socioeconomic impacts on offsite land use value of relicensing Indian Point. Jul. 31, 2008 Mem. and Order Ruling on Petitions to Intervene and Requests for Hearing (LBP-08-13) at 82-83 (ASLBP No. 07-858-03-LR-BD01) ML082130436; Jun. 16, 2009 Order Ruling on New York State's New and Amended Contentions at 7-8 (admitting NYS 17-A) ML091670435. The Final Supplemental Environmental Impact Statement for Indian Point Unit 2 and Unit 3 ("FSEIS") has not changed the previous consideration of socioeconomic impacts. Compare Draft Supplemental Environmental Impact Statement for Indian Point Unit 2 and Unit 3 ("DSEIS") 4-40 to 4-41 and 8-29 to 8-30 with FSEIS at 4-45 to 4-47 and 8-24 to 8-25. This Board has also denied a Motion for Summary Disposition filed by Entergy and NRC Staff with regard to Contention 17A. Apr. 22, 2010 Mem. and Order Denying Summary Disposition on NY 17/17A at 1, 18 (ASLBP No. 07-858-03-LR-BD01) ML101120094. Finally, this Board has denied New York State's proposed Contention 34, which was based on the concept that, because the Commission had concluded that the bases for the Waste Confidence Rule, 10 C.F.R. § 51.23 (old)¹ [Att. 1], were no longer valid, then the conclusion in 10 C.F.R. § 51.23 (old), that a permanent high level waste repository would be available by 2025 was no longer valid and thus it was necessary to consider the environmental impacts of indefinite storage of spent fuel at the Indian Point site following

¹ To avoid confusion and because the new Waste Confidence Rule does not take effect until January 24, 2011 (75 Fed. Reg. 81032), citations to the rule will indicate whether the "old"

license renewal and shutdown of the plant. Jun. 16, 2009 Order (Ruling on New York State's New and Amended Contentions). In denying the admissibility of the proposed contention the Board ruled:

At this point, the Commission has not made a final determination vis-à-vis the waste confidence rule. Therefore, it is premature to use these publications as the bases for a new contention, as the regulations now in force, specifically 10 C.F.R. § 51.23(b), do not permit "discussion of any environmental impact of spent fuel storage" at nuclear reactor sites. Accordingly, NYS-34 is an impermissible challenge to NRC regulations and must be denied.

Id. at 16.

In the wake of the revision to 51.23(a) (new), the time is now ripe for New York State to raise its concerns about the failure of the FSEIS to consider the very significant and substantial socioeconomic impacts that will occur after plant shutdown, if Indian Point is allowed to operate the plant for an additional 20 years and to create an additional 20 years of spent fuel that will be stored at the site for an undefined and indefinite period. The Commission now concludes it is unable to set a date by which such storage will end. Thus, it must be assumed that spent fuel may remain on site for a substantial period. If relicensing is allowed, the presence of the additional spent fuel generated will have a profound adverse impact on local land use value.

While this is the time to raise these concerns, it is likely that both Entergy and NRC Staff will argue that the operation of 10 C.F.R. § 51.23(b) (new) is a barrier to raising these concerns. This pleading is intended to demonstrate that no such barrier exists, and, alternatively, that if a barrier did exist, it can and should be removed to permit a full and fair consideration of significant and substantial site-specific socioeconomic impacts that are ignored in the FSEIS.

version or the "new" version is being referenced.

ARGUMENT

I. 10 C.F.R. § 51.23(b) (new) DOES NOT BAR CONSIDERATION OF THE ENVIRONMENTAL IMPACTS OF SPENT FUEL STORAGE AT INDIAN POINT FOLLOWING SHUTDOWN OF THE PLANT

The new bases added to Contention 17A, which now comprise proposed Contention 17B, challenge the adequacy of the FSEIS because it fails to address the significant and substantial environmental impact on offsite land use that will occur if Indian Point Unit 2 (IP2) and Indian Point Unit 3 (IP3) are relicensed and additional spent fuel is generated and stored on site for an indefinite period. A portion of the bases for Contention 17B focus on the time period after the facilities are shutdown and the adverse impact that will occur as a result of the continued presence of additional spent fuel at the site. As written, 10 C.F.R. § 51.23(b) (new) limits consideration of the environmental impact of spent fuel storage at the reactor site after shutdown:

within the scope of the generic determination in paragraph (a) of this section, no discussion of any environmental impact of spent fuel storage in reactor facility storage pools or independent spent fuel storage installations (ISFSI) for the period following the term of the reactor operating license or amendment or initial ISFSI license or amendment for which application is made, is required in any environmental report, environmental impact statement, environmental assessment or other analysis prepared in connection with the issuance or amendment of an operating license for a nuclear reactor.

Id. (emphasis added). However, neither 10 C.F.R. § 51.23(a) (new) nor the Waste Confidence Decision Update includes any discussion of the environmental impact on offsite land use and land value of the continued and indefinite storage of spent fuel at the reactor site, which is sitespecific and not generic. Those impacts therefore cannot fairly be said to be "within the scope of the generic determination in paragraph (a)," which determined that "if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for

at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor." 10 C.F.R. § 51.23(a) (new).

In fact, there is virtually no discussion of environmental impacts from spent fuel storage and certainly none related to non-radiological offsite environmental impacts in the Waste Confidence Decision Update or in 10 C.F.R. § 51.23(a) (new). Rather, the recent Waste Confidence Decision Update relies on the environmental analysis that accompanied the 1990 waste confidence findings. 75 Fed. Reg. 80132, 81035 (referencing the 1990 Waste Confidence amendments) [Att. 9]. But those amendments also failed to discuss offsite non-radiological environmental impacts, relying instead on a 1988 EA that accompanied amendments to 10 C.F.R. Part 72. 55 Fed. Reg. 38472, 38473 (Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation (Sept. 18, 1990) [Att. 6] ("The Commission's conclusions with respect to safety and environmental impacts of extended storage are supported by NRC's Environmental Assessment (EA) for the 10 CFR part 72 rulemaking 'Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste' (53 FR 31651, August 19, 1988)"). However, the 1988 rulemaking also did not analyze non-radiological offsite environmental impacts from spent fuel storage but relied on an environmental analysis prepared in conjunction with earlier amendments to Part 72. See 53 Fed. Reg. 31651, 31657-58 [Att. 5], which relies on NUREG-0575 ("Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," August 1979) [Att. 3]. But NUREG-0575 contains virtually no analysis of nonradiological offsite environmental impacts and certainly does not contain any analysis of the impacts on adjacent land uses and value as a result of using the former electric power generating

site as a high level nuclear waste storage facility. The entire discussion of offsite nonradiological environmental impacts of onsite spent fuel storage in NUREG-0575 consists of the following:

4.3.1 The Reference Case Storage Solution Storing spent fuel has the advantage of resulting in confinement of perceived problems to a small area. As at a nuclear power plant, safeguards and safety measures can be developed to restrict access. The location of such a site near a community would produce social problems similar to those associated with siting of other nuclear-related facilities.

Social impacts likely associated with independent storage facilities, will be similar to those occurring at power plants and are of three main types: (1) impacts on socially valued aspects of the natural environment, (2) impacts on the social structure, and (3) the effects of perceived danger of accidents and radiation. Changes caused by the disruption of the environment have direct impacts upon humans. The removal of the land for the site from future development, long-term demands on the water supply, and visual intrusion of cooling towers or buildings on the natural landscape will permanently affect the relationship of the residents with their environment and the development of the area.

Areas where such facilities would be built would pay most of the resulting socioeconomic costs but receive few of the social benefits involved. Also, while certain items can be isolated and labeled as costs or benefits, other impacts cannot be quantified or are slow in developing, causing them to be unaccountable.

NUREG-0575 (Vol. 1 Final Generic Environmental Impact Statement on Handling and Storage

of Spent Light Water Power Reactor Fuel Executive Summary and Text (August 1979)) at 4-26

(fn. omitted) (ML055220127) [Att. 3].

It is not surprising that the Waste Confidence Decision Update and its predecessor

documents did not consider the offsite socioeconomic impacts of spent fuel storage following

plant shutdown. The Commission has long concluded that such impacts are inherently site-

specific and thus inappropriate for consideration as part of a generic finding. The findings of

NUREG 1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants

("GEIS") support the fact the socioeconomic impacts of offsite land use are site-specific Category 2 issues. *See* 10 C.F.R. Part 51, Table B-1 of Appendix B of Subpart A. The reason the GEIS treats all offsite land use impacts as Category 2 issues is the unique nature of these impacts and their site-specific characteristics:

Because land use changes may be perceived by some community members as adverse and by others as beneficial, the staff is unable to assess generically the potential significance of site-specific off-site land use impacts. This is a Category 2 issue.

GEIS at 4-109. These site specific characteristics are no different for the period after the plant has shut down than they are for the operation period.

Since the Waste Confidence Decision Update, which is the underlying support for the § 51.23(a) (new) finding that 60 years of onsite spent fuel storage after plant shutdown will have no environmental impact, does not address the non-radiological environmental impacts that are the subject of Contention 17B, no exemption from the restrictions of § 51.23(b) (new) nor waiver of that provision should be necessary. By its terms, § 51.23(b) (new) only prohibits the discussion of environmental impacts of spent fuel storage onsite following plant shutdown to the extent those issues are generic and to the extent they are covered by the § 51.23(a) (new) generic finding. In this case, the impacts of concern in proposed Contention 17B are both not previously considered and site-specific. Thus § 51.23(b) (new) is not applicable, and the State of New York does not need to request an exemption or a waiver for Contention 17B.

II. IN THE ALTERNATIVE, THE STATE REQUESTS AN EXEMPTION PURSUNAT TO 10 C.F.R. § 51.6 OR A WAIVER PURSUANT TO 10 C.F.R. § 2.335

Should the Board disagree with the State's position in Point I that 10 C.F.R. § 51.23(b) (new) does not bar the Contention 17B, the State requests that the Board determine that New York is exempt from the requirements of 10 C.F.R. § 51.23(b) (new) insofar as Contention 17B addresses the environmental impacts of spent fuel storage at Indian Point following shutdown of the plant. *See* 10 C.F.R. § 51.6 (The Commission may grant exemptions that are authorized by law and in the public interest). Alternatively, New York asks that the Board find that New York has made a *prima facie* showing that the restrictions of § 51.23(b) (new) should be waived with regard to the portion of Contention 17B that addresses environmental impacts of spent fuel storage at Indian Point following shutdown of the plant and certify the matter to the Commission for its decision. *See* 10 C.F.R. §§ 2.335(b), (d).

A. The State Should Be Exempted From the Requirements of 10 C.F.R. § 51.23(b) (new) Pursuant to The Provisions of 10 C.F.R. § 51.6

Recognizing the difficulty of creating regulations that can accommodate all circumstances, the Commission included 10 C.F.R. § 51.6 to allow "any interested person" to seek an exemption from a specific requirement of Part 51.² An exemption from a requirement of

² There can be no doubt that New York State is interested in this issue since it involves the value of property held by New York State residents. There is also no question that New York State is a "person" within the meaning of the regulations:

Person means (1) any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, government agency . . . any State or any political subdivision of, or any political entity within a State, any foreign government or nation or any political subdivision of any such government or nation, or other entity;

Part 51 may be granted where the Commission "determines [the exemption is] authorized by law and [is] otherwise in the public interest." 10 C.F.R. § 51.6.³ To the extent offsite land use impacts of spent fuel storage at the Indian Point site after plant shutdown are deemed to be "within the scope of the generic determination in paragraph (a)" of § 51.23 the State may not raise any environmental impacts associated with such storage in the license renewal proceeding. 10 C.F.R. § 51.23(b). The State of New York seeks exemption from that requirement.

A thorough evaluation of the potential environmental impacts of a proposed action and the environmental benefits of the "no action alternative" are requirements of NRC Regulations, 10 C.F.R. Part 51, President's Council on Environmental Quality ("CEQ") Regulations, 40 C.F.R. Part 1502, and the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et seq.* Thus, allowing a full discussion of offsite land use impacts on land values and tax revenues of the proposed license renewal is not only authorized but required by law. Section 51.23(b) (new) should not stand in the way.

Allowing a full analysis of offsite land use impacts of license renewal at Indian Point is

10 C.F.R. § 2.4.

While New York is not aware that § 51.6 has been used by a state (*see. e.g.*, LIC-103, Requests for Exemption from NRC Regulations, NRC Staff, Jul. 26, 2002 (which focuses on exemption requests by applicants but does not preclude requests by other "interested persons")), it is clear that the regulation is applicable to "any interested person." ML021230148.

³ Pursuant to 42 U.S.C. § 2201(n) the Commission may delegate its authority to any officer (which includes a hearing board). Pursuant to 10 C.F.R. § 2.4, references to the "Commission" in the rules includes those to whom the Commission has delegated authority. The Commission delegated decision-making authority to the ASLB which in turn delegated the authority to this Board. Order, Establishment of Atomic Safety and Licensing Board (10/18/07) (ML072910164).

also in the public interest. The Commission has made clear that the purpose of an environmental

impact statement is to implement the obligations of NEPA:

The National Environmental Policy Act of 1969, as amended (NEPA) directs that, to the fullest extent possible: (1) The policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in NEPA, and (2) all agencies of the Federal Government shall comply with the procedures in section 102(2) of NEPA except where compliance would be inconsistent with other statutory requirements. The regulations in this subpart implement section 102(2) of NEPA.

10 C.F.R. § 51.10(a). NEPA requires that every federal agency shall:

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official 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,

42 U.S.C. § 4332(C).

Attached to proposed Contention 17B as supporting evidence are declarations and reports prepared by Dr. Stephen Sheppard, a professor in the Economics Department at Williams College and a recognized expert in the field of the land use impacts of nearby disamenities. Dr. Sheppard has preliminarily concluded that relicensing Indian Point will have an adverse impact of hundreds of millions of dollars. The magnitude of these substantial impacts is totally ignored in the FSEIS, and the concept of adverse impacts on local land values is barely mentioned. But for the requirement contained in § 51.23(b) (new), these impacts would be part of the "detailed statement" of "environmental impacts of the proposed action" and part of the benefits of rejecting the license renewal proposal would include the substantially increased land values and tax revenues that would follow such a decision. An analysis of the potential impacts would serve the public interest by complying with NEPA's mandate and providing a more complete evidentiary record for making the relicensing decision. The Commission has noted the value of such fully informed decisions:

While NEPA does not require agencies to select particular options, it is intended to "foster both informed decision-making and informed public participation, and thus to ensure that the agency does not act upon incomplete information, only to regret its decision after it is too late to correct."

Duke Energy Corporation (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2) CLI-02-17, 56 N.R.C. 1, 10 (2002).

Exempting the State of New York from the requirement of § 51.23(b) will also serve the public interest because it will expedite the decision on Entergy's application for relicensing. By granting an exemption from the requirements of those provisions, the Board will allow the proceeding to stay on its current schedule and hearings will be held on all matters, including whether the FSEIS has properly evaluated and weighed the adverse environmental impacts of license renewal and the positive impacts of the no action alternative as they relate to offsite land use values. By contrast, if an exemption is not granted and the Board certifies the issue to the Commission pursuant to 10 C.F.R. § 2.335(b), many months will be lost waiting for a final determination from the Commission, which, if favorable to waiver, may necessitate reopening the hearings. *See, e.g., Pacific Gas & Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2) LBP-10-15 (August 4, 2010) at 96 and Commission Order issued August 31, 2010 setting a briefing schedule for the certified question with final briefs due to be filed on October

15, 2010. In addition, while the issue of waiver is pending, the status of prefiled testimony, the likely *in limine* motions regarding such testimony as it relates to spent fuel storage following plant shutdown and responses thereto, proposed cross-examination and pre-trial briefs, and Board preparation for the hearing will be uncertain. *See id.* Granting an exemption now will provide certainty and ensure efficiency with no injury. *See* 10 C.F.R. § 2.341 (allowing petitions for review); *see also Global Laser Enrichment* (Docket Number 70-7016 GE-Hitachi Global Laser Enrichment LLC Request For Exemption From 10 CFR §§ 51.60(a) and 70.21(h) To Allow Early Submittal Of An Environmental Report (December 8, 2008) ML090350200, Attachment at 6) (citing improved hearing efficiency as a public interest basis for approval of exemption under § 51.6).

Thus, the State of New York urges the Board to use the authority of 10 C.F.R. § 51.6 to exempt it from the requirements of 10 C.F.R. § 51.23(b) (new), to the extent it precludes discussion of the offsite land use impacts of spent fuel stored at the Indian Point site following plant shutdown.

B. Waiver of the Restrictions Contained In 10 C.F.R. §51.23(b) (new) Is Warranted

Should the Board determine that an exemption from the restrictions of § 51.23(b) (new) is not warranted, the State of New York urges the Board to determine that New York State has made a *prima facie* case for waiver of the restrictions as they apply to the issue of the impact of license renewal on offsite land use impacts and tax revenues from those lands. The process for seeking waiver of a regulation is set forth in 10 C.F.R. § 2.335(b) and provides, in relevant part:

A party to an adjudicatory proceeding subject to this part may petition that the application of a specified Commission rule or regulation or any provision thereof,

of the type described in paragraph (a) of this section, be waived or an exception made for the particular proceeding. The sole ground for petition of waiver or exception is that special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule or regulation (or a provision of it) would not serve the purposes for which the rule or regulation was adopted. The petition must be accompanied by an affidavit that identifies the specific aspect or aspects of the subject matter of the proceeding as to which the application of the rule or regulation (or provision of it) would not serve the purposes for which the rule or regulation was adopted. The affidavit must state with particularity the special circumstances alleged to justify the waiver or exception requested.

The Commission has also expanded on these regulatory requirements:

for us to grant an exemption or waiver of section 50.47(a)(1) and thereby permit the adjudication of emergency-planning issues in this proceeding, we must first conclude under our regulations and case law that (i) the rule's strict application "would not serve the purposes for which [it] was adopted;" (ii) the movant has alleged "special circumstances" that were "not considered, either explicitly or by necessary implication, in the rulemaking proceeding leading to the rule sought to be waived;" (iii) those circumstances are "unique" to the facility rather than "common to a large class of facilities"; and (iv) a waiver of the regulation is necessary to reach a "significant safety problem."⁴ The use of "and" in this list of requirements is both intentional and significant. For a waiver request to be granted, all four factors must be met.

Dominion Nuclear Connecticut, Inc. (Millstone Nuclear Power Station, Units 2 and 3) CLI-05-

24, 62 NRC 551, 559-60 (2005) (footnotes omitted); see also Pacific Gas & Electric Company

(Diablo Canyon Nuclear Power Plant, Units 1 and 2) LBP-10-15 (August 4, 2010) at 9;

Tennessee Valley Authority (Watts Bar Unit 2) LBP-10-12 (Memorandum And Order (Denial of

Petition to Waive 10 C.F.R. §§ 51.53(b), 51.95(b), 51.106(c) in the Watts Bar Operating License

Proceeding) (July 29, 2010) at 3.

The ASLB in its recent decision in the Diablo Canyon case has defined the prima facie

⁴ The issue in the *Dominion* case involved safety. When applied to an environmental issue, as here, it would be reasonable to require a showing that the environmental impact is

requirement as follows:

a *prima facie* case is defined as "1. The establishment of a legally required rebuttable presumption. 2. A party's production of enough evidence to allow the fact trier to infer the fact at issue and rule in the party's favor." Black's Law Dictionary 1310 (9th ed. 2009). The Appeal Board has stated that "[*p*]*rima facie* evidence must be legally sufficient to establish a fact or case unless disproved," *Diablo Canyon*, ALAB-653, 16 NRC at 72, and that, in the context of waiver petitions, "[w]e have found that a *prima facie* showing . . . is one that is 'legally sufficient to establish a fact or case unless disproved," *Seabrook*, ALAB-895, 28 NRC at 22 (quoting *Diablo Canyon*, ALSB-653, 16 NRC at 72). Thus, the existence (or not) of a *prima facie* case is determined based on the sufficiency of the movant's assertions and informational/evidentiary support alone.

Diablo Canyon, LBP-10-15, at 40-41.

1. Strict enforcement of the requirements of 10 C.F.R. § 51.23(b) (new) in this proceeding will not serve the purposes of the regulation and will exclude consideration of special circumstances not considered in the rulemaking

When the Commission first adopted the version of 10 C.F.R. § 51.23 (old) that included a

generic finding on the safety and environmental impacts of spent fuel storage at reactor sites

following plant shut down it described the purpose of its endeavor as:

The Commission also stated that in the event it determined that on-site storage of spent fuel would be necessary or appropriate after the expiration of facility licenses, it would propose a rule addressing the environmental and safety implications of such storage.

49 Fed. Reg. 34658 (Waste Confidence Decision (Aug. 31, 1984)) [Att. 4]. One of the purposes

of § 51.23 (new) is to address the "environmental . . . implications of such storage."⁵ However,

"significant."

⁵ In *Diablo Canyon*, the ASLB rejected the argument that the only purpose of generic rules is to expedite the NEPA process. "We reject the implication that the sole purpose of the Part 51 rules is simply to expedite the NEPA process and to apply the generic determinations without exception. *See id.* Instead, as the NRC Staff stated, the purpose of these regulations is to apply generic determinations where the generic determinations are appropriate." *Diablo*

as previously set forth, the substantial site-specific environmental implications of long term storage of spent nuclear fuel at Indian Point have not been evaluated, explicitly or by implication, in either the Waste Confidence Decision Update, including earlier versions, or in the FSEIS in this case.

Those substantial site-specific impacts are outlined in the declarations provided by Dr. Sheppard. They demonstrate that allowing Indian Point to operate for an additional 20 years, generating additional spent fuel that will remain at the site, will cause substantial damage to the value of the real estate surrounding the Indian Point facility.

2. The offsite land use impacts identified by Dr. Sheppard are unique to Indian Point and its unique location

The offsite land use impacts identified in Dr. Sheppard's declarations are specific to the Indian Point site and do not apply to other sites. They are focused on the demographics of this area. In his initial report, Dr. Sheppard focuses on the unique characteristics of the area surrounding Indian Point to identify the extent and magnitude of these site-specific impacts:

In order to obtain a general estimate of the magnitude of property value impacts, I have made use of data available from the 2000 Census for the region around the Indian Point generating facility, making appropriate adjustments as described below.

A conservative estimate of property value impacts can be obtained by applying the impact estimated by Blomquist discussed above. His analysis suggested that there are no impacts on property values beyond 11,500 feet, and that up to that distance moving 10% further away from the power plant would increase the value of the property by 0.9%.

According to the 2000 Census, there are 32,427 persons living in Census Block Groups whose center is within 2 miles of the Indian Point facility. Within this area there are 12,933 housing units. The area around Indian Point and the

Canyon, LBP-10-15, at 41 (reference omitted).

associated census block groups are illustrated in Figure 1 below. The block groups are shaded blue with darker shades indicating more dwelling units. Of these dwellings, 6886 units are owner occupied units whose collective value in 2000 was \$1,425,552,500 (over \$1.4 billion). There were 5468 renter-occupied properties, whose average median contract monthly rent was about \$750 per month. I approximate the value of the rental properties by calculating the discounted present value of the stream of rents that can be earned, and this produces an estimated value of rental; property in the area of \$816,613,800 (nearly \$817 million). Combining these indicates that as of the 2000 Census the total value of residential property within 2 miles of the Indian Point facility was about \$2,242,166,300 (\$2.2 billion).

* * *

Property values have continued to increase with the overall market, and the Office of Federal Housing Enterprise Oversight (OFHEO) tracks the course of house prices in every state and many metropolitan areas in the US. Using the index for the state of New York indicates that on average house prices have increased 93% from the first quarter of 2000 to the first quarter of 2007. Therefore the current market value of residential property within 2 miles of the Indian Point plant is approximately equal to \$4,327,380,959 (over \$4.3 billion).

For each Census block group, I calculated the percentage increase in distance from the Indian Point plant that would be required to move the block group to be 11,500 feet away from the plant. This is a very conservative estimate, based on Blomquist's study, of how far away from the plant properties would have to be to be free of impact from the plant. To be particularly certain that I obtain a minimum estimate of the impact, I excluded those houses in the block group that actually contain the plant, since these are not typical of the sample in a way that would make application of Blomquist's results scientifically valid in all circumstances.

The resulting calculations indicate that removal of the impacts of the Indian Point Nuclear plant would increase property values by \$576,026,601 (over \$500 million). This is clearly, sufficient to alter the decisions about land use made by the owners of the most affected properties. The result indicates that the assertion that the impacts of extended licensing of the plant would be non-existent or undetectable cannot be accepted as scientifically valid.

November 29, 2007 Declaration of Stephen Sheppard (to which is attached Potential Impacts of

Indian Point Relicensing on Property Values) at 4-6 ("2007 Sheppard Decl. and Report") [Att.

These site-specific characteristics are further discussed in a supplemental declaration submitted by Dr. Sheppard in which he identifies the kind of localized market considerations that must go into a determination of the land use and land value impacts for any particular site, particularly where the analysis is focused on the hypothetical that the disamenity at issue will be removed and the task is to ascertain what positive impact that removal will have on land use and land value. March 15, 2010 Supplemental Declaration of Stephen C. Sheppard at 5-6 [Att. 14].

11].

As early as 1983, then-NRC Commissioner Victor Gilinsky filed a separate statement of dissent when the Commission proposed adoption of what is now the Waste Confidence Rule in which he observed "[w]hile I agree that there is no obstacle in principle to extended on-site storage, I think it is clear that each power reactor site will have to be examined in detail." 48 Fed. Reg. 22730, 22733 (May 20, 1983) [Att. 2]. The Commission itself recognized at that time the site-specific nature of the measures needed to deal with spent fuel storage following reactor shutdown by proposing, what is now 10 C.F.R. §50.54(bb), a provision that requires each licensee to submit, no later than 5 years before expiration of the operating license, a site-specific plan for how the spent fuel will be managed on the site following reactor shutdown and until such time as the fuel is sent for reprocessing or off-site disposal. *Id*, at 22732.

As noted above, the findings of the GEIS for license renewal support the fact the socioeconomic impacts of offsite land use are site-specific Category 2 issues. *See* 10 C.F.R. Part 51, Table B-1 of Appendix B of Subpart A. Thus, the issue in this Petition is not whether the offsite impacts identified by Dr. Sheppard are site-specific – they are – but whether these site-specific impacts should be allowed to be considered in this license renewal proceeding. The

State urges the Board to conclude the State has made a prima facie case that they should be.

While it is true that conceptually offsite land use impacts *could* be impacted at other plant sites, that does not turn the impact into a generic one any more than the fact that air quality during refurbishment could be an environmental impact at all plants but it is nonetheless a Category 2 issue because it will vary depending upon site-specific considerations. 10 C.F.R. Part 51, Appendix B to Subpart A, Table B-1. Dr. Sheppard has provided substantial evidence that unique characteristics in the vicinity of Indian Point make the magnitude of the offsite land use impacts substantial and warrant their consideration in this license renewal proceeding.

3. The offsite land use impacts identified by Dr. Sheppard are significant and substantial

Dr. Sheppard has identified the magnitude of the socioeconomic impacts that will occur if Indian Point is relicensed and if spent fuel is allowed to be stored at the site for years after the plant is shutdown. His preliminary estimates indicate that if the plant is relicensed it will postpone for at least 30 years the recovery of over \$500 million of land value for the land adjacent to the plant. *See* United States Department of Energy Final 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, Volume 1 – Impact Analyses, Chapters 1 through 15 (DOE/EIS-0250) Feb. 2002, [Att. 7] (evaluating the then proposed Yucca high level waste repository and scenarios for delivery of spent fuel casks either by truck or rail and assuming 24 years to remove waste from existing reactors without license extension) and October 22, 2008 Entergy decommissioning submission (NL-08-144, Enclosure 2) (ML092260723) at 10 (calculating 28 years needed to remove the spent fuel already generated at

the site) [Att. 8].

As Dr. Sheppard's January 24, 2011 Report demonstrates, license renewal will extend by at least 30 years (20 for the license renewal period plus at least 10 additional years to remove the additional spent fuel generated during license renewal) the time before the property adjacent to the Indian Point site can regain its full value of more than \$500 million. The cost of this delay to those land owners and to the local taxing authority will be hundreds of millions of dollars. All that value will be lost to a wide group of property owners within 2 miles of Indian Point by allowing Indian Point to be relicensed, an impact that dwarfs the asserted positive socioeconomic impacts from tax revenues paid by Entergy to local governments, on which the FSEIS relies in its analysis of socioeconomic impacts. FSEIS at 8-24 to 8-25. Since the FSEIS concedes that these socioeconomic impacts are relevant to the relicensing decision, it is significant that denial of relicensing will boost the socioeconomic benefits to local taxing authorities as well as provide substantial increased land value to thousands of private property owners, underscoring the environmental significance of the post-plant operation offsite land use issue that, but for an exemption from, or a waiver of, the requirements of 10 C.F.R. §51.23(b) (new) may not be available for consideration in the relicensing decision.

4. The Commission has suggested that Waiver of 10 C.F.R. § 51.23(b) (new) may be appropriate

As noted above, the Commission has recently completed its reevaluation of its previous Waste Confidence decision. Waste Confidence Decision Update RIN 3150-AI47 and NRC-2008-0482 Consideration of Environmental Impacts of NRC-2008-0404 Temporary Storage of Spent Fuel After Cessation of Reactor Operation (75 Fed. Reg. 81032). The State of New York

submitted extensive comments in that proceeding including Supplemental Comments By The Office Of The Attorney General Of The State Of New York Concerning The Nuclear Regulatory Commission's Proposed Waste Confidence Decision Update And Consideration Of Environmental Impacts Of Temporary Storage Of Spent Fuel After Cessation Of Reactor Operation (Feb. 9, 2010) ("NYS Supplemental Comments") [Att. 13]. New York and other commenters noted that there were numerous site-specific impacts associated with the anticipated long term storage of spent fuel at reactor sites after plant shutdown. NYS Supplemental Comments at 7-13. The State specifically identified the Declarations of Dr. Stephen Sheppard regarding the impact on offsite land use values which continued storage of spent fuel will have. Id. at 12-13 ("Dr. Sheppard has identified site-specific environmental issues which are relevant to the indefinite storage of spent fuel at reactor sites.... Dr. Sheppard identified substantial impacts on the land use and land values surrounding the Indian Point site in the event that license renewal is not allowed and the plant is promptly decommissioned and the spent fuel removed to a waste disposal site by 2025 (land values will increase) and in the event that spent fuel is stored indefinitely at the site (land values will remain depressed for the indefinite future").

In response to comments about potential site-specific environmental impacts associated with storage of spent fuel at the reactor site after plant shutdown, the Commission suggested that 10 C.F.R. § 2.335 might offer a vehicle to allow the review of site-specific impacts. *See, e.g.,* 75 Fed. Reg. at 81044 ("10 CFR 2.335(b) provides that a party to an adjudicatory proceeding may petition for the waiver of the application of the rule or for an exception for that particular proceeding"); *id.* at 81050 ("The Commission already has a rule, 10 CFR 2.335, that allows a party to an adjudicatory proceeding to seek a waiver or exception to a rule where its application

would not serve the purposes for which the rule was adopted"). These general statements were then applied specifically to the State of New York and its concerns that there were site-specific environmental issues that were not being addressed by the Waste Confidence Rule.

The Attorney General is correct that there may be some issues that cannot be addressed through a generic process like the Waste Confidence Decision. The Commission has long recognized this, even in cases where issues are resolved through a generic rulemaking. Site-specific circumstances may require a site specific analysis; the Commission has provided for these situations through its regulations in 10 CFR 2.335, which allows parties to adjudicatory proceedings to petition for the waiver of or an exception to a rule in a particular proceeding.

* * *

If the State believes that there are site-specific issues associated with the Indian Point license renewal proceeding, the State should seek a waiver of the rule through that proceeding using the procedures in 10 CFR 2.335. But the potential that one or more sites might not fall under the generic determination in the Waste Confidence Decision and Rule is not sufficient reason for the Commission to require to a site-specific analysis for all sites. The 10 CFR 2.335 waiver process is intended to address the circumstances that the Attorney General claims are present at Indian Point; and the adjudicatory proceeding for the Indian Point license renewal, not this rulemaking, is the proper venue to raise these issues.

75 Fed. Reg. at 81057.

Thus, the new bases offered for Contention 17A and this Petition are in part a direct response to the Commission's invitation, as articulated in the Waste Confidence Decision Update. Obviously, New York State does not assert that the Commission has already ruled that such a petition should be granted, but it has certainly recognized that the issues raised here by New York State and raised before the Commission in the Waste Confidence proceeding are the type of site-specific issues for which waiver may be appropriate.

CONCLUSION

For the reasons stated, New York State requests that the Board find that the socioeconomic issues raised by the amended bases of Contention 17A are not barred by § 51.23(b) (new). In the alternative, the State asks that if they are barred by § 51.23(b) (new), the Board find that the State is entitled to an exemption from the requirements of that section pursuant to § 51.6. Finally, the State asks that if the socioeconomic issues are barred by § 51.23(b) (new) and an exemption is not granted, the Board find that the State has made a *prima facie* case pursuant to § 2.335(b) that the provisions of § 51.23(b) (new) should be waived and certify the matter to the Commission.

Respectfully submitted,

s/ Susan L. Taylor

Assistant Attorney General

Dated: January 24, 2011

Tohn J. Sipos Assistant Attorney General Office of the Attorney General of the State of New York The Capitol Albany, New York 12224

UNITED STATES NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

-----x In re:

License Renewal Application Submitted by

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. Docket Nos. 50-247-LR; 50-286-LR

ASLBP No. 07-858-03-LR-BD01

DPR-26, DPR-64

January 24, 2011

STATE OF NEW YORK

CONTENTION 17B

Office of the Attorney General for the State of New York The Capitol State Street Albany, New York 12224

CONTENTION 17B

THE FSEIS FAILS TO ADDRESS THE IMPACT OF THE CONTINUED OPERATION OF IP2 AND IP3 FOR ANOTHER 20 YEARS ON OFFSITE LAND USE, INCLUDING REAL ESTATE VALUES IN THE SURROUNDING AREA IN VIOLATION OF 10 C.F.R. §§ 51.71(a), 51.71(d), 51.95(c)(1), AND 51.95(c)(4)

BASIS

1. Appendix B to Subpart A of 10 C.F.R. Part 51 requires that offsite land use impacts be evaluated in a Final Supplemental Environmental Impact Statement. Offsite land use impacts cannot be assessed generically and are thus Category 2 issues that fall within the scope of the proceeding. *See* Memorandum and Order, *In the Matter of Entergy Nuclear Operations*. *Inc.* (Indian Point Nuclear Generating Units 2 and 3) (Jul. 31, 2008) at 82. *See also Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (1996) ("GEIS") §

4.7.4.2 ("Because land use changes may be perceived by some community members as adverse and by others as beneficial, the staff is unable to assess generically the potential significance of site-specific off-site land use impacts. This is a Category 2 issue"). In December 2010, NRC Staff issued a Final Supplemental Environmental Impact Statement for the requested renewal of the operating licenses for Indian Point Unit 2 ("IP2") and Indian Point Unit 3 ("IP3") ("FSEIS").

2. The FSEIS's evaluation of land use impacts is deficient because it fails to adequately evaluate the positive impact on land use and land value from denial of the license extension for IP2 and IP3. See 10 C.F.R. §§ 51.71(a), 51.71(d), 51.95(c)(1), and 51.95(c)(4).

3. The FSEIS improperly limited its analysis of the land use impacts of relicensing to plant-related population growth or to land development driven by tax revenues generated by the plant. FSEIS at 4-45 to 4-47. This analysis is improper because "NRC regulations do not limit consideration to tax-driven land-use changes" and "the impact on real estate values that
would be caused by license renewal or non-renewal" should have been considered in an environmental analysis of relicensing IP2 and IP3. Memorandum and Order, *In the Matter of Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3) (July 31, 2008) at 83.

4. Under the no-action alternative, if the licenses were not renewed, the Indian Point plants would cease operating 20 years earlier, the site would be decommissioned 20 years earlier, the quantity of spent fuel generated at the plant would be approximately 50% less than with license renewal, and the time to remove the spent fuel from the site when, and if, a high level waste repository is available would be reduced by at least 10 years.

5. The no-action alternative, by removing the operating nuclear plants and structures associated with an operating nuclear plant from the site sooner, and significantly reducing the time that spent fuel will be stored at the site, will more quickly and more substantially increase the beneficial uses for land adjacent to (within 2 miles) the Indian Point site and will therefore increase the value of that land. The FSEIS discounts some of these beneficial impacts and ignores others, without any consideration of the substantial evidence submitted by Dr. Stephen Sheppard (*see* November 29, 2007 Declaration of Stephen C. Sheppard with accompanying report, *Potential Impacts of Indian Point Relicensing on Property Values*; February 26, 2009 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Potential Impacts of Indian Point Relicensing with Delayed Site Reclamation*; and March 15, 2010 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Determinants of Property Values*) and by reliance on a report by Levitan and Associates, which found that the "combined increase in property values and increased taxes could have a noticeable effect on some area homeowners

and business, though Levitan and Associates did not indicate the magnitude of this effect and whether the net effect would be positive or negative. "FSEIS at 8-25.

6. Extended operation of IP2 or IP3 will delay the time when adjacent lands would achieve the economic recovery that they would otherwise enjoy if IP2 and IP3 are not relicensed.

7. In addition, extending the license for an additional 20 years will require additional storage for spent fuel generated during the extended period.

8. The IP2 and IP3 spent fuel pools are not sufficient to contain the spent fuel that will be generated during the additional 20 years of operation of IP2 or IP3 and thus dry cask storage is required. *See* August 13, 2009 Entergy package submitted to NRC on decommissioning funding (ML092260736) (package containing ML092260720 and ML092260723) at 10 (estimating that 96 dry casks will be needed to store the spent fuel from IP1 and IP2 and anticipating that more casks will be needed to store the spent fuel from IP3 *even without license renewal*) [Att. 8] and Entergy Document Ell-1583-006 Preliminary Decommissioning Cost Analysis For The Indian Point Energy Center, Unit 3 (Dec. 2010) (indicating that a new spent fuel storage area will need to be developed at Indian Point to store all the IP3 spent fuel) at 10 [Att. 10].

9. This dry cask storage of high level nuclear wastes will create further impacts on the value and potential use of adjacent lands beyond the impacts of the operating nuclear plants.

10. The FSEIS contains no analysis of the environmental impact on adjacent land values that will be associated with the construction and long term operation of a dry cask storage facility at the Indian Point site of a size sufficient to handle the spent fuel from extended operation of either reactor.

11. If the licenses for IP2 and IP3 are not extended, owners and potential purchasers of land adjacent to Indian Point can contemplate that the site will be cleared of an operating nuclear plant and the structures associated with operation of the plant by 2025. *See* 10 C.F.R. § 50.82(a)(6) (precluding licensees from performing decommissioning activities that "[r]esult in significant environmental impacts not previously reviewed") and the FSEIS, which has no analysis of the substantial adverse impacts that would occur to local land values if Indian Point remains as an abandoned nuclear power plant for as much as 60 years (the outer limit of SAFSTOR) after shutdown; *see also* August 13, 2009 Entergy package submitted to NRC on decommissioning funding (ML092260736) (in which Entergy announces its intent to keep IP2 and IP3 in SAFSTOR for 60 years after shutdown) [Att. 8].

12. However, if the licenses are extended for IP2 or IP3, the site will remain as an operating nuclear plant for at least another 20 years and substantial additional quantities of spent fuel will be generated during this period, indefinitely stored in dry casks at the site as a result of license renewal. The additional spent fuel will require an additional 10 years before the license renewal spent fuel can be removed from the site. This will have an adverse impact on the value of adjacent land and its development as compared to what would occur if the licenses were not renewed.

13. Thus, the FSEIS fails to consider reasonable alternatives to mitigate offsite land use impact and fails to fully analyze the adverse impacts of license renewal on offsite land value as required by 10 C.F.R. § 51.71 such that the applicable requirements of Appendix B of Subpart A of 10 C.F.R. Part 51 have not been satisfied. 10 C.F.R. § 54.29(b).

14. On December 23, 2010, the NRC completed a lengthy rule making process involving reconsideration of 10 C.F.R. § 51.23 ("Waste Confidence Rule"). 75 Fed. Reg. 81032 (Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation). The new rule is effective January 24, 2011. *Id.*

15. The new provision abolished the date certain by which a high level waste repository would be available and replaced it with a finding that such a repository would be available "when necessary." 10 C.F.R. §51.23(a) (75 Fed. Reg. 81032, 81037).

16. The new provision also stated that "spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor." *Id.*

17. The State of New York submitted Supplemental Comments on the proposed waste confidence rule, which addressed the inappropriateness of attempting to make a generic finding regarding the offsite environmental impacts associated with spent fuel storage at the reactor site following shutdown of the reactor. Supplemental Comments by the Office of the Attorney General of the State of New York Concerning the Nuclear Regulatory Commission's Proposed Waste Confidence Decision Update and Consideration of Environmental Impacts of Temporary Storage of Spent Fuel after Cessation of Reactor Operation (Feb. 9, 2010) (ML100480809) at 12-13 [Att. 13]. New York State cited the Declarations of Dr. Stephen Sheppard that were offered in this proceeding to demonstrate that such impacts would be considerable and that they were specific to each site and not generic. *Id*.

18. The new provision and the accompanying "Waste Confidence Decision Update," acknowledged the State of New York's Supplemental Comments but included no discussion of the potential impact on offsite land value of the extended storage of spent fuel at the reactor site. 75 Fed. Reg. 81032-81076.

19. The prohibition on discussion of the environmental impacts of spent fuel storage following the end of license renewal contained in 10 C.F.R. § 51.23(b) applies only to impacts that are within the scope of 10 C.F.R. § 51.23(a). 10 C.F.R. § 51.23(a) provides

The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.

The prohibition does not preclude a discussion of the offsite land use impacts involved here since, as noted, they are not discussed in the new § 51.23(a), are site-specific and not generic, and are therefore not within the scope of those generic determinations.

20. Adding 20 years of additional spent fuel to the spent fuel that would need to be stored if the Indian Point reactors were shutdown by 2013 and 2015 will exacerbate the adverse impact on offsite land values.

21. The FSEIS contains no discussion of the adverse impact on offsite land values of allowing additional spent fuel to be generated and stored at the plant site after the plant is shut down. Thus, the FSEIS fails to consider reasonable alternatives to mitigate offsite land use

impact as required by 10 C.F.R. § 51.71 such that the applicable requirements of Appendix B of Subpart A of 10 C.F.R. Part 51 have not been satisfied. 10 C.F.R. § 54.29(b).

22. The FSEIS also contains no discussion of the adverse impact on offsite land values of Entergy's newly announced intention to abandon the facility for 60 years to allow its decommissioning trust fund to accumulate sufficient funds. *See* August 13, 2009 Entergy package submitted to NRC on decommissioning funding (ML092260736) [Att. 8]. Although Entergy's proposal has not yet been subjected to review and has not been approved,¹ NRC Staff has concluded that it provides sufficient assurance of adequate decommissioning funding at the time of permanent termination of operations to absolve Entergy of the duty to replenish its decommissioning accounts. *See* December 28, 2009 letter from NRC Senior Project Manager John P. Boska to Entergy (ML093450778) [Att. 16]. Accordingly, all parties must assume that the site will contain a non-operating nuclear facility for a period of 60 years from the end of operations.²

23. The FSEIS contains no discussion of the impact on surrounding property values of a mothballed nuclear facility with stored spent waste through 2095 nor does it compare those impacts to the impacts that would result if the plant licenses were not renewed and/or if the SAFSTOR option were rejected because of its severe adverse offsite environmental impacts.

24. In the new version of 10 C.F.R. § 51.23 and the accompanying discussion of environmental impacts, the Commission fails to consider, offers no evidence regarding, and

¹ The State reserves its right to challenge the proposal.

² Indeed, in 2008, Entergy assumed that the plant would remain in storage until 2064 and would not be restored to "Greenfield" condition until 2073. Enclosure 2 to NL-08-144, Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 2 (Oct. 22,

makes no findings as to the environmental impact of spent fuel storage at the reactor site beyond 60 years after plant shutdown. 75 Fed. Reg. 81032-81076.

25. In addition neither the Commission nor 10 C.F.R. § 51.23 indicates any date by which spent fuel will be removed from the plant site. *See* 75 Fed. Reg. 81032-81076.

26. Thus, for purposes of real estate development and planning by the local communities it has to be assumed, at this time, that spent fuel will remain at the site even after expiration of the longest potential time period for decommissioning the plant. *See* 10 C.F.R. § 50.82(a)(3) (specifying that decommissioning must occur within 60 years after shutdown, absent special permission for a longer period).

27. The prospect of the continued presence of the spent fuel on the site after decommissioning and evolution of the site from an electric power generating facility into a high level waste temporary storage facility will have a severe adverse impact on the value of land adjacent to the site (within a radius of 2 miles).

28. The FSEIS contains no consideration of these adverse environmental impacts or of alternatives that might be adopted to mitigate or eliminate these adverse consequences. Thus, the FSEIS fails to consider reasonable alternatives to mitigate offsite land use impact as required by 10 C.F.R. § 51.71 and therefore the applicable requirements of Appendix B of Subpart A of 10 C.F.R. Part 51 have not been satisfied. 10 C.F.R. § 54.29(b).

SUPPORTING EVIDENCE

29. An analysis of offsite land use impacts of license renewal during the time of license renewal is required by 10 C.F.R. Part 51, Subpart A, Appendix B, which identifies such

2010) (ML092260723) at 3, 17 & n.22; id. at 26 [Att. 8]. Following revision of the Waste

impacts as Category 2 – that is, for that impact, "the analysis reported in the Generic Environmental Impact Statement has shown that one or more of the criteria of Category 1 cannot be met, and therefore additional plant-specific review is required." *Id.* at n.2.

30. The Commission has decided by regulation that there is no set date by which a permanent offsite high level waste repository sufficient to handle all the wastes that will have been generated by IP1, IP2, and IP3 will be available. See 10 C.F.R. § 51.23,

31. 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."

32. The FSEIS concludes that there will be "no population-related land use impacts during the license renewal term beyond those already being experienced" and "no tax-revenue-related land use impacts during the license renewal term beyond those currently being experienced." FSEIS at 4-46 to 4-47. These are the only two land use impacts addressed. While the FSEIS examined tax benefits to local communities from continued operation of the plant beyond the current license term, it ignored the tax benefits to local communities from restoration of the value of lands adjacent to the plant if license renewal is not approved and it ignored the adverse impact on tax revenues to local communities if the Indian Point site is converted from an operating nuclear power plant to a high level nuclear waste storage facility.

33. The FSEIS did not consider the changes in property values associated with the unanticipated continuation of an operating nuclear power generation facility and the associated

Confidence Rule, that estimate is almost certainly optimistic.

increase in dry cask storage of spent waste for the license renewal period although NRC Staff was fully apprised of substantial site specific information related to these impacts. *See Potential Impacts of Indian Point Relicensing on Property Values*, Stephen C. Sheppard, Ph.D., November 2007 (appended to Declaration of Stephen C. Sheppard, sworn to November 28, 2007) [Att. 11]; *see* also February 26, 2009 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Potential Impacts of Indian Point Relicensing with Delayed Site Reclamation* [Att. 12]; March 15, 2010 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Determinants of Property Values*) [Att. 14]; Feb. 27, 2009 State of New York Contentions Concerning Staff's DSEIS (ML 090690303); and March 31, 2009 NYS Combined Reply to Entergy and NRC Staff in Support of Contentions 12-A, 16-A, 17-A, 33 and 34 (ML090960470).

34. Relying on *The Effect of Electric Utility Power Plant Location on Area Property Value*, Glenn Blomquist, Land Economics, Vol. 50, No. 1 (Feb. 1974) at 97-100, Dr. Sheppard states that "there was a clear and statistically significant impact of [non-nuclear] power plants on property values" up to a distance of 11,500 feet from the facility. *See Potential Impacts of Indian Point Relicensing on Property Values* at p. 2 (attached to the Nov. 29, 2007 Declaration of Stephen C. Sheppard). If anything, the impact of nuclear power plants is even larger. *Id.* at 4.

35. Moreover, an analysis titled *An Interregional Hedonic Analysis of Noxious Facility Impacts on Local Wages and Property Values*, David Clark and Leslie Nieves, Journal of Environmental Economics and Management, Vol. 27 (1994) at 235-53, concludes, to a reasonable and professionally accepted degree of scientific certainty, that "the impact of nuclear generating plants is more than 3 times the impact of coal fired plants and more than 4 times the

impact of gas and oil fired generating facilities." *Potential Impacts of Indian Point Relicensing on Property Values* at 3 (attached to the November 29, 2007 Declaration of Stephen C. Sheppard). This impact is from the facility itself when compared to an alternative use that is also capable of generating employment and income. These properly done studies support the contention that a nuclear power plant may have a significant, not a small, impact on adjacent land values.

36. Data from the 2000 Census demonstrate that, at the time of that census, the total value of residential property within 2 miles of the facility was about \$2.2 billion. *Potential Impacts of Indian Point Relicensing on Property Values. Id.* at 4. According to Dr. Sheppard's calculations, the current market value of residential property within 2 miles of the facility is slightly over \$4.3 billion (an increase of 93% from the first quarter of 2000). *Id.* Professor Sheppard calculated, conservatively, that removal of the facility and its spent fuel would increase property values within 2 miles of Indian Point by \$576,026,601. *Id.* Plainly, land use impacts of more than a half billion dollars cannot be considered "SMALL" or even "MODERATE."

37. Absent relicensing, the suppressed land values of adjacent property would substantially recover and would recover sooner. The FSEIS's failure to analyze the impact of relicensing on the property values of adjacent lands renders its land use impact analysis incomplete and its conclusions erroneous.

38. Absent relicensing, the volume of spent fuel at the site will be approximately 50% less, the time during which it will remain at the site is likely to be substantially less (at least 10 years) and thus the adverse impact of the site functioning as a high level nuclear waste storage facility will be diminished. August 13, 2009 Entergy package submitted to NRC on

decommissioning funding (ML092260736) (package containing ML092260720 and ML092260723) at 9 [Att. 8] and Entergy Document Ell-1583-006 Preliminary Decommissioning Cost Analysis For The Indian Point Energy Center, Unit 3 (December 2010) at 9 [Att. 10].

39. This contention is also supported by the previously submitted appendeddeclarations and reports of Dr. Sheppard, and the Jan. 24, 2011 4th Report of Dr. Sheppard {Att.15].

40. It is further supported by the 2002 U.S. Department of Energy Yucca Mountain Environmental Impact Statement,³ which indicates that it will take 24 years to remove the spent wastes from existing reactors, an analysis that does not include the waste from relicensed facilities. Because there is no basis to believe that any site will have priority and because license renewal will roughly increase the waste volume by 50% but not all plants will seek or obtain license renewal, it would appear reasonable to assume that adding 20 years of spent fuel from Indian Point license renewal will add at least an additional 10 years to the length of time that spent fuel will remain on site at Indian Point.

41. The contention is also supported by the August 13, 2009 Entergy package submitted to NRC on decommissioning funding (ML092260736) (package containing ML092260720 and ML092260723) at 10 [Att. 8], which estimates that 96 dry casks will be needed to store the spent fuel from IP1 and IP2 and anticipates that more casks and cask storage areas will be needed to store the spent fuel from IP3 *even without license renewal*.

³ See Environmental Impact Statement, U.S. Department of Energy Office of Civilian Radioactive Waste Management DOE/EIS-0250 Final Volume I - Impact Analyses Chapters 1 through 15 (February 2002) at 2-2 and 2-47. Excerpts from the DOE EIS are attached to this submission [Att. 7].

42. Finally, the contention is supported by Entergy Document Ell-1583-006 Preliminary Decommissioning Cost Analysis For The Indian Point Energy Center, Unit 3 (December 2010) at 10, which indicates the need to develop a new storage area for the spent fuel from IP3.

Respectfully submitted,

Nin WAW I s/) Susan L. Taylor Assistant Attorney General

Dated: January 24, 2011

John J. Sipos Assistant Attorney General Office of the Attorney General of the State of New York The Capitol Albany, New York 12224

UNITED STATES NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:

Docket Nos. 50-247-LR; 50-286-LR

ASLBP No. 07-858-03-LR-BD01

License Renewal Application Submitted by

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. DPR-26, DPR-64

January 24, 2011

DECLARATION OF AAG JOHN J. SIPOS

Pursuant to 28 U.S.C. § 1746, John J. Sipos hereby declares as follows:

1. I am an Assistant Attorney General for the State of New York, counsel for petitioner-intervenor State of New York in this proceeding.

ATTACHMENTS

2. Attachment 1 contains a true and correct copy of 10 C.F.R. § 51.23 as it appeared in the January 2010 edition of the Code of Federal Regulations (referred to in the State's filing of today's date as "10 C.F.R. § 51.23 (old)").

3. Attachment 2 contains a true and correct copy of Volume 48 of the Federal Register, pages 22730-22733 (May 20, 1983), Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of the Reactors' Operating Licenses.

4. Attachment 3 contains a true and correct excerpt from NUREG-0575, Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, Volume 1, (Aug. 1979) ML022550127 including pages 4-25 – 4-27.

5. Attachment 4 contains a true and correct copy of Volume 49 of the Federal

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Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination, Exemption, or Waiver Register, including pages 34658-34688 (Aug. 31, 1984), Waste Confidence Decision.

6. Attachment 5 contains a true and correct copy of Volume 53 of the Federal Register including pages 31651-31683 (Aug. 19, 1988), Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste.

7. Attachment 6 contains a true and correct copy of Volume 55 of the Federal Register, including pages 38472-38474 (Sept. 18, 1990), Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation.

8. Attachment 7 contains a true and correct excerpt from the United States Department of Energy Final 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, Volume I – Impact Analysis, DOE/EIS-0250, February 2002, including pages 2-2 and 2-47.

 Attachment 8 contains a true and correct excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 2, (Enclosure 2 to NL-08-144), prepared by TLG Services, Inc. for Entergy Nuclear, October 2008, ML092260723, including pages 2-4, 9-11, 16-18, 25-27.

10. Attachment 9 contains a true and correct copy of Volume 75 of the Federal Register, pages 81032-81076, published December 23, 2010, Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation & Waste Confidence Decision Update.

11. Attachment 10 contains a true and correct excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 3, Document E11-1583-006, prepared by TLG Services, Inc. for Entergy Nuclear, December 2010,

> Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination, Exemption, or Waiver

ML103550608, including pages 8-11.

12. Attachment 11 contains a true and correct copy of the November 29, 2007 Declaration of Dr. Stephen C. Sheppard with accompanying report, *Potential Impacts of Indian Point Relicensing on Property Values*.

13. Attachment 12 contains a true and correct copy of the February 26, 2009 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Potential Impacts* of Indian Point Relicensing with Delayed Site Reclamation.

14. Attachment 13 contains a true and correct copy of the February 9, 2010 Supplemental Comments of the State of New York submitted by the Office of the Attorney General in NRC rulemaking proceeding RIN 3150-AI47, NRC-2008-0482, NRC-2008-0404 – Waste Confidence Decision Update and Consideration of Environmental Impacts of Temporary Storage of Spent of Spent Fuel After Cessation of Reactor Operation.

15. Attachment 14 contains a true and correct copy of the March 15, 2010 Supplemental Declaration of Stephen C. Sheppard and accompanying report, *Determinants of Property Values*).

Attachment 15 contains a true and correct copy of the January 24, 2011 Report of
Dr. Stephen C. Sheppard in connection with NYS Contention 17B.

17. Attachment 16 contains a true and correct copy of the December 28, 2009 Letter from John P. Boska to Entergy Nuclear Operations, Inc. regarding IP2 decommissioning funding status report, ML093450778.

WAIVER

18. Included in the State's submission is a Petition for Waiver. *See* State of New York Request for Determination, Exemption, or Waiver (Jan. 24, 2011). The Petition requests a

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Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and

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waiver of the provisions of 10 C.F.R. § 51.23(b) to the extent they prevent consideration of the site-specific offsite land use impacts associated with increased amount of, and time of onsite storage of, spent fuel that will be generated as a result of the proposed relicensing of Indian Point Units 2 and 3.

19. When the Commission first adopted the version of 10 C.F.R. § 51.23 (old) that included a generic finding on the safety and environmental impacts of spent fuel storage at reactor sites following plant shut down it described the purpose of its endeavor as:

The Commission also stated that in the event it determined that on-site storage of spent fuel would be necessary or appropriate after the expiration of facility licenses, it would propose a rule addressing the environmental and safety implications of such storage.

49 Fed. Reg. 34658 Waste Confidence Decision August 31, 1984 [Att. 4].One of the purposes of § 51.23 is to address the "environmental . . . implications of such storage".¹

20. The offsite land use impacts identified in Dr. Sheppard's declarations are specific to the Indian Point site and do not apply to other sites. They are focused on the demographics of this area. In his initial report, Dr. Sheppard focuses on the unique characteristics of the area surrounding Indian Point to identify the extent and magnitude of these site-specific impacts:

In order to obtain a general estimate of the magnitude of property value impacts, I have made use of data available from the 2000 Census for the region around the Indian Point generating facility, making appropriate adjustments as described below.

A conservative estimate of property value impacts can be obtained by applying the impact estimated by Blomquist discussed above. His analysis suggested that

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¹ In *Pacific Gas & Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2) LBP-10-15 (August 4, 2010) the ASLB rejected the argument that the only purpose of generic rules is to expedite the NEPA process. "We reject the implication that the sole purpose of the Part 51 rules is simply to expedite the NEPA process and to apply the generic determinations without exception. *See id.* Instead, as the NRC Staff stated, the purpose of these regulations is to apply generic determinations where the generic determinations are appropriate." LBP-10-15, at 41 (reference omitted).

there are no impacts on property values beyond 11,500 feet, and that up to that distance moving 10% further away from the power plant would increase the value of the property by 0.9%.

According to the 2000 Census, there are 32,427 persons living in Census Block Groups whose center is within 2 miles of the Indian Point facility. Within this area there are 12,933 housing units. The area around Indian Point and the associated census block groups are illustrated in Figure 1 below. The block groups are shaded blue with darker shades indicating more dwelling units. Of these dwellings, 6886 units are owner occupied units whose collective value in 2000 was \$1,425,552,500 (over \$1.4 billion). There were 5468 renter-occupied properties, whose average median contract monthly rent was about \$750 per month. I approximate the value of the rental properties by calculating the discounted present value of the stream of rents that can be earned, and this produces an estimated value of rental; property in the area of \$816,613,800 (nearly \$817 million). Combining these indicates that as of the 2000 Census the total value of residential property within 2 miles of the Indian Point facility was about \$2,242,166,300 (\$2.2 billion).

Property values have continued to increase with the overall market, and the Office of Federal Housing Enterprise Oversight (OFHEO) tracks the course of house prices in every state and many metropolitan areas in the US. Using the index for the state of New York indicates that on average house prices have increased 93% from the first quarter of 2000 to the first quarter of 2007. Therefore the current market value of residential property within 2 miles of the Indian Point plant is approximately equal to \$4,327,380,959 (over \$4.3 billion).

For each Census block group, I calculated the percentage increase in distance from the Indian Point plant that would be required to move the block group to be 11,500 feet away from the plant. This is a very conservative estimate, based on Blomquist's study, of how far away from the plant properties would have to be to be free of impact from the plant. To be particularly certain that I obtain a minimum estimate of the impact, I excluded those houses in the block group that actually contain the plant, since these are not typical of the sample in a way that would make application of Blomquist's results scientifically valid in all circumstances.

The resulting calculations indicate that removal of the impacts of the Indian Point Nuclear plant would increase property values by \$576,026,601 (over \$500 million). This is clearly, sufficient to alter the decisions about land use made by the owners of the most affected properties. The result indicates that the assertion that the impacts of extended licensing of the plant would be non-existent or undetectable cannot be accepted as scientifically valid.

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Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination. Exemption, or Waiver November 29, 2007 Declaration of Stephen Sheppard (to which is attached *Potential Impacts of Indian Point Relicensing on Property Values*) at 4-6 ("2007 Sheppard Decl. and Report") [Att. 11].

21. These site-specific characteristics are further discussed in a supplemental declaration submitted by Dr. Sheppard in which he identifies the kind of localized market considerations that must go into a determination of the land use and land value impacts for any particular site, particularly where the analysis is focused on the hypothetical that the disamenity at issue will be removed and the task is to ascertain what positive impact that removal will have on land use and land value. March 15, 2010 Supplemental Declaration of Stephen C. Sheppard at 5-6 [Att. 14].

22. There is virtually no discussion of environmental impacts from spent fuel storage and certainly none related to non-radiological offsite environmental impacts in the Waste Confidence Decision Update or in 10 C.F.R. § 51.23(a) (new). Rather, the recent Waste Confidence Decision Update relies on the environmental analysis that accompanied the 1990 waste confidence findings. 75 Fed. Reg. 80132, 81035 (referencing the 1990 Waste Confidence amendments) [Att. 9]. But those amendments also failed to discuss offsite non-radiological environmental impacts, relying instead on a 1988 EA that accompanied amendments to 10 C.F.R. Part 72. 55 Fed. Reg 38472, 38473 (Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation (September 18, 1990)) ("The Commission's conclusions with respect to safety and environmental impacts of extended storage are supported by NRC's Environmental Assessment (EA) for the 10 CFR part 72 rulemaking 'Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste' (53 FR 31651, August 19, 1988)"). However, the 1988

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Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination, Exemption, or Waiver rulemaking also did not analyze non-radiological offsite environmental impacts from spent fuel storage but relied on an environmental analysis prepared in conjunction with earlier amendments to Part 72. *See* 53 Fed. Reg. 31651, 31657-58 that relies on NUREG-0575 ("Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," August 1979). But NUREG-0575 contains virtually no analysis of non-radiological offsite environmental impacts and certainly does not contain any analysis of the impacts on adjacent land uses and value as a result of using the former electric power generating site as a high level nuclear waste storage facility. The entire discussion of offsite non-radiological environmental impacts of onsite spent fuel storage in NUREG-0575 consists of the following:

4.3.1 The Reference Case Storage Solution Storing spent fuel has the advantage of resulting in confinement of perceived problems to a small area. As at a nuclear power plant, safeguards and safety measures can be developed to restrict access. The location of such a site near a community would produce social problems similar to those associated with siting of other nuclear-related facilities.

Social impacts likely associated with independent storage facilities, will be similar to those occurring at power plants and are of three main types: (1) impacts on socially valued aspects of the natural environment, (2) impacts on the social structure, and (3) the effects of perceived danger of accidents and radiation. Changes caused by the disruption of the environment have direct impacts upon humans. The removal of the land for the site from future development, long-term demands on the water supply, and visual intrusion of cooling towers or buildings on the natural landscape will permanently affect the relationship of the residents with their environment and the development of the area.

Areas where such facilities would be built would pay most of the resulting socioeconomic costs but receive few of the social benefits involved. Also, while certain items can be isolated and labeled as costs or benefits, other impacts cannot be quantified or are slow in developing, causing them to be unaccountable.

NUREG-0575 (Vol. 1 Final Generic Environmental Impact Statement on Handling and Storage

of Spent Light Water Power Reactor Fuel Executive Summary and Text (August 1979)) at 4-

26(fn. omitted) (ML055220127) [Att. 3].

23. The Commission has long concluded that offsite land use impacts are inherently

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site-specific and thus inappropriate for consideration as part of a generic finding. The findings of NUREG 1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants ("GEIS") support the fact the socioeconomic impacts of offsite land use are site-specific Category 2 issues. See 10 C.F.R. Part 51, Table B-1 of Appendix B of Subpart A. The reason the GEIS treats all offsite land use impacts as Category 2 issues is the unique nature of these impacts and their site-specific characteristics:

Because land use changes may be perceived by some community members as adverse and by others as beneficial, the staff is unable to assess generically the potential significance of site-specific off-site land use impacts. This is a Category 2 issue.

GEIS at 4-109. These site specific characteristics are no different for the period after the plant has shut down than they are for the operation period.

24. Dr. Sheppard has identified the magnitude of the socioeconomic impacts that will occur if the Indian Point is relicensed and if spent fuel is allowed to be stored at the site for years after the plant is shutdown. His preliminary estimates indicate that if the plant is relicensed it will postpone for at least 30 years the recovery of over \$500 million of land value for the land adjacent to the plant. ; see United States Department of Energy Final 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, Volume 1 – Impact Analyses, Chapters 1 through 15 (DOE/EIS-0250) Feb. 2002,(evaluating the then proposed Yucca high level waste repository and scenarios for delivery of spent fuel casks either by truck or rail and assuming 24 years to remove waste from existing reactors without license extension) [Att. 7] 13, 2009 Entergy package submitted to NRC on decommissioning funding (ML092260736) (package containing ML092260720 and ML092260723) at 10 (calculating 28 years needed to remove the spent fuel already generated at the site).

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Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination, Exemption, or Waiver

25. As Dr. Sheppard's January 24, 2011 Report demonstrates, license renewal will extend by at least 30 years (20 for the license renewal period plus at least 10 additional years to remove the additional spent fuel generated during license renewal) the time before the property adjacent to the Indian Point site can regain its full value. According to Dr. Sheppard, the cost of this delay to those land owners and to the local taxing authority will be hundreds of millions of dollars. All that value will be lost to a wide group of property owners within 2 miles of Indian Point by allowing Indian Point to be relicensed, an impact that dwarfs the asserted positive socioeconomic impacts from tax revenues paid by Entergy to local governments, on which the FSEIS relies in its analysis of socioeconomic impacts. FSEIS at 8-24 to 8-25. Since the FSEIS concedes these socioeconomic impacts are relevant to the relicensing decision, it is significant that denial of relicensing will boost the socioeconomic benefits to local taxing authorities as well as provide substantial increased land value to thousands of private property owners, underscoring the environmental significance of the post-plant operation offsite land use issue that, but for an exemption from, or a waiver of, the requirements of 10 C.F.R. §51.23(b) (new) may not be available for consideration in the relicensing decision.

CONCLUSION

26. I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 24, 2011.

John J. Sipos

Declaration of AAG John Sipos in Support of State of New York Motion for Leave to File NYS 17B and Request for Determination, Exemption, or Waiver

Attachment 1

10 C.F.R. § 51.23 as it appeared in the January 2010 edition of the Code of Federal Regulations (referred to in the State's filing of today's date as "10 C.F.R. § 51.23 (old)")

THENTICATED GOVERNMENT FORMATION GPO

Nuclear Regulatory Commission

52, or part 70 of this chapter which deletes any limiting condition of operation or monitoring requirement based on or applicable to any matter subject to the provisions of the Federal Water Pollution Control Act.

(18) Issuance of amendments or orders authorizing licensees of production or utilization facilities to resume operation, provided the basis for the authorization rests solely on a determination or redetermination by the Commission that applicable emergency planning requirements are met.

(19) Issuance, amendment, modification, or renewal of a certificate of compliance of gaseous diffusion enrichment facilities pursuant to 10 CFR part 76.

(20) Decommissioning of sites where licensed operations have been limited to the use of—

(i) Small quantities of short-lived radioactive materials; or

(ii) Radioactive materials in sealed sources, provided there is no evidence of leakage of radioactive material from these sealed sources.

(21) Approvals of direct or indirect transfers of any license issued by NRC and any associated amendments of license required to reflect the approval of a direct or indirect transfer of an NRC license.

(22) Issuance of a standard design approval under part 52 of this chapter.

(23) The Commission finding for a combined license under §52.103(g) of this chapter.

(d) In accordance with section 121 of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10141), the promulgation of technical requirements and criteria that the Commission will apply in approving or disapproving applications under part 60 or 63 of this chapter shall not require an environmental impact statement, an environmental assessment, or any environmental review under subparagraph (E) or (F) of section 102(2) of NEPA.

[49 FR 9381, Mar. 12, 1984]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §51.22, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§51.23 Temporary storage of spent fuel after cessation of reactor operation—generic determination of no significant environmental impact.

(a) The Commission has made a generic determination 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 or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first 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 highlevel waste and spent fuel originating in such reactor and generated up to that time.

(b) Accordingly, as provided in §§ 51.30(b), 51.53, 51.61, 51.80(b), 51.95, and 51.97(a), and within the scope of the generic determination in paragraph (a) of this section, no discussion of any environmental impact of spent fuel storage in reactor facility storage pools or independent spent fuel storage installations (ISFSI) for the period following the term of the reactor operating license or amendment, reactor combined license or amendment, or initial ISFSI license or amendment for which application is made, is required in any environmental report, environmental impact statement, environmental assessment, or other analysis prepared in connection with the issuance or amendment of an operating license for a nuclear power reactor under parts 50 and 54 of this chapter, or issuance or amendment of a combined license for a nuclear power reactor under parts 52 and 54 of this chapter, or the issuance of an initial license for storage of spent fuel at an ISFSI, or any amendment thereto.

(c) This section does not alter any requirements to consider the environmental impacts of spent fuel storage during the term of a reactor operating

§51.23

§51.25

license or combined license, or a license for an ISFSI in a licensing proceeding.

[49 FR 34694, Aug. 31, 1984, as amended at 55 FR 38474, Sept. 18, 1990; 72 FR 49509, Aug. 28, 2007]

DETERMINATIONS TO PREPARE ENVIRON-MENTAL IMPACT STATEMENTS, ENVI-RONMENTAL ASSESSMENTS OR FINDINGS OF NO SIGNIFICANT IMPACT, AND RE-LATED PROCEDURES

§ 51.25 Determination to prepare environmental impact statement or environmental assessment; eligibility for categorical exclusion.

Before taking a proposed action subject to the provisions of this subpart, the appropriate NRC staff director will determine on the basis of the criteria and classifications of types of actions in $\S51.20$, 51.21 and 51.22 of this subpart whether the proposed action is of the type listed in \$51.22(c) as a categorical exclusion or whether an environmental impact statement or an environmental assessment should be prepared. An environmental assessment is not necessary if it is determined that an environmental impact statement will be prepared.

§ 51.26 Requirement to publish notice of intent and conduct scoping process.

(a) Whenever the appropriate NRC staff director determines that an environmental impact statement will be prepared by NRC in connection with a proposed action. a notice of intent will be prepared as provided in §51.27, and will be published in the FEDERAL REG-ISTER as provided in §51.116, and an appropriate scoping process (see §§51.27, 51.28, and 51.29) will be conducted.

(b) The scoping process may include a public scoping meeting.

(c) Upon receipt of an application and accompanying environmental impact statement under $\S60.22$ or $\S63.22$ of this chapter (pertaining to geologic repositories for high-level radioactive waste), the appropriate NRC staff director will include in the notice of docketing required to be published by $\S2.101(f)(8)$ of this chapter a statement of Commission intention to adopt the environmental impact statement to the extent practicable. However, if the appro-

10 CFR Ch. I (1-1-10 Edition)

priate NRC staff director determines, at the time of such publication or at any time thereafter, that NRC should prepare a supplemental environmental impact statement in connection with the Commission's action on the license application, the NRC shall follow the procedures set out in paragraph (a) of this section.

(d) Whenever the appropriate NRC staff director determines that a supplement to an environmental impact statement will be prepared by the NRC, a notice of intent will be prepared as provided in §51.27, and will be published in the FEDERAL REGISTER as provided in §51.116. The NRC staff need not conduct a scoping process (see §§51.27, 51.28, and 51.29), provided, however, that if scoping is conducted, then the scoping must be directed at matters to be addressed in the supplement. If scoping is conducted in a proceeding for a combined license referencing an early site permit under part 52, then the scoping must be directed at matters to be addressed in the supplement as described in §51.92(e).

[49 FR 9381, Mar. 12, 1984, as amended at 54 FR 27870, July 3, 1989; 66 FR 55791, Nov. 2, 2001; 72 FR 49510, Aug. 28, 2007]

§51.27 Notice of intent.

(a) The notice of intent required by \$51.26(a) shall:

(1) State that an environmental impact statement will be prepared;

(2) Describe the proposed action and, to the extent sufficient information is available, possible alternatives;

(3) State whether the applicant or petitioner for rulemaking has filed an environmental report, and, if so, where copies are available for public inspection:

(4) Describe the proposed scoping process, including the role of participants, whether written comments will be accepted, the last date for submitting comments and where comments should be sent, whether a public scoping meeting will be held, the time and place of any scoping meeting or when the time and place of the meeting will be announced; and

(5) State the name, address and telephone number of an individual in NRC who can provide information about the proposed action, the scoping process,

Attachment 2

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Volume 48 of the Federal Register, pages 22730-22733 (May 20, 1983), Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of the Reactors' Operating Licenses

Westlaw

48 FR 22730-01, 1983 WL 131501 (F.R.)

Page 1

PROPOSED RULES

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 50 and 51

Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of the Reactors' Operating Licenses

Friday, May 20, 1983

*22730 AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Commission has determined, in a separate proceeding known as the "Waste Confidence" rulemaking proceeding that there is reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by 2007-2009. However, the Commission recognizes that there are circumstances under which spent fuel generated prior to that time may remain at reactor sites after the expiration of reactor operating licenses. Some reactor operating licenses will expire or the permanent shutdown of some reactors could occur prior to the 2007-2009 period. Also, since there are not expected to be any safety or environmental problems which would create a need to move fuel offsite, there is some possibility that an election of onsite spent fuel storage after reactor operating license operation may be appropriate. The Commission has considered the safety and environmental impacts of such extended spent fuel storage in the "Waste Confidence" proceeding and for the reasons discussed therein and highlighted below, finds that extended storage for up to 30 years after the expiration of an operating license will result in no significant safety or environmental impacts. The Commission believes there is reasonable assurance that no later than 30 years after the expiration date of the operating license for any commercial power reactor, sufficient repository capacity will have been made available to dispose of all commercial high-level radioactive waste and spent fuel in existence. Thus there is no reasonable probability that spent fuel will unavoidably remain at a reactor site at the end of that 30-year period. Accordingly, the Commission hereby proposes a rule providing that the environmental and safety implications of spent fuel storage after the termination of reactor operating licenses need not be considered further in Commission proceedings for the issuance of an operating license or licensee amendment for a nuclear power plant, despite some probability that such storage may be elected or necessary. The proposed rule also applies to proceedings for licensing spent fuel storage in independent spent fuel storage installations under Part 72, since the same safety and environmental considerations apply as for storage in reactor basins.

The Commission hereby proposes a rule whereby in proceedings for licensing of facilities at which spent fuel will be stored, or proceedings for licensing the expansion of storage capacity at existing facilities, the NRC will continue to require consideration of reasonable foreseeable safety and environmental impacts of spent fuel storage for the period of the license or amendment applied for but will not require consideration of the safety and environmental impacts of storage of spent fuel beyond the expiration of the license or amendment applied for. However, the Commission's proposed rule would require reactor licensees to submit their plans for NRC review and approval 5 years before their operating licenses expire on specifically how spent fuel at these sites will be

Accordingly, the Commission hereby proposes amendments to the Code of Federal Regulations which define procedures to be followed by the licensee to ensure the continued safe management of spent fuel beyond the expiration date of reactor operating licenses and which address the environmental aspects of extended spent fuel storage past the expiration of reactor operating licenses or license for storage in an independent spent fuel storage installation. The amendments are set forth here to complement and complete the Commission findings resulting from the Waste Confidence rulemaking proceeding.

DATES: Comments should be filed with the Commission's Secretary not later than July 5, 1983. Comments received after this date will be considered if it is practicable to do so, but assurance of consideration cannot be given except as to comments received on or before that date.

ADDRESSES: Send comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Attn.: Docketing and Service Branch.

Hand deliver comments to: Room 1121, 1717 H St., N.W., Washington, D.C. between 8:15 a.m. and 5:00 p.m. Examine comments received at: The NRC Public Document Room, 1717 H St., N.W., Washington, D.C.

FOR FURTHER INFORMATION CONTACT: Dennis Rathbun or Clyde Jupiter, Office of Policy Evaluation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, telephone (202) 634-3295.

SUPPLEMENTARY INFORMATION:

Background

By a Notice of Proposed Rulemaking dated October 18, 1979, 44 FR 61372 (October 25, 1979), the Nuclear Regulatory Commission ("Commission" or "NRC") began a generic rulemaking proceeding "to reassess its degree of confidence that radioactive wastes produced by nuclear facilities will be safely disposed of, to determine when any such disposal will be available, and whether such wastes can be safely stored until they are safely disposed of."This proceeding became known as the "Waste Confidence" rulemaking proceeding; and was conducted partially in response to a remand by the United States Court of Appeals for the D.C. Circuit. State of Minnesota v. NRC, 602 F.2d 412 (1979). State of Minnesota involved a challenge to license amendments to permit the expansion of spent fuel pool storage capacities at two nuclear powerplants. It was contended that uncertainty regarding ultimate disposal of commercial nuclear wastes required the Commission to consider the safety and environmental implications of storing spent fuel in the pools for an indefinite period following expiration of the plants' operating licenses. The Commission had excluded consideration of such long-term on-site storage from the license amendment proceedings, relying on its earlier finding that safe *22731 permanent disposal of reactor wastes would be available when needed.

The Court of Appeals agreed with the Commission that, in accordance with the "rule of reason" implicit in the National Environmental Policy Act (NEPA), impacts of extended on-side storage of spent fuel need not be considered in licensing proceedings unless such storage was reasonably foreseeable and not merely a theoretical possibility. The Court held, however, that the Commission's statement of reasonable confidence in the timely availability of waste disposal solutions was "not the product of a rulemaking record devoted expressly to considering the question" and furthermore did not address the particular problem whether disposal solutions would be

available before the expiration of plant operating licenses. Id. at 417. Accordingly, the D.C. Circuit remanded to the Commission for determination "whether there is reasonable assurance that an off-site storage solution will be available by the years 2007-09, the expiration of the plants operating licenses, and if not, whether there is reasonable assurance that the fuel can be stored safely at the site beyond those dates."Id. at 418. The Court noted that "the breadth of the questions involved and the fact that the ultimate determination can never rise above a prediction suggest that the determination may be a kind of legislative judgment for which rulemaking would suffice."Id. at 417. The Court agreed that the Commission "may proceed in these matters by generic determinations."Id. at 419. Accord, Potomac Alliance v. NRC, 682 F.2d 1030 (D.C. Cir. 1982).

Amendment to Part 51

The Commission announced the conclusions it reached in the Waste Confidence rulemaking proceeding. The Commission found that there is reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by 2007-09. However, some reactor operating licenses may expire without being renewed or some reactors may be permanently shut down prior to this period. Since independent spent fuel storage installations have not yet been extensively developed, there is then a probability that some onsite spent fuel storage after license expiration may be necessary or appropriate. In addition, the Commission also realizes that some spent fuel may be stored in existing or new storage installations for some period beyond 2007-2009. The Commission hereby proposes a rule providing that the environmental and safety implications of such storage after the termination of reactor operating licenses need not be considered in Commission proceedings related to issuance or amendment of a reactor operating license. This rule has the effect of continuing the Commission's practice, employed in the proceedings reviewed in State of Minnesota, of limiting considerations of safety and environmental impacts of spent fuel storage in licensing proceedings to the period of the license in question and not requiring the NRC staff or the applicant to address the impacts of extended storage past expiration of the license applied for. The rule relies on the Commission's generic determination in the Waste Confidence proceeding that the licensed storage of spent fuel for 30 years beyond the reactor operating license expiration either at or away from the reactor site is feasible, safe, and would not result in a significant impact on the environment. For the reasons discussed in the Waste Confidence decision, the Commission believes there is reasonable assurance that adequate disposal facilities will become available during this 30-year period. Thus, there is no reasonable probability that storage will be unavoidable past the 30-year period in which the Commission had determined that storage impacts will be insignificant. The same safety and environmental considerations apply to fuel storage installations licensed under Part 72 as for storage in reactor basins. Accordingly, in licensing actions involving (a) the storage of spent fuel in new or existing facilities, or (b) the expansion of storage capacity at existing facilities, the NRC will continue to require consideration of reasonably foreseeable safety and environmental impacts of spent fuel storage only for the period of the license applied for. The amendment to 10 CFR Part 51 confirms that the environmental consequences of spent fuel storage in reactor facility storage pools or independent spent fuel storage installations for the period following expiration of the reactor or facility license or amendment applied for need not be addressed in any environmental report, impact statement, impact assessment, safety analysis report, or other analysis prepared in connection with the reactor operating license or amendment to the operating license, or initial license for an independent spent fuel storage installation, or amendment thereto.

The Commission's conclusions with respect to safety and environmental impacts of extended storage beyond expiration of current operating licenses are supported by the record in NRC's waste confidence proceeding and by NRC's experience in more than 80 individual safety and environmental evaluations conducted in storage licensing proceedings. The record of the Waste Confidence proceeding indicates that significant release of radioactiv-

ity from spent fuel under licensed storage conditions is highly unlikely because of the resistance of the spent fuel cladding against corrosive mechanisms and the absence of any conditions that would provide a driving force for dispersal of radioactive material. The non-radiological environmental impacts associated with site preparation and construction of storage facilities are and will continue to be considered by the NRC at the time applications are received to construct these facilities, which are licensed under NRC's regulations in either 10 CFR Part 50 for reactors or 10 CFR Part 72 for independent spent fuel storage installations. There are no significant additional non-radiological consequences which could adversely affect the environment for storage past the expiration of operting licenses at reactors and independent spent fuel storage installations.

The amendment to Part 51 published here consists of two parts: paragraph (e) (1) and paragraph (e)(2). Paragraph (e)(1) is a restatement of a final generic Commission determination based on the Waste Confidence rulemaking proceeding, while paragraph (e)(2) establishes the procedures for implementing that generic determination in individual licensing cases. The Commission requests public comment on paragraph (e) (2).

Amendment to Part 50

The Commission is also proposing an amendment to 10 CFR Part 50 as set forth here, concerning the management of spent fuel from nuclear power reactors whose operating licenses may expire prior to the availability of a repository. The procedures established by this amendment are intended to confirm that there will be adequate lead time for whatever actions may be needed at individual reactor sites to assure that the management of spent fuel following the expiration of the reactor operating license will be accomplished in a safe and environmentally acceptable manner.

The Commission proposes that Part 50, § 50.54 be amended to establish requirements that the licensee for an operating nuclear power reactor shall no later than 5 years prior to expiration of the reactor operating license submit *22732 plans for NRC review and approval of the actions which the licensee proposes for mangement of all irradiated fuel at the reactor upon expiration of its operating license. No specific course of action is required of the licensee by the NRC. Licensee actions could include, but are not necessarily limited to, continued storage of spent fuel in the reactor spent fuel storage basin; storage in an independent spent fuel storage installation (refer to 10 CFR § 72.3(m)) located at the reactor site or at another site; transshipment to and storage of the fuel at another operating reactor site in that reactor's basin; reprocessing of the fuel if it appears that licensed reprocessing facilities will be available; or disposal of the fuel in a repository. The proposed actions must be consistent with NRC requirements for licensed possession of irradiated or spent fuel (as defined in §72.3(v)) and must be capable of being authorized by the NRC and implemented by the licensee on a timely basis. The licensee's plans must specify how the financial costs of extended storage or other disposition of spent fuel will be funded. Further, the licensee's plans must describe the proposed disposition of all irradiated fuel from the reactor. The licensee shall notify the NRC of any significant changes to these plans; changes are not precluded provided that the licensee maintains the capability to manage the spent fuel safely.

The Commission notes that extended storage of spent fuel at a reactor beyond the expiration date of the operating license will require an amendment to the Part 50 license to cover possession only of the reactor and spent fuel under the requisite provisions of Parts 30, 50 and 70, or an athorization pursuant to Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI). This rulemaking does not alter the requirements and provisions of Part 72 with respect to environmental considerations (§ 72.20), nor provisions of Part 51 (§ 51.5(a)(10) and § 51.5(b)(4)(iv)) with respect to the performance of environmental assessments of the impacts of spent fuel storage in an independent spent fuel storage installation or ex-

tended storage in a reactor spent fuel pool. This means that the NRC staff will continue to perform environmental reviews before issuing a license under 10 CFR Part 72 or an amendment for extend storage under 10 CFR Part 50. Notice of the receipt of a license application for storage of spent fuel pursuant to Part 72 will be published in the Federal Register.

Related Commission Actions

On March 13, 1978, an Advance Notice of Proposed Rulemaking was published by NRC in the Federal Register (43 FR 10370) that indicated that the NRC was reevaluating its decommissioning policy and considering amending its regulations to provide more specific guidance on decommissioning of nuclear facilities. In January 1981, NRC published a "Draft Generic Environmental Impact Statement on Decommissioning Nuclear Facilities" (NUREG-0586). Proposed amendments to 10 CFR Parts 30, 40, 50, 70, and 72 are being prepared by the NRC staff for Commission consideration. The proposed amendments for decommissioning would allow unrestricted use of a reactor or independent spent fuel storage installation site and would permit termination of the license. However, the storage of irradiated fuel either in a reactor basin or in an independent spent fuel storage installation would require restricted access and management of the storage facility to protect public health and safety. Thus, any continued storage of spent fuel beyond expiration of an operating license would be licensed under either Parts 50 or 72 and could preclude final decommissioning of the site.

Amendments

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, Section 301 of Public Law 96-295, and Section 553 of Title 5 of the United States Code, notice is hereby given that adoption of the following amendments to Parts 50 and 51 of Title 10, Chapter 1, of the Code of Federal Regulations is contemplated.

The Commission requests public comment on the proposed new paragraph, 10 CFR 50.54(x), to be added to 10 CFR Part 50. The Commission also requests public comment on the proposed new paragraph 10 CFR 51.5(e)(2), to be added to 10 CFR Part 51. The Commission does not request comment on the proposed paragraph, 10 CFR 51.5(e)(1), which restates a conclusion of the Commission's "Waste Confidence" proceeding.

List of Subjects

10 CFR Part 50

Administrative practice and procedure, Antitrust, Classified information, Emergency medical services, Fire prevention, Intergovernmental relations, Nuclear power plants and reactors, Penalty, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements.

10 CFR Part 51

Administrative practice and procedure, Environmental impact statement, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

PART 50-DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES 10 CFR § 50.54

21. In § 50.54 immediately following paragraph (w), a new paragraph (x) is added to read as follows:

10 CFR § 50.54

§ 50.54 Conditions of Licenses.

Whether stated therein or not, the following shall be deemed conditions in every license issued.

* * * * *

(x) For operating nuclear power reactors, the licensee shall, no later than 5 year before expiration of the reactor operating license, submit written notification to the Commission for its review and 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 ultimate disposal of the spent fuel in a repository. The licensee must demonstrate to NRC that the elected actions will be consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that the actions will be implemented on a timely basis. Where implementation of such actions require NRC authorizations, the licensee shall verify in the notification that submittals for such actions have been made to NRC and shall identify them. A copy of the notification shall be retained by the licensee as a record until expiration of the reactor operating license. The licensee shall notify the NRC of any significant changes in the proposed waste management program as described in the initial notification.

PART 51—LICENSING AND REGULATORY POLICY AND PROCEDURES FOR ENVIRONMENTAL PROTECTION1. The authority citation for Part 51 is revised to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended (42 U.S.C. 2201); secs. 201, as amended, 202, 88 Stat. 1242 as amended, 1244 (42 U.S.C. 5841, 5842); National Environmental Policy Act of 1969, secs. 102, 104, 105, 83 Stat. 853, 854, as amended (42 U.S.C. 4332, 4334, 4335).

*22733 2. In § 51.5 immediately following paragraph (d)(4) a new paragraph (e) is added to read as follows:

10 CFR § 51.5

§ 51.5 Actions requiring preparation of environmental impact statements, negative declarations, environmental impact appraisals; actions excluded.

* * * * *

(e)(1) The Commission has made a generic determination that no significant environmental impacts will result from the storage of spent fuel for up to 30 years or more beyond the expiration of reactor operating licenses in onsite reactor facility storage pools or independent spent fuel storage installations located at reactor or awayfrom-reactor sites. Further, the Commission believes there is reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by the years 2007-09, and that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

(e)(2) Accordingly, the environmental consequences of spent fuel storage in reactor facility storage pools or independent spent fuel storage installations for the period following expiration of the reactor or storage installation license applied for need not be addressed in any environmental report, impact statement, impact assessment, safety analysis report, or other analysis prepared in connection with a reactor operating license or amendment to

the operating license or initial license for an independent spent fuel storage installation, or amendment thereto. This rule does not alter any pre-existing regulatory requirements for consideration in licensing proceedings of safety or environmental consequences of spent fuel storage for the term of the license or amendment applied for.

Dated at Washington, D.C. this 16th day of May 1983.

For the Commission.[FN1]

FN1 Commissioner Gilinsky dissented from this action and his separate views are attached.

Samuel J. Chilk,

Secretary of the Commission.

Commissioner Gilinsky's Separate Views Regarding Proposed Amendments to 10 CFR Parts 50 and 51 (Waste Confidence Proceeding)

May 13, 1983.

The current generation of nuclear power plants was licensed on the assumption that spent fuel would be retained on site for a brief period, prior to being sent away for reprocessing. It has now become obvious that the spent fuel will, in fact, be kept on-site for an extended period of time, in many cases beyond the operating life of the plants.

The Commission apparently recognizes that its past assumptions on the disposition of spent fuel no longer hold true but is doing nothing about this beyond making a broad finding that extended on-site storage is acceptable from the point of view of safety. While I agree that there is no obstacle in principle to extended on-site storage, I think it is clear that each power reactor site will have to be examined in detail. The rule proposed by the Commission puts off addressing the practical aspects of this problem for many years, and in some cases, decades.

In the case of new reactors which are applying for operating licenses, the rule should require the utility to show that there will be no impediment to storing on-site the spent fuel which will be generated during the plant's useful life. In view of the uncertainties about the availability of off-site disposal capacity, the Commission should, in addition, require a showing that there is no impediment to continuing such storage for some reasonable period of time after the likely end of operation. The utilities should also be required to commit themselves formally to financing on-site fuel storage until the fuel can be moved off-site. In the case of reactors which are already in operation, the utilities should be asked to make similar showings within a few years.

[FR Doc. 83-13801 Filed 5-19-83; 8:45 am]

BILLING CODE 7590-01-M

48 FR 22730-01, 1983 WL 131501 (F.R.) END OF DOCUMENT

Attachment 3

excerpt from NUREG-0575, Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, Volume 1, (Aug. 1979) ML022550127 including pages 4-25 – 4-27

generic Text Convironmental Executive Summi Text

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on

HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

AUGUST 1979

Project No. M-4

U. S. Nuclear Regulatory Commission

Office of Nuclear Material Safety and Safeguards

NUREG-0575, Vol 1

FINAL - GENERIC ENVIRONMENTAL IMPACT STATEMENT

ON

HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

EXECUTIVE SUMMARY AND TEXT

August 1979

Office of Nuclear Material Safety and Safeguards U.S. Nuclear Regulatory Commission

4.2.5 Termination Case

The termination case assumes that as nuclear power plant pools became filled with spent fuel, the plants will be shut down and the generation capacity replaced by coal plants. In addition it was assumed that no new nuclear plants would be built for start up after 1985.

The staff has made several projections of public health fatalities derived from the termination case. Table 4.12 presents a generic analysis for the whole coal fuel cycle.¹⁷ This appears to be the best approximation of excess mortality due to substituting coal fired plants. This table corresponds to Table 4.2 for an LWR. Health effects estimates from radon have been conservatively extended into an admittedly uncertain future to incorporate periods ranging from 100 to 1,000 years. Similarly, the staff also extended health effects estimates of carbon-14 releases for 100 to 1,000 years into the future.

In this table, excess mortality is synonymous with premature death. Therefore, in the case of radiogenic cancer, for example, excess mortality does not mean more people in a given population will die, since every member of the population will die at some time from some cause. Premature death implies that some members of the population will die (statistically) at an earlier time than they would have had they not received a radiation dose.

The "excess mortality" figures represent projected deaths 90 years into the future (i.e., a 40-year environmental dose commitment period per annual fuel requirement, with a 50-year dose -commitment for each of the 40 years).

4.3 SOCIAL IMPACTS

Two assumptions underlie the discussion of all the alternatives. First, analysis of the various options assumes a period of socio-political stability. This includes the assumptions that no unexpected national or international event will occur (e.g., oil embargo), the economy will be reasonably healthy, and a political atmosphere conducive to problem solving will prevail. Second, the analysis projects normal operating conditions at all generating facilities.

Fuel Cycle - Component	Occupational			General	Public	,	
	Accident	Disease	۰. 	Accident	Disease	Totals	
Resource recovery (mining, drilling, etc.)	0.3-0.6	- 07	- 6-2 ·	* *	· · · · · · · · · · ·	0.3-8	- (.
Processing .	0.04	*	Y2 ¹	. + ·	10	<u>.</u> , - 10	
Power generation	0.01	3 🛨 1	• • .	* 1 + 2	3-100	⁻ 3~100 `	-
Fuel storage	*	*		, marina 15. m∰ 1. star a sa sa	• • • • • • • • • • • • • • • • • • •	и у та т Ту	· · ·
Transportation	*		;• · •	1.2	u _n , 2, * 2	. 1.2	,
Waste management	•• • * 2 -	et at taken in	r., .;	•	. *	* -	• • •
Totals	0.35-0.65	0-7	.21 -	ì.2 ^{`-}	13-100	15-120	

Table 4.12. Summary of Excess Mortality due to Coal-Fired Electric Power Production, per 0.8 Gigawatt-Year Electric

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The effects associated with these activities are not known at this time but are generally . believed to be small. The totals would increase only slightly if these values were included.
4.3.1 The Reference Case Storage Solution

Storing spent fuel has the advantage of resulting in confinement of perceived problems to a small area. As at a nuclear power plant, safeguards and safety measures can be developed to restrict access. The location of such a site near a community would produce social problems similar to those associated with siting of other nuclear-related facilities.

Social impacts likely associated with independent storage facilities will be similar to those occurring at power plants and are of three main types: 30 (1) impacts on socially valued aspects of the natural environment, (2) impacts on the social structure, and (3) the effects of perceived danger of accidents and radiation. Changes caused by the disruption of the environment have direct impacts upon humans. The removal of the land for the site from future development, long-term demands on the water supply, and visual intrusion of cooling towers or buildings on the natural landscape will permanently affect the relationship of the residents with their environment and the development of the area.

Areas where such facilities would be built would pay most of the resulting socioeconomic costs but receive few of the social benefits involved. Also, while certain items can be isolated and labeled as costs or benefits, other impacts cannot be quantified or are slow in developing, causing them to be unaccountable.

4.3.2 Termination Case

This social analysis is based on the phasing out of nuclear power through a one-to-one replacement of such plants with coal fired plants and past 1985 by building only coal fired plants. By hypothesizing a phased decline in nuclear generating capacity, one can explore the consequences of switching to coal.

4.3.2.1 Employment

The electric power industry is one of the nation's largest employers. Nuclear facilities require about the same labor force as do coal fired plants. Therefore, a shift to coal fired plants thus would result in no significant difference in employment.

4.3.2.2 Life Style/Quality of Life

Where people live depends upon the provisions of economic and environmental service systems. Thus, people are clustered where there is adequate employment, markets and distribution systems. Coincident with denser population there will be requirements for water, a capability for wasteremoval, and a capacity for home heating and cooling. In the past two decades when energy was relatively inexpensive and the price of electricity was declining. Americans developed an energyintensive life style. The suburbs and low-density housing grew rapidly. However, with the recent increases in energy costs, the rate of suburbanization has declined.²⁸ The suburban development, with its predominance of single-family homes, is far more consumptive of energy than multiple dwelling units. More and more Americans are turning to either common-wall dwellings or apartments. In the future it appears that a larger proportion of homes built will be in these latter two categories. With the decline of the suburban alternative, population growth will lead also to the filling in of urban areas. It is probable that urban patterns of densely populated communities connected by transportation corridors will-replace the present spread-city pattern. Local impacts in coal mining areas and along transportation corridors could be quite significant. These include population and transportation increases with attendant local societal stresses and adjustments. For the average citizen, the most noticeable impact of the replacement of nuclear energy with coal fired or other types of power plants under the termination alternative would be higher utility bills.

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Attachment 4

Volume 49 of the Federal Register, including pages 34658-34688 (Aug. 31, 1984), Waste Confidence Decision

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49	FR	3465	8-01							Page 1
49	FR	3465	8-01,	1984 WL	118011	(F.R.)				
(Ci	te	as:	49 FR	34658)						

RULES AND REGULATIONS

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 50 and 51

Waste Confidence Decision

Friday, August 31, 1984

*34658 AGENCY: Nuclear Regulatory Commission.

ACTION: Final Waste Confidence Decision.

SUMMARY: The Nuclear Regulatory Commission initiated a rulemaking proceeding on October 25, 1979 to assess generically the degree of assurance now available that radioactive waste can be safely disposed of, to determine when such disposal of off-site storage will be available, and to determine whether radioactive wastes can be safely stored on-site past the expiration of existing facility licenses until off-site disposal or storage is available. This proceeding became known as the "Waste Confidence Rulemaking" and was conducted partially in response to a remand by the U.S. Court of Appeals for the D.C. Circuit. State of Minnesota v. NRC. 602F 2d 412 (1979). The Commission also stated that in the event it determined that onsite storage of spent fuel would be necessary or appropriate after the expiration of facility licenses, it would propose a rule addressing the environmental and safety implications of such storage.

The Commission's decision is summarized in the following findings:

(1) The Commission finds reasonable assurance that safe disposal of high level radioactive waste and spent fuel in a mined geologic repository is technically feasible.

(2) The Commission finds reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by the years 2007-09, and that

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sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of existing commercial high level radioactive waste and spent fuel originating in such reactor and generated up to that time.

(3) The Commission finds reasonable assurance that high-level radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level radioactive waste and spent fuel.

(4) The Commission finds 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 expiration of that reactor's operating licenses at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

(5) The Commission finds reasonable assurance that safe independent onsite or offset spent fuel storage will be made available if such storage capacity is needed.

In keeping with its commitment to issue a rule providing procedures for considering environmental effects of extended onsite storage of spent fuel in licensing proceedings, the Commission is issuing, elsewhere in this issue, final amendments to 10 CFR Parts 50 and 51.

FOR FURTHER INFORMATION CONTACT: Dennis Rathbun or Clyde Jupiter, Office of Policy Evaluation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, telephone (202) 634-3295, or Sheldon Trubatch, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555; telephone (202) 634-3224.

The Commission's Decision

In the Matter of RULEMAKING on the Storage and Disposal of Nuclear Waste (Waste Confidence Rulemaking)

[PR-50, -51 (44 FR 61372)]

August 22, 1984.

Contents

Commission's decision

Addendum to the decision

Appendix

Decision

1.0 Introduction

1.1 Initiation of the Waste Confidence Rulemaking Proceeding

In response to the remand of the U.S. Court of Appeals for the District of Columbia Circuit (State of Minnesota v. NRC, 602 F.2d 412 (1979)), and as a continuation of previous proceedings conducted in this area by NRC (44 FR 61372), the Commission initiated a generic rulemaking proceeding on October 25, 1979. In its Notice of Proposed Rulemaking, the Commission stated that the "purpose of this proceeding is solely to assess generically the degree of assurance now available that radioactive waste can be safely disposed of, to determine when such disposal or off-site storage will be available, and to determine whether radioactive wastes can be safely stored onsite past the expiration of existing facility licenses until off-site disposal or storage is available." The Commission also stated that in the event it determined that on-site storage of spent fuel would be necessary or appropriate after the expiration of facility licenses, it would propose a rule addressing the environmental and safety implications of such storage. The Commission recognized that the scope of this generic proceeding would be broader than the Court's instruction, which required the Commission to address the questions of whether off-site storage for spent fuel would be available by the expiration of reactor operating licenses and if not, whether spent fuel could continue to be safely stored on-site (44 FR 61373).

However, the Commission believed that the primary public concern was whether nuclear waste could be disposed of safely rather than with an off-site solution to the storage problem per se. Moreover, as stated in the Federal Register Notice of October 25, 1979, the Commission committed itself to reassess its basis for reasonable assurance that methods of safe permanent disposal of high level waste would be available when they are needed. In conducting that reassessment, the Commission noted that it would "draw upon the record compiled in the Commission's recently concluded rulemaking on

the environmental impacts of the nuclear fuel cycle (44 FR 45362-45374 [August 2, 1979])" (44 FR 61373).

The Department of Energy (DOE), as the lead agency on nuclear waste management filed its statement of position (PS) on April 15, 1980. Statements of position were filed by 30 participants by June 9, 1980, and were followed by cross statements (CS) from 21 of the participants by August 11, 1980.

1.2 Establishment of the Working Group

On May 28, 1980, the Commission directed the staff to form a Working Group to advise the Commission on the adequacy of the record to be compiled in this proceeding, to review the participants' submissions and identify issues in controversy and any areas in which additional information would be needed. The Working Group submitted a report to the Commission on January 29, 1981. The report summarized the record, identified key issues and controversies, and commented on the adequacy of the record for considering the key issues. The participants were invited to submit comments on the adequacy of the Working Group's summary of the record and its identification and description of the issues. Such comments were made by 20 participants by March 5, 1981.

1.3 Commission's Order for Oral Presentations

The Commission found additional limited proceedings to be useful to allow the participants to state their basic ***34659** positions directly to the Commissioners and to enable the Commissioners to discuss specific issues with them. In addition, the Commission invited comment on the following policy developments: (1) the Administration's announcement [FN1] of a policy favoring commercial reprocessing of spent fuel and instructing the Secretary of Energy to proceed swiftly toward deployment of a means of storing and disposing of commercial high-level radioactive waste, and (2) the submission of information to the Presiding Officer in this proceeding by DOE on March 27, 1981, concerning the DOE decision to "discontinue [its] efforts to provide federal government-owned or controlled away-fromreactor (AFR) [spent fuel] storage facilities." The participants were asked to comment on the significance to the proceeding of issues, particularly institutional concerns, resulting from these policy developments and to comment on the merits of DOE's new projection of spent fuel storage requirements and on the technical and practical

feasibility of DOE's suggested alternative storage methods.

FN1 Presidential Nuclear Policy Statement, October 9, 1981.

To implement the additional limited proceedings, the Commission consolidated the participants into the following identifiable groups: (a) federal government, (b) state and local participants, (c) industry, and (d) public interest groups (Second Prehearing Memorandum and Order, November 6, 1981). Prehearing statements (PHS) were provided by the consolidated groups, as well as by individual participants. The oral arguments were presented to the Commissioners on January 11, 1982.

The extensive record, comprised of all written and oral submissions provides the primary basis for the Commission's decision regarding the safe storage and disposal of spent fuel and nuclear waste. However, while the Commission was preparing this Waste Confidence decision, the Nuclear Waste Policy Act of 1982 (NWPA) was enacted. The Commission found that this Act had a significant bearing on the Commission's decision, and the Commission has considered the NWPA in reaching its conclusions. The Commission believes that the NWPA had its most significant impact in narrowing the uncertainties surrounding institutional issues. Moreover, although the NWPA is intrinsically incapable of resolving technical issues, it will establish the necessary programs, milestones, and funding mechanisms to enable their resolution in the years ahead.

The Commission's preliminary decision in the Waste Confidence proceeding was served on the consolidated participants on May 17, However, the parties to this proceeding had not yet had an 1983. opportunity to comment on what implications, if any, the NWPA had on the Commission's decision. Further, the Commission's discussion of the safety of dry storage of spent nuclear fuel, in its preliminary decision, relied substantially on material not yet in the record. Therefore, the preliminary decision was issued as a draft decision. The Commission requested the consolidated groupings of participants to comment on either or both of these issues. In addition, the Commission found that onsite storage after license expiration might be necessary or appropriate, and therefore, in accordance with its notice initiating this proceeding, it proposed a rule to establish how the environmental effects of extended onsite storage would be considered in licensing proceedings (48 FR 22730, May 20, 1983), as amendments to 10 CFR Parts 50 and 51.

Subsequently, in response to public comments on the proposed amendments to 10 CFR Part 51, the Commission reopend the comment period to address the environmental aspects of the fourth finding of the Commission's Waste Confidence decision, on which the proposed amendment to Part 51 is based (48 FR 50746, November 3, 1983). Public comments were requested on: (1) The environmental aspects of the fourth finding--that the Commission has reasonable assurance that, if necessary, spent fuel can be stored without significant environmental effects for at least 30 years beyond the expiration of reactor operating licenses at reactor spent fuel storage basins, or at either onsite or offsite independent spent fuel storage installations; (2) the determination that there are no significant non-radiological consequences which could adversely affect the environment if spent fuel is stored beyond the expiration of operating licenses either at reactors or at independent spent fuel storage installations; and (3) the implications of comments on items (1) and (2) above for the proposed amendment to 10 CFR Part 51.

After reviewing these additional comments, the Commission found no reason to modify its fourth finding or the supporting determination. The analysis of comments, together with the Commission's response is summarized in the Addendum to the Commission's decision.

The Commission notes that two relevant developments have occurred subsequent to the closing of the record in the Waste Confidence proceeding. They are the publication of DOE's draft Mission Plan for the Civilian Radioactive Waste Management Program (April, 1984) and the Commission's concurrence in DOE's General Guidelines for Recommendation of Sites for Nuclear Waste Repositories (July 3, 1984). These developments are a matter of public record, and in the case of the Commission's concurrence was the conclusion of a separate public proceeding. The Commission has considered the effects of these developments on its previously announced decision in this proceeding and determined that these developments do not substantially modify the Commission's previous conclusions.

The decision is summarized as five Commission findings in Section 2.0. The detailed rationale for these findings, including references to the record developed in this proceeding, is contained in the Appendix to this document. The Commission considers these five findings to be a response to the mandate of the U.S. Court of Appeals for the District of Columbia Circuit and, in addition, a generic determination that there is reasonable assurance that radioactive waste can and will be safely stored and disposed of in a timely manner.

In keeping with its commitment to issue a rule providing procedures for considering environmental effects of extended onsite storage of spent fuel in licensing proceedings, final amendments to 10 CFR Parts 50 and 51 are being issued simultaneously with this decision.

2.0 Commission Findings [FN2]

FN2 All findings by the Commission in this proceeding are limited to the storage and disposal of high-level radioactive waste and spent fuel generated by nuclear power reactors required to be licensed under sections 103 or 104 b of the Atomic Energy Act of 1954 (42 U.S.C. 2133 and 2134(b)), and to facilities intended for such storage or disposal. The Commission's findings in this proceeding do not address the storage and disposal of high-level radioactive waste or spent fuel resulting from atomic energy defense activities, research and development activities of the Department of Energy, or both. This is consistent with the Nuclear Waste Policy Act of 1982, <u>section</u> $\delta(c)$.

(1) The Commission finds reasonable assurance that safe disposal of high level radioactive waste and spent fuel in a mined geologic repository is technically feasible.

(2) The Commission finds reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel *34660 will be available by the years 2007-09, and that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of existing commercial high level radioactive waste and spent fuel originating in such reactor and generated up to that time.

(3) The Commission finds reasonable assurance that high-level radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level radioactive waste and spent fuel.

(4) The Commission finds 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

expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

(5) The Commission finds reasonable assurance that safe independent onsite or offsite spent fuel storage will be made available if such storage capacity is needed.

3.0 Future Actions by the Commission

The Commission's Waste Confidence decision is unavoidably in the nature of a prediction. While the Commission believes for the reasons set out in the decision that it can, with reasonable assurance, reach favorable conclusions of confidence, the Commission recognizes that the possibility of significant unexpected events remains open. Consequently, the Commission will review its conclusions on waste confidence should significant and pertinent unexpected events occur, or at least every 5 years until a repository for high-level radioactive waste and spent fuel is available.

.0 For Further Information Contact

Dennis Rathbun or Clyde Jupiter, Office of Policy Evaluation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, telephone (202) 634-3295, or Sheldon Trubatch, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555; telephone (202) 634-3224.

Dated at Washington, D.C. this 22nd day of August, 1984. Commissioner Zech did not participate in this action.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

Addendum to the Commission's Waste Confidence Decision

Introduction

On May 17, 1983, the Commission issued its proposed decision in the Waste Confidence proceeding, and asked the consolidated groups of

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participants to comment on two aspects of the decision: the 'implications of the Nuclear Waste Policy Act (NWPA) for the decision and the Commission's discussion of the safety of dry storage of spent nuclear fuel, which relied substantially on material not in the record. The analysis of these comments is subdivided into several issue categories and presented, with NRC's responses, in Part I below. The membership of the consolidated groups responding to the Commission's request as well as the abbreviations used to identify the groups are provided in Section 3 of Part I.

Subsequently, in response to public comments on the Commission's proposed amendment to 10 CFR Part 51 (48 FR 22730, May 20, 1983), the Commission reopened (48 FR 50746, November 3, 1983) the comment period to address the environmental aspects of the fourth finding of the Commission's proposed Waste Confidence decision on which the proposed amendment to Part 51 is based. Public comments were requested on: (1) The environmental aspects of the fourth finding -that the Commission has reasonable assurance that, if necessary, spent fuel can be stored without significant environmental effects for at least 30 years beyond the expiration of reactor operating licenses at reactor spent fuel storage basins, or at either onsite or offsite independent spent fuel storage installations; (2) the determination that there are no significant non-radiological consequences which could adversely affect the environment if spent fuel is stored beyond the expiration of operating licenses either at reactors or at independent spent fuel storage installations; and (3) the implications of comments on items (1) and (2) above for the proposed amendment to 10 CFR Part 51. The analysis of public comments and NRC's responses are presented in Part II of this The list of respondents to this reopened comment period document. and the abbreviations used to identify them are given in Section 4 of Part II.

The Commission notes that two relevant developments have occurred subsequent to the closing of the record in the Waste Confidence proceeding. They are the publication of DOE's draft Mission Plan of the Civilian Radioactive Waste Management Program (April, 1984) and the Commission's concurrence in DOE's General Guidelines for Recommendation of Sites for Nuclear Waste Repositories (July 3, 1984). These developments are a matter of public record, and in the case of the Commission's concurrence was the conclusion of a separate public proceeding. The Commission has considered the effects of these developments on its previously announced decision in this proceeding and determined that these developments do not substantially modify the Commission's previous conclusions.

Part I. Analysis of the Consolidated Groups' Comments on the Commission's Waste Confidence Decision and NRC Responses

1. Effect of the Nuclear Waste Policy Act on the Commission's Decision

A. General

(1) Summary of Comments. The Consolidated Industry Group agreed with the Commission's view that the NWPA contains provisions pertinent to all of the major elements relevant to mined geologic disposal of high level radioactive wastes (Industry, p. 3). The Industry Group called attention to the comprehensive nature of the NWPA which authorizes DOE to undertake steps leading to the construction, operation and maintenance of a deep geologic test and evaluation facility; requires DOE to prepare a waste management mission plan; establishes a prescribed schedule for repository siting, construction and operation; defines the decision-making roles of affected states and Indian tribes in repository site-selection and evaluation; provides for the continuity of Federal management of the nuclear waste program and continued funding; and facilitates the establishment of an overall integrated spent fuel and waste The Industry Group suggested that these features management system. of the Act should increase the Commission's confidence that waste can and will be disposed of safely. The Group pointed out that the Act also contains special procedures to facilitate the licensing of spent fuel storage capacity expansion and transshipments; directs DOE research, development and cooperation with utilities in developing dry storage and rod compaction; and provides for federally supplied interim storage capacity to supplement that of industry (Industry. pp. 4-8).

*34661 The Industry Group believed that the NWPA's enactment--in and of itself--provides a sound basis for confidence that institutional difficulties can and will continue to be resolved. At the same time, Industry stated that the NWPA's enactment was not essential for the Commission to reach an affirmative decision in this proceeding (Industry, p. 9).

In contrast, the Consolidated Public Interest Group (CPIG) believed

that the NWPA provides an insufficient basis for the Commission's
decision in this proceeding with respect to the availability or timing of a nuclear waste repository. The CPIG contended that the NWPA contains many areas of ambiguity, and gave as examples:

(i) Section 114(a) of the NWPA requires DOE to make a recommendation to the President for the first repository site, accompanied by the preliminary comments by the Commission concerning the suitability of three alternative candidate sites for licensing under 10 CFR Part 60. DOE interprets this section to require such preliminary comments before site characterization begins * * * The Commission staff interprets that section * * * to require a judgment of suitability under 10 CFR Part 60 after site characterization has occurred.

(ii) DOE originally interpreted Sec. 112(f) to permit continuation of ongoing site characterization at Hanford before completion of the DOE siting guidelines. DOE now concedes that such site characterization work must await completion of an environmental assessment prepared in accordance with final DOE siting guidelines (CPIG, pp. 2-3).

(2) NRC Response. The Commission has considered the effect of enactment of the Nuclear Waste Policy Act of 1982 and concludes that the Act provides support for timely resolution of technical uncertainties and reduces uncertainties in the institutional arrangements for the participation of affected states and Indian tribes in the siting and development of repositories and in the longterm management, direction and funding of the repository program. The bases for the Commission's conclusion are set forth in the decision and will not be repeated here. The passage of the Act provides evidence of a strong national commitment to the solution of the radioactive waste management problem.

The Commission recognizes the possibility of differing interpretations regarding the implementation of the NWPA. With respect to CPIG's discussion of <u>Section 114(a)</u>, the Commission is unaware of any differences between DOE and NRC in the interpretation of this section of the Act. We note that DOE's recommendation of a repository site to the President would necessarily be made after DOE's preliminary determination that three sites are suitable for development. DOE and NRC now agree that the preliminary determination of site suitability for the alternative sites should be made following site characterization (Commission's Final Decision on the U.S. Department of Energy's General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories [July 3, 1984]).

Concerning <u>Section 112(f)</u>, DOE has continued site characterization at Hanford during formulation of the siting guidelines; in accordance with the views of the states and environmental groups, DOE has deferred drilling of the exploratory shaft pending the completion of the guidelines, submission of the site characterization plan to NRC and preparation of an environmental assessment of site characterization activities.

B. Technical Aspects

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(1) Summary of Comments. The Consolidated Industry Group believed that the Act contained provisions pertinent to all of the major elements relevant to disposal (Industry, p. 3). The Consolidated Public Interest Group, on the other hand, contended that the NWPA did not resolve technical uncertainties concerning repository development and safety (CPIG, p. 5). The Consolidated State Group did not believe that the NWPA supported a finding of confidence because it failed to resolve technical questions and merely set target dates for deciding on the site of the first waste repository. The State Group noted that if technical problems are not resolved by the dates proposed by Congress, the milestone dates will have to be postponed. The State Group contended too that, although the Act authorizes DOE to conduct research on unresolved technical issues, the research could uncover additional problems (States, p. 2). However, DOE pointed out that the NWPA provides for a focused, integrated and extensive research and development program for the deep geologic disposal of high-level waste and spent fuel. DOE believed that Sec. 215 of the Act enhances confidence in the timely availability of disposal facilities by authorizing a research facility to develop and demonstrate a program for waste disposal. DOE also stated that the schedule for a Test and Evaluation Facility would require the in situ testing described in Sec. 217 of the Act to begin not later than May 6, 1990, thus allowing for research and development results to be incorporated in the repository which is scheduled to open in 1998 (DOE, pp. 11, 12).

(2) NRC Response. As the record of this proceeding shows, there are no known technical problems that would make safe waste disposal impossible. Clearly, further engineering development and site-

specific evaluations will be required before a repository can be constructed. The Commission did not propose to rely on the NWPA as the basis for resolving technical uncertainties. Rather, the Commission found that the NWPA provides a framework for facilitating the solution of the remaining technical issues. Title II of the Act authorizes DOE to undertake steps leading to the construction, operation and maintenance of a deep geologic test and evaluation facility and to conduct the necessary research and development as well as to establish a demonstration program. The schedule set forth in the Act is consistent with the objective of assuring repository operation within the time period discussed in the Waste Confidence decision. The "Mission Plan" which is required by the Act will provide an effective management tool for assuring that the many technical activities are properly coordinated and that results of research and development projects are available when needed.

C. Institutional Aspects

(1) Summary of Comments. The Consolidated State Group believed that the NWPA failed to resolve institutional questions. The States argued that their cooperation cannot be assumed in the event that the general public in the vicinity of a proposed site is opposed to the location. Further, the States contended that, if a site is vetoed by a host state or Indian tribe, there is no assurance that Congress will vote to override the veto. Moreover, if the veto is overridden, a legal challenge is likely and the outcome is uncertain (States, p. 3).

The Consolidated Public Interest Group also believed that the NWPA has not significantly reduced institutional uncertainties regarding participation and objections of affected states and Indian tribes. As examples of institutional difficulties, CPIG pointed out that state officials and Indian tribes still have concerns regarding the adequacy of time to monitor and comment upon agency proposals, the lack of agency response to their concerns, and inadequate funding to support their full participation. Further, CPIG noted that the Act (Sec. 115) provides states and Indian tribes with *34662 strong new authority to veto the siting of a repository within their borders (CPIG, p. 5).

DOE, on the other hand, believed that Sections 116 and 117 of the NWPA will reduce Federal-state institutional uncertainties (DOE p. 9).

I(2) NRC Response. It would be unrealistic to expect that the NWPA will resolve all institutional issues. However, it does provide specific statutory procedures and arrangements for accomplishing such resolution. The right of affected states and Indian tribes to disapprove a site designation under the NWPA might create uncertainty in gaining the needed approvals. Nevertheless, the NWPA's establishment of a detailed process for state and tribal participation in the development of repositories and for the resolution of disputes should minimize the potential for substantial disruption of plans and schedules. The Commission does not expect that the NWPA can eliminate all disagreement about development of waste repositories. However, in providing for information exchange, financial and technical assistance to affected groups, and meaningful participation of affected states and tribes in the decision-making process, the Act should minimize the potential for direct confrontations and disputes.

D. Funding Aspects

(1) Summary of Comments. The Consolidated Industry Group expressed its general belief that the NWPA assures adequate funding for interim storage and disposal of radioactive waste (Industry, pp. 6, 7). Similarly, DOE believed that the funding mechanism provided by the NWPA should largely remove uncertainties in assuring adequate resources to complete the program (DOE, pp. 10, 11). On the other hand, the Consolidated States Group contended that, since the law can be changed at any time, the NWPA assures neither an adequate level of funding nor a prolonged Congressional commitment (States, p. 4).

(2) NRC Response. The Commission believes that the general approach prescribed by the NWPA is to operate DOE's radioactive waste program on a full cost recovery basis. It seems clear that Congress intended to establish a long-term program for waste management and disposal, with built-in reviews and adjustments of funding as necessary to meet changing requirements. In this regard, the Act provides that DOE must annually review the amount of the established fees to determine whether collection of the fees will provide sufficient revenues to offset the expected costs. In the event DOE determines that the revenues being collected are less than the amount needed to recover costs, DOE must propose to Congress an adjustment to the fees to ensure full cost recovery. The Act also provides that, if at any time, the monies available in the waste fund are insufficient to support DOE's nuclear waste program, DOE will have the authority to borrow from the Treasury. The Commission believes that long-term funding provisions of the Act will ensure adequate financial support for DOE's nuclear waste program for FY 1984 and beyond.

The Commission believes that uncertainties regarding the adequacy of financial management of the nuclear waste program have also been reduced by the NWPA requirement that an Office of Civilian Radioactive Waste Management be established within the Department of Energy. This Office is to be headed by a Director, appointed by the President with Senate confirmation, who will report directly to the Secretary of Energy. Further, the Act stipulates that an annual comprehensive report of the activities and expenditures of the Office will be submitted to Congress and that an annual audit of the Office will be conducted by the Comptroller General, who will report the results to Congress.

Some concern has been expressed that the Congress may amend the funding provisions of the NWPA and thereby undermine the financial stability of the Federal radioactive waste management program. Commenters have not provided any basis for this belief. The Commission considers this possibility to be most unlikely. It is reasonable to assume that the long-range public health and safety and political concerns which motivated the Congress over the past several years to pass the NWPA will continue to motivate the Congress in considering amendments to the NWPA.

E. Schedule

(1) Summary of Comments. DOE contended that the NWPA provides additional assurance that a repository will be available by 1998. As the basis for this belief, DOE stated that sections 111 through 125 of the NWPA provide specific schedules and reporting requirements for the timely siting, development, construction, and operation by 1998 of a repository for high level waste and spent fuel (DOE, p. 6). DOE believed that these schedules and reporting requirements will ensure that deadlines are met. The Commission notes that DOE recognizes that there has been a delay of about 1-year in its schedule for meeting early milestones such as publication of its siting guidelines; nevertheless, DOE continues to maintain that its date for completion of repository development will be met (DOE Draft Mission Plan for the Civilan Radioactive Waste Management Program, April 1984).

The Consolidated Public Interest Group, however, did not believe that the provision of specific dates in the NWPA gives assurance that they will be met. CPIG cited, for example, the delay in preparing DOE's site selection guidelines, which were due by June 1983, and were expected to be delayed further (CPIG, p. 4).

Further, the CPIG contended that a date for the availability of a repository is not certain since both the President and the NRC have explicit authority to reject any or all site proposals that are submitted to them (CPIG, p. 4). Also, CPIG believed that the legislation contemplates the possibility of delay beyond satutory deadlines and NWPA's legislative history indicates that the timing of repository availability remains uncertain (CPIG, p. 5).

(2) NRC Response. One of the primary purposes of the NWPA is "to establish a schedule for the siting, construction, and operation of repositories that will provide reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and such spent nuclear fuel as may be disposed of in a repository." (Sec. 111(b)(1)). The Commission believes this purpose will be achieved.

As the Commission noted in the proposed decision, the Congress would not be able to legislate the schedules for the accomplishment of fundamental technical breakthroughs if it believed that such breakthroughs were necessary. They are not necessary. Rather, it is the Commission's judgment that the remaining uncertainties can be resolved by the planned step-by-step evaluation and development based on ongoing site studies and research programs. The Commission believes the Act provides means for resolution of those institutional and technical issues most likely to delay repository development, both because it provides an assured source of funding and other significant institutional arrangements, and because it provides detailed procedures for maintaining progress, coordinating activities and rectifying weaknesses.

The Commmission believes that the milestones established by the Act are generally consistent with the schedules presented by DOE in the Waste *34663 Confidence proceeding and that those milestones are generally reasonable. Achievement of the scheduled first date of repository operation is further supported by other provisions of the

Act which specify means for resolution of issues most likely to delay One of the earlier milestones-publication of repository completion. DOE's general guidelines for the recommendation of sites for a repository -- was about a year behind schedule and the Commission was concerned that his delay could result in corresponding delays in DOE's nomination of at least five sites for characterization work. However, DOE has indicated in its draft Mission Plan (April, 1984) that the subsequent milestones have been scheduled to provide completion of the first repository by 1998. The Commission believes that the timely attainment of a repository does not require DOE's program schedule to adhere strictly to the milestones set out in the NWPA over the approximately 15 year duration of the repository development program. Delays in some milestones as well as advances in others can be expected.

The Commission has no evidence that delays of a year or so in meeting any of the milestones set forth in the NWPA would delay the repository availability date by more than a few years beyond the 1998 date specified in the NWPA. The Commission found reasonable assurance that a repository would be available by 2007-09, a decade later than that specified in the NWPA, and a date which allows for considerable slippage in the DOE schedule. The Act also requires that any Federal agency that determines that it cannot comply with the repository development schedule in the Act must notify both the Secretary of Energy and Congress, provide reasons for its inability to meet the deadlines, and submit recommendations for mitigating the The Commission notes that the Act also clarifies how the delav. requirements of the National Environmental Policy Act are to be met. These provisions of the Act, as well as the provisions for research, development and demonstration efforts regarding waste disposal, increase the prospects for having the first respository in operation not later than the first few years of the next century.

The repository development schedule may have to accommodate such contingencies as vetoes of proposed repository sites, prolonged public hearings, protracted litigation, possible project reorientation, or delay in promulgation of siting guidelines. The schedule now incorporated into the Act allows substantial time for these possibilities.

2. Discussion of the Safety of Dry Storage

A. Summary of Comments

DOE believed that the availability of dry storage techniques provides further reasonable assurance of the ability to safely store nuclear wastes at least 30 years beyond the expiration of reactor operating licenses. DOE stated that the citations quoted in the Commission's rationale are reliable and representative of the literature in the area, and that the Commission's technical judgment on dry storage conforms with DOE's experience and is accurate and correct (DOE, p. 16). The Consolidated Industry Group also stated that the pertinent points in the Commission's discussion appear to be adequately supported with appropriate references (Industry, pp. 10, 11).

In further support of the safety of dry storage, DOE cited the following:

--Extensive world-wide experience shows that dry fuel handling and storage is safe and efficient. Irradiated fuel has been handled, shipped, and safely stored under dry conditions since the mid-1940's. All types of irradiated fuel have been handled dry at hot cells, where a variety of phenomena have been observed in detail. The passive nature of most dry storage concepts contributes to the safety of interim storage by not requiring active cooling systems involving moving parts (DOE, p. 16).

--Regarding specific experience, DOE stated that a reactor fuel has been successfully stored in dry vaults licensed under Part 50 at the Hallam sodium-cooled graphite research reactor in Nebraska and the Fort St. Vrain HTGR prototype facility in Colorado. In addition, dry storage of zircaloy-clad fuel has been successfully conducted in drywells and in air-cooled vaults at DOE's Nevada Test Site. There is favorable foreign experience with dry storage at Wylfa, Wales in Great Britain, at Whitesell in Canada, in the Federal Republic of Germany, in France where vault dry storage of vitrified waste is routine, and in Japan, where a dry storage vault has been recently constructed (DOE, p. 17).

--To date, all dry storage tests have indicated satisfactory storage of zircaloy-clad fuel without cladding failure over the temperature range of 100 degrees C to 570 degrees C, in inert atmospheres. Existing data which support the conclusion that spent fuel can be stored safely in an inert atmosphere for at least 30 years is being augmented by additional ongoing research (DOE, pp. 17, 18). None of the consolidated groups of participants offered comments which were critical of the Commission's discussion of the safety of dry storage.

B. NRC Response

The Commission is confident that dry storage installations can provide continued safe storage of spent fuel at reactor sites for at least 30 years after expiration of the reactor operating licenses.

3. List of Respondents

Consolidated Participants as Respondents to the Commission's Waste Confidence Decision

1. Department of Energy (DOE)

2. Consolidated States Representative [FN1] (States)

FN1 The Consolidated States Group consists of the Attorney General of the State of New York, Minnesota (by its Attorney General and the Minnesota Pollution Control Agency), Ohio, South Carolina and Wisconsin. The remaining participants previously consolidated in the States Group have not joined in these comments.

3. Consolidated Public Interest Representative [FN2] (CPIR)

FN2 The Consolidated Public Interest Group is represented here by the Natural Resources Defense Council, Inc., the New England Coalition on Nuclear Pollution, the Sierra Club, the Environmental Coalition on Nuclear Power, Wisconsin's Environmental Decade, Mississippians Against Disposal, Safe Haven, Ltd., John O'Neill, Jr., and Marvin Lewis.

4. Consolidated Industry Representative [FN3] (Industry)

FN3 The Consolidated Industry Group is represented by: American Institute of Chemical Engineers; American Nuclear Society; Association of Engineering Geologists; Atomic Industrial Forum; Bechtel National; Consumers Power; General Electric; Neighbors for the Environment; Scientists and Engineers for Secure Energy; Tennessee Valley Authority; the Utilities Group (Niagara Mohawk Power Corporation, Omaha Public Power District, Power Authority of the State of New York, and Public Service Company of Indiana, Inc.); and the Utility Nuclear Waste Management Group--Edison Electric Institute. In order to emphasize the independent nature of its participation, the American Nuclear Society has chosen to proceed separately. ANS continues to protest its assignment to the Consolidated Industry Group and has offered separate comments on the Commission's Waste Confidence decision. Since only the consolidated groups of participants were invited to comment on the proposed decision, the ANS's separate comments are not discussed here. Further, TVA, as a Federal agency, wishes to stress the independent nature of its paticipation.

PART II: Commission Consideration of Additional Comments on Its. Fourth Finding

1. Introduction

On November 3, 1983, the Commission reopened the comment period in this proceeding to receive comments on: (1) *34664 The environmental aspects of its fourth finding--that it has reasonable assurance that, if necessary, spent fuel can be stored without significant environmental effects for at least 30 years beyond the expiration of reactor operating licenses at reactor spent fuel storage basins, or at either onsite or offsite independent spent fuel storage installations; (2) the determination that there are no significant non-radiological consequences which could adversely affect the environment if spent fuel is stored beyond the expiration of operating licenses either at reactors or at independent spent fuel storage installations; and (3) implications of comments on items (1) and (2) above for the proposed amendment to 10 CFR Part 51 ($\frac{46}{10}$ FR 50746).

The Commission has considered those comments and, for the reasons discussed below, finds no reason to substantively modify its fourth finding or other related aspects of its decision in this proceeding. The Commission has, however, made revisions in its fourth finding to clarify its original intent.

Thirteen comments were received. Seven commenters identified various reasons which they believed argued against the finding. [FN4] Six commentors supported the finding. [FN5] In addition to the issues on which the Commission specifically requested comments, some commentors raised additional issues regarding the Commission's

compliance with the National Environmental Policy Act (NEPA).

FN4 Department of Law of the State of New York, Marvin Lewis, Sierra Club, Safe Haven, Ltd., Attorney General of the State of Minnesota, Department of Justice of the State of Wisconsin and Natural Resources Defense Council, Inc.

FN5 Scientists and Engineers for Secure Energy, Inc. American Institute of Chemical Engineers, American Nuclear Society, Utility Nuclear Waste Management Group--Edison Electric Institute, and U.S. Department of Energy.

2. Environmental Aspects of Extended Storage of Spent Fuel

A. Radiological Consequences of Spent Fuel Storage

The Commission's proposed fourth finding stated:

The Commission finds reasonable assurance that, if necessary, spent fuel can be stored safely without significant environmental effects for at least 30 years beyond the expiration of reactor operating licenses at reactor spent fuel storage basins, or at either onsite or offsite independent spent fuel storage installations.

The public was invited to submit additional comments on the environmental aspects of this finding. Those comments, and the Commission's responses to them, are set out below.

The State of Minnesota ("Minnesota"), through its Attorney General, and the Sierra Club believe that an event at the spent fuel pool for Prairie Island Nuclear Generating Station ("Prairie Island") indicates that irradiated spent fuel assemblies are degrading rapidly In December 1981, during a fuel transfer operation at with time. Prairie Island, the top nozzle assembly separated from the remainder of a spent fuel assembly due to stress corrosion cracking of the spent fuel assembly while it was in the spent fuel pool. Minnesota and the Sierra Club acknowledge that this separation was an isolated event; over 5,000 similar spent fuel assemblies have been moved successfully at other plants. These commentors also acknowledge that television examination showed no corrosion cracking of similarly designed fuel assemblies at other nuclear power plants: Zion, Trojan, Kewanee and Point Beach. They also acknowledge that even though the water contaminant contributing to stress corrosion

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cracking has never been identified, the possibility that it may have been sulfates has led the Commission to suggest that Prairie Island monitor the sulfate levels of its spent fuel pool.

However, the Sierra Club contended [FN6] that the NRC staff essentially ignored the opinion of Mr. Earl J. Brown, an NRC engineer, that sulfate contamination is a generic problem at Pressurized Water Reactors (PWRs). The Sierra Club also believes that television inspection of spent fuel assemblies in spent fuel pools cannot reveal the initial signs of stress corrosion cracking. For these reasons, the Sierra Club and Minnesota believe that there is no assurance that spent fuel can be stored safely in spent fuel pools for 30 years after reactor shut down or for 60 years after irradiation.

FN6 Sierra Club also stated that the staff did not consider an Oak Ridge report (ORNL 3684, Nov. 1964) which identified water vapor as contributing to corrosion of the type of steel used in spent fuel assemblies. That report is not germane to light water reactor fuel because it addressed the sensitization of stainless steel in a high temperature gas cooled reactor environment, which is very different from the environment of a light water reactor. Refer to the discussion in Sec. 2.4A of the Appendix to the Commission's decision.

The NRC investigated the Prairie Island event and found it to be an isolated event without generic impact. The staff also concluded that if a fuel assembly were to drop due to top nozzle failures, such an event would not lead to a criticality hazard in a spent fuel pool and that such an accident would result in radiation levels at the site boundary well within the limits in 10 CFR Part 100. The NRC Staff Assessment Report ("SAR") and associated memoranda, although already publicly available in the Commission's Public Document Room, have been added to the docket of this proceeding. That SAR concluded that the event was caused by intergranular stress-corrosion cracking due to an unidentified corrodant temporarily present in the spent fuel pool.

As for the Sierra Club's specific comments, the staff recognized that sulfate contamination was suspected to have contributed to the corrosion and recommended that licensees administratively control sulfate level concentrations in spent fuel pools. Such monitoring had been recommended by Mr. Brown as the only action that should be taken in response to the incident. Although Mr. Brown stated that in his opinion the event was a "potential" generic issue for PWRs, subsequent staff investigation revealed that the event was an isolated incident. The staff also considered the properties of the steel used in the spent fuel assemblies and acknowledged that they could have contributed to the event. However, the absence of any similar events for 5,000 other spent fuel assemblies indicated that the type of steel was not critical. Accordingly, the Commission finds no basis for reconsidering the Safety Assessment Report's finding that the Prairie Island event was an isolated incident and recommendation that sulfate control was an adequate response, or for altering its conclusion concerning the potential environmental impacts of stored spent fuel.

Wisconsin, Safe Haven, Ltd. and NRDC contended that the environmental effects of extended spent fuel storage are site specific and should be considered on a case-by-case basis. [FN7] Safe Haven believes that the individuality of each plant and its environmental surroundings necessitate separate evaluations of extended storage of spent fuel, but identified no site-specific factors which would result in significant environmental impacts. NRDC listed some site specific factors: geology, hydrology, seismicity, ecological factors and individual proposals for spent fuel management and storage. However, NRDC did not suggest how these factors could lead to significant site-specific environmental impacts that would preclude the ***34665** Commission from making a generic Similarly, Wisconsin listed as relevant factors proximity finding. to population centers, highways, geologic faults, dams, flood plains or shorelines affected by erosion, but offered no suggestion of how these factors could affect the Commission's generic determination. For example, there has been no discussion of why the Commission's seismic design requirements, though site specific, are not generically adequate to assure that spent fuel can be stored for up to 30 more years in a spent fuel pool designed to withstand the largest expected earthquake at each reactor site. Mr. Marvin Lewis contended that the fourth finding had no basis because the Commission had little or no experience with storing spent fuel for 30 years or with storing fuel that could be up to 70 years old. Mr. Lewis also asserted that the pyrophoricity of the zircaloy tubes containing spent fuel for 30 years presents and unknown fire danger. This comment is based on a private communication to Mr. Lewis regarding the condition of the spent fuel at Three Mile Island, Unit 2. Βv the terms of that letter, any fire danger associated with pyrophoricity of zircaloy arises from the accident conditions at TMI-

NRC has previously studied the effects of loss of water from 2. pools on the temperature of stored spent fuel (NUREG/CR-0649, "Spent Fuel Heatup Following Loss of Water During Storage" [March, 1979]). While this study noted that oxidation could become self-sustaining for temperatures in the neighborhood of 850-950 C (NUREG/CR-0649, page 13), the study shows that such oxidation can only occur for extreme temperature conditions and for spent fuel that has been stored for a relatively brief storage period. In order for rapid oxidation to occur, the age of the spent fuel (30,000 MWD/MT burnup) would have to be in the range of less than 10 days to less than two years, depending on the density at which it is stored (see page 55, Figure 17 of NUREG/CR-0649). Moreover, one must assume a continuing oxygen supply adequate to sustain the oxidation. Any damaged spent fuel such as that from TMI-2, would be canned to avoid particulate loss and would have already aged several years. Neither the heat load leading to temperatures capable of initiating rapid oxidation nor the presence of an adequate supply of oxygen to sustain a pyrophoric reaction would seem to be present in any storage configuration or under conditions that would receive NRC approval. While it is correct that spent fuel has not been stored for over 30 years, the record shows that utilities have successfully stored spent fuel for over 20 years, and that there are no known physical processes which would indicate that it is impractical to extrapolate that experience to make predictions about the behavior of spent fuel for 70 years of storage.

FN7 Safe Haven also suggested that a full environmental and safety review should accompany any utility's proposed plans submitted pursuant to 10 CFR 50 (§ 50.54(aa)) for extended storage of spent fuel. The Commission will treat its review of any such utility proposal in accordance with the established procedures for considering any application for a license amendment.

The Utility Nuclear Waste Management Group--Edison Electric Institute and the U.S. Department of Energy referred to several documents in the record which show that the relatively low energy content of spent fuel and the relatively benign static environment of spent fuel storage render insignificant the radiologic impacts arising from extended storage of spent fuel. As discussed in more detail below, these documents also show that there are no significant non-radiologic environmental impacts arising from such extended storage. Under these circumstances, the Commission finds that it has sufficient experience with spent fuel storage to predict spent fuel behavior during 70 years of storage and to find that such storage will not result in significant environment effects.

B. Non-Radiological Consequences of Spent Fuel Storage

The Commission's fourth finding rested in part on the Commission's determination that there are no significant non-radiological consequences due to the extended storage of spent fuel which could adversely affect the environment. The public was invited to comment also on this finding and to provide a detailed discussion of any such environmental impacts. Mr. Marvin Lewis asserted that the continuous storage of spent fuel under water for 30 years or more requires unprecedented institutional guarantees. He also noted that there had been no consideration of financial, economic and security implications of storage for 30 or more years. Mr. Lewis did not expand upon these assertions to explain how they would result in significant non-radiological environmental consequences. In any event, the more than twenty years of experience with storing spent fuel demonstrates that storage of spent fuel for 30 years or more does not require unprecedented institutional guarantees or raise unique questions regarding finances, economics or the security of extended spent fuel storage. Further, the Commission will require all reactor licensees, 5 years before expiration of their operating license to provide a plan for managing the spent fuel prior to Moreover, the record documents referred to by UNWMG-EEI, disposal. DOE and AIF show that there are no significant non-radiological environmental impacts associated with the extended storage of spent The amount of heat given off by spent fuel decreases with fuels. time as the fuel ages and decays radioactively. No additional land needs to be devoted to storage facilities because reactor sites have adequate space for additional spent fuel pools or dry storage The additional energy and water needed to maintain installations. spent fuel storage is also environmentally insignificant. No commentor has challenged these assessments of environmental impacts and the Commission has no reason to question their validity. Under these circumstances, the Commission has no reason to reassess its prior determination that extended storage of spent fuel will present no significant non-radiological consequences which could adversely affect the environment.

3. Commission Compliance With NEPA

Several participants challenged the Commission's compliance with

NEPA. The States of New York ("New York") and Wisconsin contend that since its inception, this proceeding has focused on the availability and safety of spent fuel storage, and has been conducted outside the scope of NEPA. New York supports this contention with the following quote from the First Prehearing Conference Order (February 1, 1980):

This rulemaking proceeding does not involve a major federal action having a significant impact on the environment, and consequently an environmental impact statement is not required by NEPA . . .

New York asserts that this statement caused the participants not to Accordingly, New York believes that consider NEPA in their filings. the Commission cannot now transform the Waste Confidence Proceeding into a NEPA proceeding. In New York's view, joined by the Natural Resources Defense Council, Inc. ("NEDC"), NEPA required the Commission to prepare an environmental impact statement ("EIS") or environmental assessment to consider the environmental impacts of spent-fuel storage at reactor sites beyond the expiration dates of The Utility Nuclear Waste Management Group-Edison reactor licenses. Electric Institute ("UNWMG-EEI") believes that it has been clear from the outset of this proceeding that the Commission intended to develop environmental regulations appropriate to the issues considered here. UNWMG-EEI cites several factors in support of its position:*34666 (1) this proceeding was the direct outgrowth of a NEPA case, Minnesota v. NRC, 602 F.2d 412 (D.C. Cir. 1979); (2) the Notice of Proposed Rulemaking explicitly stated a Commission intent to deal with environmental aspects of spent fuel storage; (3) the proceeding was docketed under Part 51, the Commission's regulations implementing NEPA; (4) the Commission stated that it would draw on the record of the rulemaking on environmental impact of the nuclear fuel cycle (Table S-3) and included in the NRC Data Bank for this proceeding sources of information on the environmental impacts of spent fuel storage; and (5) several participants included in their statements information pertaining to the environmental impacts of spent fuel storage.

The Commission believes that from the very beginning of this proceeding, participants were on notice that environmental aspects of spent fuel storage were under consideration. The notice initiating this proceeding stated, in pertinent part:

If the Commission finds reasonable assurance that safe, off-site disposal for radioactive wastes from licensed facilities will be

available prior to expiration of the facilities' licenses, it will promulgate a final rule providing that the environmental and safety implications of continued on-site storage after the termination of licenses need not be considered in individual licensing proceedings. In the event the Commission determines that on-site storage after license expiration may be necessary or appropriate, it will issue a proposed rule providing how that question will be addressed.

* * * * *

Based on the material received in this proceeding and on any other relevant information properly available to it, the Commission will publish a proposed or final rule in the Federal Register. Any such final rule will be effective thirty days after publication.

44 FR 61372, 61273-61374 (1979). (Emphasis supplied).

It is clear from this notice that if the Commission found that onsite storage after termination of reactor operating licenses would be necessary or appropriate, then it would propose a rule for dealing with the question of environmental and safety implications of continued onsite storage. New York's reference to the statement in the First Prehearing Conference Order is inapposite. That statement addressed the issue of whether a decision in this proceeding would be a proposal for major federal action having significant impact on the environment so as to require an EIS. The Presiding Officer found that the decision itself would not require an EIS. His decision in no way implied a change in the scope of the proceeding as announced in the notice initiating it.

There is also nothing about the Commission's fourth finding which requires an EIS. Neither New York nor NRDC has explained how this finding is a major federal action having a significant impact on the human environment. The finding provides a basis for a rule that provides that environmental impacts from extended storage of spent fuel are so insignificant as not to be required to be included in an The validity of such a rule depends on the impact statement. procedures used to promulgate it and the record supporting it. An EIS is not required because such a rule itself has no environmental impacts, significant or otherwise. [FN8] To require an EIS here would be essentially to require an EIS to show that no EIS is Clearly such a result would be incorrect. required. Accordingly, the Commission finds that NEPA does not require an EIS to support the fourth finding.

FN8 See, for example, Natural Resources Defense Council, Inc., v. U.S. Nuclear Regulatory Commission, 547 F.2d 633, 653, n. 57 (D.C. Cir. 1976), reversed on other grounds, sub nom, <u>Vermont Yankee</u> Nuclear Power Corp. v. NRC, 435 U.S. 519 (1978).

4. List of Respondents.

Respondents to the Commission's November 3, 1983 Order ($\underline{48}$ FR 50746) To Reopen the Period for Limited Comment on the Environmental Aspects of the Commission's Fourth Finding in the Waste Confidence Proceeding

1. Attorney General of the State of New York (N.Y.)

2. Marvin Lewis (Lewis)

3. Sierra Club Radioactive Waste Campaign (Sierra)

4. Scientists and Engineers for Secure Energy, Inc. (SE2)

5. Safe Haven, Ltd. (S.H.)

6. American Institute of Chemical Engineers (AICE)

7. Atomic Industrial Forum, Inc. (AIF)

8. Utility Nuclear Waste Management Group--Edison Electric Institute (UNWMG-EEI)

9. Natural Resources Defense Council, Inc. (NRDC)

10. Attorney General of the State of Wisconsin (Wis.)

11. U.S. Department of Energy (DOE)

12. American Nuclear Society (ANS)

13. Attorney General of the State of Minnesota (Minn.)

Appendix--Rationale for Commission Findings in the Matter of the Waste Confidence Proceeding

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1.0 Introduction

The rationale for the five Commission findings resulting from the Waste Confidence proceeding is summarized below. This rationale is based principally on the record of the proceeding which includes participants' position statements, cross-statements, pre-hearing and oral statements (in the discussion below, the participants are identified by the citations defined in the Reference Notation at the end of this document). The Commission also relied on the provisions of the Nuclear Waste Policy Act of 1982 (NWPA), and other substantive material not originally included in the record relating to the discussion of the safety of dry storage of spent nuclear fuel in the Commission's Fourth Finding; the NWPA and the dry storage material have now been incorporated into the record along with the relevant comments of participants in this proceeding.

The Commission notes that two relevant developments have occurred subsequent to the closing of the record in the Waste Confidence proceeding. *34667 They are the publication of DOE's draft Mission Plan for the Civilian Radioactive Waste Management Program (April, 1984) and the Commission's concurrence in DOE's General Guidelines for Recommendation of Sites for Nuclear Waste Repositories (July 3, 1984). These developments are a matter of public record, and in the case of the Commission's concurrence was the conclusion of a separate public proceeding. The Commission has considered the effects of these developments on its previously announced decision in this proceeding and determined that these developments do not substantially modify the Commission's previous conclusions.

2.0 Rationale for Commission Findings

2.1 First Commission Finding

The Commission finds reasonable assurance that safe disposal of radioactive waste and spent fuel in a mined geologic repository is technically feasible.

The Commission finds that safe disposal of high-level radioactive waste and spent fuel is technically possible and that it is achievable using existing technology. Although a repository has not yet been constructed and its safety and environmental acceptability demonstrated, no fundamental breakthrough in science or technology is needed to implement a successful waste disposal program. Those participants who questioned the availablity of a repository did not contend that fundamental scientific breakthroughs were required, but questioned whether technical problems could be resolved in a timely manner. The record supports the conclusion that the safe disposal of high level radioactive waste and spent nuclear fuel from licensed facilities can be accomplished.

The Department of Energy's (DOE) position is that disposal in mined geologic repositories can meet the goal of providing safe and effective isolation of radionuclides from the environment (DOE PHS pp. 2, 4; Tr. p. 11). A number of participants stated that waste containment and isolation from the biosphere are scientifically feasible (USGS PS p. 4; NRDC PS p. 9; UNWMG-EEI PS, Doc. 1 p. 22, Doc. II p. II-6; Consolidated Industry Group Tr. p. 16; Consolidated States Group Tr. p. 98). This view is consistent with the conclusions of the Report to the American Physical Society by the Study Group on Nuclear Fuel Cycles and Waste Management (Rev. Mod. Phys., Vol. 50, No. 1, Pt. II, p. S6, Jan. 1980) and the Report to the President of the Interagency Review Group on Nuclear Waste Management (Final Report, March, 1979, p. 38).

The conclusion that safe radioactive waste disposal is technically feasible is based on consideration of the basic features of repository design and the problems to be solved in developing the

final design. A mined geologic repository for disposal of highlevel radioactive waste, as developed during the past three decades, will be based on application of the multi-barrier approach for isolation of radionuclides. The high-level radioactive waste or spent fuel is to be contained in a sealed package and any leakage from the package is to be retarded from migrating to the biosphere by engineered barriers. These engineered barriers include backfilling and sealing of the drifts and shafts of the mined repository. We believe that the isolation capability and long-term stability of the geologic setting provide a final barrier to migration to the biosphere.

The selection of a suitable geologic setting is one of the key technical problems which DOE must solve. Other problems include development of waste packages that can contain the waste until the fission product hazard is greatly reduced and engineered barriers that can effectively retard migration of radionuclides out of the repository. The Commission recognizes that these three problems are not only the ones which DOE's program must solve, but they are critical components of the multi-barrier approach for nuclear waste isolation. Much of the discussion in this proceeding has focused on these problems. We have reviewed each of these issues and have concluded that they do not present an insoluble problem which will prevent safe disposal of radioactive waste and spent fuel.

A. The Identification of Acceptable Sites

There is general agreement among the participants that the period during which the wastes must be isolated from the biosphere is at least several millenia and that such prolonged isolation can be achieved in a deep mined respository provided the geologic setting is suitable. The geologic setting is the "final" isolating barrier. If the waste package and engineered barriers fail to perform as expected, the geologic barrier must prevent harmful quantities of radioactive materials from entering the human environment.

The Commission believes that technically acceptable sites exist and can be identified. In many locations in the continental United States there are geologic media potentially suitable for a waste repository. These media occur in large, relatively homogeneous and unfaulted formations and have properties (e.g., mechanical strength, thermal stability, impermeability to water which gualify them as potential host rocks for radioactive wastes. The potential host rocks include those being investigated by DOE--that is, domed salt, bedded salt, tuff, basalt, granite, and shale (DOE PS pp. II-70 to II-80.). Thousands of square miles of the United States are underlain with formations containing extensive masses of such potential host rocks. Moreover, more than one-half of the United States is underlain with rock that has been stable against significant deformation and disruption for over ten million years. The potential sites being investigated by DOE are in regions of relative tectonic stability (USGS PS pp. 19, 23, 24, 25, 26, 28; Tr. p. 236).

Host rock suitability and formation stability are not the only relevant technical factors to be considered in repository site selection. Geohydrologic conditions--particularly the absence of significant groundwater flow from the repository to the biosphere-must be favorable for effective isolation of the wastes (USGS PS p. 11). DOE's investigations reveal that the hydrologic characteristics of a major portion of the sites underlain with stable formations of potential host rock appear to be suitable for repository location (Tr. p. 236; DOE PS p. II-77).

These general conclusions about the extent of potential repository sites are based on the results of DOE's site exploration program (DOE PS Appendix B) and the extensive body of earth-sciences information available at the United States Geological Survey--the Federal agency principally concerned with earth-sciences issues and, under a DOE-USGS Memorandum of Understanding, a primary source of geologic, hydrologic and mineral resource data for the National Waste Terminal Storage program (USGS PS p. 2 and Appendix A; DOE PS p. III-44).

DOE's site exploration efforts are focused on four host rocks (domed salt, bedded salt, basalt, and tuff) in six regions (Gulf Interior, Paradox Basin, Permian Basin, Salina Basin, DOE Hanford Site, DOE Nevada Test Site) (DOE PS Appendix B). Although investigations of granite sites in the U.S. have been limited, DOE is developing data on the potential of granite as a host rock in collaboration with foreign investors. A Swedish-American cooperative program (DOE's Lawrence Berkeley Laboratory is the U.S. principal in the program) has involved a series of in situ tests in a granite formation *34668 conducted at the Stripa mine in Sweden. The investigations included determinations of thermally induced stresses and deformations in the Another cooperative study at Studsvik in Sweden granite rock mass. involved experiments in nuclide migration in fractured subsurface crystalline rocks (DOE PS p. II-258).
Some participants objected to the fact that most of DOE's site exploration involved federally-owned or -controlled areas, arguing that this would result in ignoring sites that were technically better (NRDC PS p. 17; Tr. p. 206). This objection, apparently based on the assumption that Federal lands investigated were limited in area and geologic diversity, is not supported by the record. The Federal lands being investigated by DOE are extensive and geologically diverse; moreover, they are more readily accessible to DOE and some of them, such as Nevada Test Site, have been previously subjected to extensive geologic assessment. These latter factors are significant advantages (DOE PS Appendix B; UNWMG-EEI CS p. IV. B-4). Although, as the United States Geological Survey pointed out, there may be advantages from a purely earth-science viewpoint in examining all parts of the country for their potential as repositories, time and resource limitations require that site exploration efforts be concentrated in limited regions fairly early so that detailed sitespecific characterization efforts can be undertaken in a timely way (USGS PS p. 17).

A specific site has not yet been identified as technically acceptable, and investigations of potential sites have shown some to be unsuitable. This does not necessarily mean that DOE's site selection program will be unsuccessful in identifying technically acceptable sites. The elimination of some sites is to be expected in a pursuit of the site selection program and is not, as some participants implied, an indication that suitable sites cannot ultimately be found.

Although the record of this proceeding does not show that DOE has progressed far enough in site characterization to confirm the existence of an acceptable site, the record does indicate that DOE's site characterization and selection program is technically sound. The data obtained in each stage of the screening process are analyzed and compared against criteria that must be satisfied for adequate performance of the total isolation system. DOE's program is providing information on site characteristics at a sufficiently large number and variety of sites and geologic media to support the expectation that one or more technically acceptable sites will be identified (DOE PS pp. III-8 to III-24; CS p. II-140). As discussed above, DOE's site screening efforts have concentrated on a diverse set of potentially suitable geologic media and are directed to an examination of large areas of the country on both federally-

owned and non-federal lands (USGS PS p. 17).

The technology for site identification is particularly well-advanced (UNWMG-EEI PS p. III-A-b79). The record describes numerous site characterization techniques, both remote sensing and in-situ, which are being used to evaluate sites (DOE PS pp. II-84 to II-103). The location and demonstration of acceptability of repository sites are problems which can be solved by the investigative and analytical methods now available (AEG PS p. 1). Site selection criteria are being refined (DOE PS pp. II-80 to II-83; <u>48 FR 5671</u>, February 7, 1983) and the technology exists for site characterization (DOE PS pp. II-84 to II-103). Areas have been found where most natural geologic and hydrologic processes operate at rates favorable to long-term containment in a mined repository (DOE PS p. II-128; Consolidated Industry Group PHS p. 9).

The Commission recognizes that there are gaps in the current state of knowledge about potential repository sites and geologic media, and about geochemical processes which affect radionuclide migration (e.g., CEC PS pp. 17, 54; NRDC PS pp. 18, 50, 64; NY pp. 38, 80; USGS CS pp. 5, 6). The gaps include a lack of a detailed understanding of such relevant processes as sorption of radionuclidebearing molecules by the geologic media, leaching of the wastes by groundwater, and radionuclide migration through subsurface formations. Some participants contend that these gaps and uncertainties in knowledge make it difficult to predict on the basis of any effort less than a detailed on-site investigation whether a candidate repository site will be technically suitable (e.g., NRDC PS pp. 18, 50, 53; ECNP PS pp. 3, 4; NECNP PS pp. 20, 21, 22).

The Commission recognizes that detailed site characterization is necessary to confirm that a proposed site is indeed suitable. The Commission does not believe, however, that all uncertainties must be resolved as a pre-condition to repository development. The performance of a repository may be bounded by using conservative values for controlling parameters, such as waste form solubility, ground water travel time and retardation of radionuclides. Furthermore, bounding analyses can be useful to take residual gaps in knowledge and uncertainties into account. If it can be established that a repository can perform its isolation function using established, conservative values for the controlling parameters, then it is not necessary to resolve uncertainties in the range of value these parameters may exhibit (DOE CS pp. II-83, II-84, II-130, III-

9, III-12):

The statements of those participants who are pessimistic about timely accomplishment of disposal tend to assign equal importance to all areas of uncertainty. Hence, they contain few attempts to assess the consequences of gaps in knowledge or to project the benefits of expected results from ongoing research and development efforts. It is the Commission's belief that the waste isolation system elements are adequately understood so that major unforeseen surprises in results of research and development are highly unlikely. This view is supported by USGS (USGS CS pp. 1-2).

A further concern of some participants is that, even if DOE were to identify a potentially acceptable repository site, the in-situ testing required to determine acceptability would breach the integrity of the candidate site (NY PS pp. 59, 63-65). If, for example, boreholes essential to characterize a potential site result in penetration of aquifers which are not amenable to effective sealing, this might make the site unacceptable (DOE PS pp. II-161 to II-164). However, no persuasive evidence was presented in the record to support the position that in-situ tests for site characterization work are likely to compromise the integrity of The Commission believes that in-situ tests can be candidate sites. successfully accomplished without adversely affecting site integrity for the following reasons. Many non-destructive remote sensing methods are available for determining site characteristics. Further, boreholes can be located in shafts or pillars of the future repository to minimize the possibility of leakage through them.

As discussed later, borehole sealing methods are expected to be adequate. The number of boreholes necessary to adequately characterize a site can be minimized by careful planning and by use of remote sensing methods in conjunction with the drilling program (DOE PS pp. II-84 to II-103, II-181). Finally, the Commission believes that if a site is found to be sufficiently sensitive to the testing program so that its integrity would be destroyed, then ***34669** that site would necessarily be found unacceptable.

In summary, the Commission believes that technically acceptable sites for disposal of radioactive waste and spent fuel exist and can be found. There are a number of suitable host rock type to select from; many areas are underlain with massive, stable formations containing these host rocks; the areas being investigated by DOE contain such rock formations; and the uncertainties in knowledge of the earth and material sciences relevant to the identification of an acceptable repository site are not fundamental uncertainties that would prevent the identification of technically acceptable sites. Further, in-situ testing required to characterize a candidate site would not necessarily compromise its integrity.

B. The Development of Effective Waste Packages

1. Waste Package Considerations. An important technical aspect of safe waste disposal is to assure that the waste form and the balance of the waste package, including the primary container and ancillary enclosures, are capable of containing the radioactivity for a time sufficient for the hazard from fission-product activity to be significantly reduced (e.g., DOE PS p. II-8). Decay heat, groundwater and nuclear radiation could cause the waste package components to interact with each other or with the host rock materials in such a way as to degrade the ability of the package to contain the radionuclides. These items are discussed below.

To assure long-term containment, DOE's conceptual design of a waste package is based on a defense-in-depth approach and involves a number of components including spent fuel, stabilizer (or filler), waste canister, overpack, and an emplacement hole sleeve. The stabilizer is intended to improve heat transfer from the spent fuel, to provide mechanical resistance to possible canister collapse caused by lithostatic pressure, and to act as a corrosion-resistant barrier between the spent fuel and the canister. Selection of canister overpack and emplacement hole sleeve materials will be based on tests of their chemical and physical integrity at various temperatures and levels of radiation and under various conditions of groundwater chemistry, as well as tests of their compatibility with each other and with the host rock materials under repository conditions. The canister, overpack, and sleeve should constitute relatively impermeable elements of the waste package. A variety of candidate materials is being considered for these elements. The various waste package components are to be combined in a conservative design that will compensate for the overall technical uncertainties in containment capability. The requirement for retrievability during some specified period after emplacement places conditions (e.g., ruggedness) on waste package design which are added factors to be considered in its development (DOE PS p. II-129 to II-152, II-282).

It is apparent from the foregoing that the development of an effective waste package depends on obtaining engineering data on those materials that appear to be promising candidates for package DOE is studying over 28 candidate materials for components. canisters and overpack (DOE PS p. II-143). The DOE evaluation program indicates that many of these materials are promising. For example, iron alloys have demonstrated long term durability (DOE PS p. II-144, Reference 383), and titanium alloys and nickel alloys show high resistance to corrosion (DOE PS p. II-144, Refs. 315, 338, 342). Ceramics are resistant to chemical degradation and have many other desirable properties (DOE PS p. II-145, Refs. 337, 347, 348 and 349). Preliminary analysis indicates that mild steel canisters with an appropriate backfill material would be a feasible waste package for either a salt or hard rock repository. For more demanding requirements, such as brine applications, the alloys of titanium, zirconium or nickel appear to represent alternate choices (DOE PS p. II-150, Refs. 337, 382). The DOE program also includes experimental studies of the release of radioisotopes from spent fuel exposed to simulated repository conditions (e.g., salt brine and fresh water with varying dissolved oxygen content). The studies are being conducted under temperature and pressure conditions that bound and exceed repository conditions (DOE PS pp. II-139 to II-141).

Not all participants were optimistic about waste package One participant asserted that in spite of DOE's development. efforts to develop a package that would remain inert and stable under repository conditions, none had yet been found and the DOE program would not succeed in finding one (NRDC PS p. 46). Other participants pointed to the limits of present knowledge, particularly about the leaching of radioisotopes from spent fuel in a groundwater environment, and concluded that it is not possible to select a waste form which will prevent radioisotopes from migrating to the biosphere (e.g., CEC PS p. 51). They also pointed out that chemical and physical properties of spent fuel varied widely and depended on burnup, location within the reactor core, age, and physical integrity; design of a system of barriers to accommodate this heterogeneity within the context of a given geohydrologic environment would be a major undertaking (NY PS p. 83).

The Commission recognizes the difficulties which must be overcome in developing a suitable waste package. A large body of experimental data must be accumulated and applied to a variety of candidate arrangements of waste package components. Suitably conservative

assumptions must be postulated to define the repository conditions. Data from experiments of relatively short duration have to be used to predict behavior for much longer periods. It is common practice in materials research to perform short-duration experiments under physical or chemical conditions much more severe than those expected for the longer duration and, from known fundamental properties of the materials under investigation, to extrapolate the experimental data to predict long-term behavior. Conservatism can usually be assured by making the experimental conditions sufficiently severe.

The complex composition of the mixture of radionuclides in fission products and their basic chemical properties are known and have been the subject of investigation for more than three decades. The large body of published data on fission product chemistry and experience with fission product mixtures should provide considerable support for predicting the behavior of spent fuel and high-level radioactive waste in waste package designs. [FN1] The Commission, therefore, concludes that the chemical and physical properties of spent nuclear fuel and high-level radioactive waste can be sufficiently understood to permit the design of a suitable waste package.

FNI Published compilations of such data, although not specifically included in the record of this proceeding, are well known to the nuclear science and engineering community. Examples are the three volumes of the National Nuclear Energy Series, "Radiological Studies: The Fission Products," by C. D. Coryell and N. Sugarman, McGraw-Hill, 1951; "Reactor Handbook," Second Edition, Vol. II, Fuel Reprocessing, edited by S.M. Stoller and R.B. Richards, Interscience Publishers, Inc., New York, 1961).

The Commission also concludes that the DOE program is capable of developing a suitable waste package which can be disposed of in a This conclusion is based upon the large mined geologic respository. number of candidate materials being considered by DOE, the detailed evaluation of these *34670 materials to be conducted as part of the DOE program and the results of DOE's preliminary analysis of candidate materials, as described above (see Sec. 2.1(b)(1)). The Commission's conclusion that the development of a suitable waste package is technically feasible is also consistent with other For example, a study sponsored by the material in the record. National Academy of Sciences (NAS) concluded that no insurmountable technical obstacles were foreseen to preclude safe disposal of nuclear wastes in geologic formations (UNWMG-EEI PS Doc. 2 p. II-6).

The United States Geological Survey stated that a long-lived canister is within the capability of materials science technology to be achieved in the same time frame as repository site identification, qualification and development (USGS PS p. 11). The National Research Council, after reviewing the Swedish waste disposal work (DOE PS p. II-335 Ref. 380), concluded that the Swedish waste package could contain the radionuclides in spent fuel rods for hundreds of thousands of years (DOE CS p. II-98).

2. Effect of Reprocessing on Waste Form and Waste Package. The waste form itself (spent fuel or other high-level waste) serves as the first barrier to radionuclide release and thus supplements the containment capability of the other components of the waste package as well as the repository's natural isolation capability. Throughout this processing it has been assumed that the waste form would be spent fuel discharged from light water reactors, with mechanical disassembly for volume reduction and packaging in a canister as the only potential modifications. The relevant properties of the spent fuel (irradiated uranium dioxide pellets and zircaloy cladding) are known. DOE's program has been directed toward providing data to determine the behavior of spent fuel as a waste package component under repository conditions. In its Position Statement DOE stated that the "representative case" to be considered in this proceeding is the disposal and storage of spent fuel from commercial reactors and that this does not foreclose "other approaches, such as the reprocessing of spent fuel and solidification of resultant nuclear wastes" (DOE PS p. I-2).

On August 27, 1981 the National Resources Defense Council filed a Motion for Judgment requesting a prompt ruling that, on the basis of the present record, there is not reasonable assurance that off-site storage or disposal will be available by the year 2007-09. NRDC stated that, because the present Administration [FN1] had changed Federal policy towards commercial reprocessing of spent fuel (reprocessing was deferred "indefinitely" in April 1977 by the previous Administration), the disposal of spent fuel would be contrary to the present Administration's policy, and thus spent fuel was no longer a valid "reference waste form" for this proceeding. As a consequence, according to NRDC, DOE schedules and timetables. which were based on spent fuel storage and disposal, were irrelevant. The NRDC view was challenged by DOE as well as by seven participants representing utilities and the nuclear industry. The Commission took note of the NRDC filings and the responsive filings by other

participants, considering them part of the record, and in its November 6, 1981 Second Prehearing Memorandum and Order asked the participants to address the significance of commercial reprocessing to the Commission's decision in the waste confidence proceeding. In response, the participants addressed this change in government policy in their prehearing statements filed in December 1981.

FN2 The NRDC statement was based on DOE testimony before a Congressional committee. The President's Nuclear Policy Statement of October 8, 1981 confirmed the DOE testimony.

In response to those who argued that the change of reprocessing policy invalidated DOE's position, DOE stated that the program for development of the technology is not dependent on the waste form. Moreover, DOE pointed out that the purpose of this proceeding -- "to determine whether there is at least one safe method of disposal or storage for high-level radioactive waste" is not changed by this Administration's support of reprocessing of spent fuel (DOE PHS pp. Some participants who agreed with DOE commented that spent 2-3). fuel disposal involves greater difficulty than disposal of solidified reprocessing waste because of its higher radioactivity and less easily handled form; in addition, they asserted that the removal of the uranium and most actinides by reprocessing would ease the requirements for safe long-term storage and simplify the waste disposal problem (UNWMG-EEI PHS p. 16; SE2 PHS p. 4). Others contended that spent fuel is a more difficult waste form because heat dissipation and packaging problems involved in disposal appear to be more severe than in disposal of solidified reprocessing waste (AIF PHS p.6; ANS PHS p. 5).

The Commission recognizes that the proceeding has been primarily concerned with storage and disposal of spent fuel. However, the Commission does not believe that the possibility of future reprocessing, and the potential need to dispose of high-level radioactive waste resulting from reprocessing, significantly alters the technical feasibility or the schedule for developing a mined geologic repository and the design of its multiple barriers.

With regard to technical feasibility, the effect of spent fuel reprocessing on the commercial radioactive waste disposal problem is not a new consideration. The disposal of waste from reprocessing spent fuel has been studied for a longer time than the disposal of spent fuel. Until 1977, the commercial waste management program was directed primarily toward disposal of waste from spent fuel reprocessing, and those efforts have continued. A variety of waste forms has been studied (DOE PS pp. II-153 to II-160). Thus, considerable information is already available on the technical feasibility of developing a suitable waste form for reprocessed highlevel radioactive waste. In fact, there is evidence that the disposal of reprocessed high-level waste may pose fewer technical challenges than the disposal of spent fuel (Tr. p. 29). Moreover, commercial reprocessing of spent fuel cannot be undertaken in this country in the absence of a full NRC licensing review. That review will consider, among other things, the waste form to be produced by the reprocessing method and its implications for waste disposal. Unless the Commission determines that commercial reprocessing and management of its products assure adequate protection to the public health and safety and the common defense and security, spent fuel will continue to be the predominant commercial waste form available for disposal in a repository.

With regard to the impact on DOE's repository schedule, the Commission recognizes that DOE's waste package development program will eventually be affected to some extent by the nature of the waste form under development. However, the direction taken in research and evaluation of materials being conducted in the DOE program is expected to produce results which would be relevant to the waste package design, regardless of which waste form is used (DOE PS pp. II-141 to II-152, CS pp. II-96 to II-100). Moreover, the choice of waste form will not significantly affect other elements of the DOE repository program. The storage and disposal of reprocessed waste would involve substantially the same problems as those being addressed for spent fuel, *34671 and a change in waste form would not alter the site-selection program or the program for development of suitable engineered barriers (DOE PHS p. 3). Thus, DOE's program is proceeding on a basis that would permit the disposal of either highlevel waste or spent fuel. This approach is consistent with the recommendations of the Interagency Review Group in its March 1979 report to the President (IRG Final Report, p. 73) and with the direction in the Nuclear Waste Policy Act of 1982 (Sec. 111(a)(2)). Finally, as noted above, any decision to permit the commercial reprocessing of spent fuel will include consideration of the reprocessed waste form and its implications for waste disposal. For these reasons, the Commission concludes that the possibility of commercial reprocessing does not substantially alter the technical feasibility of, or the schedule for, developing a suitable waste

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package.

The Commission concludes that the basic knowledge of spent fuel and high-level waste and its behavior in a repository environment, together with DOE's ongoing development and testing program, are sufficient to provide assurance that a waste package can be developed that will provide adequate containment until the potential hazard from the fission product activity is sufficiently reduced.

C. The Development of Effective Engineered Barriers for Isolating Wastes From the Biosphere

1. Backfill Materials. In DOE's conceptual design, one engineered barrier consists of backfill materials for filling voids between canister, overpack, sleeve and host rock. The materials are chosen to retard radionuclide migration. The task is to design and test barrier materials which will be effective for very long periods of time. Candidate materials include bentonite, zeolites, iron, calcium or magnesium oxide, tachyhydrite, anhydrite, apatite, peat, gypsum, alumina, carbon, calcium chloride, crushed host rock, and others (DOE PS p. II-147). Host rock or other materials would also be used to backfill drifts and shafts within the repository.

The California Department of Conservation (CDC) contends that repository shaft and borehole backfill material performance may be degraded as a result of increased temperature and other factors (CDC PS pp. 19-22). However, the expected temperature rise in the shaft backfill material will be only about 10 Farenheit degrees, and will cause no significant degradation of the shaft backfill material (DOE, PS p. II-347 Ref. 527 NUREG/CR 0495). Other participants believe that there is inadequate information to permit development of longlived engineered barriers that will effectively contain high-level radioactive wastes (NRDC PS pp. 18, 32;

PS pp. 3-4; NECNP PS p. 18). CDC further contends that at this time, no information appears to have been developed that specifies the best type of backfill material to be used in particular geologic media (CDC PS pp. 19-22). However, the choice of backfill must take into account the rock media at the selected site as well as the waste package material. Thus, the backfill cannot be selected until a repository site has been selected. The NWTS program has as its objective, providing information on a practical range of options for backfill materials. Although a considerable amount of work remains to be done, an active research and development program on backfill materials is underway (DOE PS p. II-147). Further, that program is providing information to evaluate the backfill material options, as well as to establish a basis for selection of a suitable material for the geologic media being considered. The Commission believes that this approach provides an adequate basis for concluding that effective backfill materials will be identified in a timely fashion.

In the National Waste Terminal Storage program a wide range of candidate backfill materials have been and are continuing to be evaluated (DOE PS II-129 to II-152). The DOE studies includë measurements of the appropriate properties of backfill material including nuclide sorption capacities, capability to prevent or delay ground water flow, thermal conductivity, mechanical strength, swelling, plastic flow and methods of backfill emplacement. Data on available candidate materials show significant radionuclide sorption capabilities and sorptive properties can be maintained at elevated temperature and in the presence of radiation (DOE CS pp. II-98, II-Analyses indicate that several of the materials could provide 99). adequate performance characteristics (DOE PS, Part II, Ref. 339, 340, 346, 372, 374, 376). As an example of the development of effective engineered barriers, the results of Swedish studies on radionuclide release in a repository were cited. The studies showed that a bentonite clay backfill, in conjunction with a thick copper canister (with spent fuel inside) could prevent the release of radionuclides to the host rock in the presence of granitic ground water for thousands to hundreds of thousands of years. In the Swedish experiments, the clay barrier provided sorptive properties which were predicted to delay the breakthrough of various radionuclides for thousands of years and also served to chemically condition the ground water, reducing its corrosive effect on the canister (DOE PS pp. II-The use of certain clays to retard the transport of 145, II-148). radionuclides released by the waste package is applicable to repository designs here in this country. While DOE has not proposed using thick copper canisters as employed in the Swedish studies, this example of a durable combination of waste package and backfill material which was demonstrated to be effective in isolating radionuclides for very long times, indicates that the basic approach The use of clays, combined with other appropriate is reasonable. materials, could provide an effective means for radionuclide retardation and corrosion control.

In sum, the Commission believes that DOE's ongoing developmental

studies reported in this proceeding (DOE PS pp. II-129 to II-152) are technically sound and provide a basis for reasonable assurance that engineered barriers can be developed to isolate or retard radioactive material released by the waste package.

2. Borehole and Shaft Sealants. A major factor in repository performance is the effective sealing of boreholes and shafts during repository closure operations. All penetrations provide potential pathways for radionuclides to reach the biosphere or for ground water to enter the repository. The penetrations must be sealed for an extended period of time. Further, the geology and hydrology at a particular site, as well as the expected temperature and pressure conditions during repository lifetime, must be understood in order to make a proper choice of the borehole and shaft sealing materials and to develop effective borehole and shaft seals.

Some participants concluded that current information concerning the technology for the sealing of the boreholes and shafts is inadequate. They also questioned the capability of the DOE program to develop sufficient information to allow effective seal design (CDC PS pp. 19-22; NRDC PS p. 5). The views of several participants who expressed concern about sealing were reflected in the comments of CDC. The Commission's response to each of the points raised by CDC on borehole and shaft sealing issues is discussed below.

CDC indicated that since long-term effects of heat and radiation on seal materials were not a factor in past oil and gas borehole sealing experience, *34672 such experience is not applicable to repository sealing. [FN3] However, at distances of more than several feet from waste canisters emplaced in a repository, radiation exposures are small and the temperature rise at seals in the shafts and boreholes is insignificant for sealing purposes (DOE CS II-108).

FN3 The Commission notes that the extensive oil and gas borehole sealing experience has not been concerned with very long-term sealing. Therefore, DOE's sealing research and development must provide a basis to extend that experience for the development of long-term seals for a repository.

CDC also believes that the tests of cement seals with epoxy resins in bedded salt deposits discussed by DOE are insufficient to provide assurance of seal stability over a period of 10,000 years, especially when the effects of higher temperature and radiation are not included. As noted above, temperature and radiation effects on seals are expected to be negligible.

While these tests may not provide conclusive proof of performance for 10,000 years, they are expected to provide useful information for seal development.

CDC states that the results of field tests described by DOE as continuing over the next few years will not be completed in time to contribute to seal design criteria which are to be completed [FN4] in 1982. However, the final seal design for the selected site is scheduled for two years after a site is selected (DOE PS p. II-184). Testing up to that date is expected to be useful in designing an effective seal.

FN4 DOE has published "Schematic Designs for Penetration Seals For a Reference Repository In Bedded Salt," ONWI-405, November, 1982.

CDC questioned whether tests of waste package system component interactions with the surrounding media in bedded salt described by DOE will be completed in time for location of a repository. However, the Commission finds no basis for this assertion in the record. The DOE program appears to be adequately addressing this issue. Studies are in progress to characterize further the interactions between candidate backfill-getter materials and waste container alloys. These studies include investigations of dry rock salt/metal interactions and high intensity radiation/salt/brine/metal interactions. (DOE PS p. II-149, II-150).

CDC asserts that DOE has not discussed designing backfill material and penetration seals to allow for safe reentry if retrieval should become necessary. However, the provision to retrieve high-level waste and spent fuel for a number of years after the repository is filled has been addressed by DOE (DOE PS pp. II-280 to II-283). Although it has not yet been established whether backfilling and sealing will be conducted before repository closure, these operations may be reserved until a final decision for closure is made. In any event, CDC provides no basis for concluding that providing for retrievability will necessarily create any major difficulties for the design of backfill material and penetration seals.

According to one participant, "There is no established way to seal a repository so as to prevent radionuclide release to the biosphere for

the necessary period of time. DOE has termed the sealing problem a 'key unknown' but there is no consensus that the technology which is currently anticipated will provide adequate seals for even a few decades" (Consolidated States Group PHS p. 8). Other participants maintained that seals must perform as well as the host rock in preventing radionuclide migration (NRDC PS p. 55). The DOE position is that the seal should provide a barrier with sufficient integrity to ensure acceptable consequences and sealing adequacy should be determined only on a site-specific basis (DOE CS p. II-106). DOE asserted that its program will successfully resolve remaining uncertainties in repository sealing technology (DOE CS pp. II-106 to II-109).

DOE has been studying cement-based borehole plugging and has examined use of grout materials for application to the Waste Isolation Pilot Plant (WIPP) and other potential repository sites. Earth-melting technology for plugging in salt and use of compacted natural earth materials are also being investigated (DOE PS p. II-There is a considerable body of experience in 183, CS p. 106-109). sealing subsurface formations in the oil, gas, and other mineral However, related industrial experience and extraction industries. requirements for sealing a repository differ in one important respect: repository sealing must be effective for a very long time while most other sealing applications are for relatively short time periods (DOE PS p. II-182). Future DOE effort will be needed to verify borehole seal performance and durability for each candidate medium. An important aspect of DOE's work is to determine the rate of degradation of seal performance as a function of time. DOE plans to determine seal performance specifications for a particular site on the basis of calculated predictions of radionuclide release and transport to the accessible environment (DOE PS p. II-182). These predictions are expected to indicate that a site whose characteristics for waste isolation are clearly superior may not require sealing performance specifications as stringent as those for a less favorable site.

Based upon the extensive experience with shaft and borehole sealing in other industries and DOE's detailed program for evaluating the long-term performance of seals, the Commission believes that there is a reasonable basis to expect that long-term effective borehole and shaft seals can be developed.

D. Summary of Views on the Technical Feasibility of Safe Waste

Disposal

The Commission notes that participants in the Waste Confidence Rulemaking proceeding have generally agreed there are no known fundamental technical problems which would make safe waste disposal impossible. Where they differ is the extent to which the technical problems of disposal technology and siting have already been solved and the capability of DOE to solve them, and particularly to solve them by 2007-09 or by the expiration date of reactor operating licenses (e.g., NY PS p. 3; NECNP PS p. 171; Minn PS pp. 13-20 of Enclosure).

The Commission believes that the record provides a basis for reasonable assurance that the key technical problems can be solved. Technically acceptable sites exist and can be found among the various types of geologic media and locations under investigation by DOE. Currently developed geophysical methods for site evaluation appear capable of adequately characterizing the site, and the residual uncertainties in earth sciences data do not seem to be an insurmountable impediment. Further, the Commission believes that the multi-barrier approach to waste package design is sound and that package development is being adequately addressed by DOE. DOE's development work on backfill materials and sealants provides a reasonable basis to expect that backfill materials and long-term Reprocessing of spent fuel would only seals can be developed. become a licensed commercial activity if disposal of reprocessing waste in a mined repository would be established as technically feasible. While the Commission recognizes that more engineering development and site-specific work on disposal technology will have to be conducted before a waste repository can be constructed and operated, the Commission concludes that it is technically feasible to safely dispose of high-level radioactive waste ***34673** and spent fuel in a mined geologic repository.

2.2 Second Commission Finding

The Commission finds reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by the years 2007-09, and that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

While the record of the proceeding supports a finding that disposal is technically achievable, the Federal government has, in the past, made inadequate progress in developing sound waste management The Commission notes that DOE has stated in policies and programs. its April 1984 draft Mission Plan that the first repository will begin operations in 1998, and that the second will start up in 2004. However, it is recognized that both technical and institutional issues contribute to uncertainties concerning DOE's ability to complete one or more mined geologic repositories for high-level radioactive waste by those dates. The technical issues concern DOE's ability to find technically acceptable sites in a timely fashion and the timely development of waste forms, packages, and engineered barriers. The institutional issues concern primarily Federal-state relations and the management and funding of the Federal program.

The Commission has considered the effect of enactment of the Nuclear Waste Policy Act of 1982 and concludes that the Act helps to reduce these scheduling and institutional concerns. The Act provides support for timely resolution of technical uncertainties by: (1)Establishing specific milestones for all the key tasks; (2)coordinating the activities of all the involved Federal agencies; (3) providing for time schedules and a mission plan for the accomplishment of the tasks; and (4) providing a mechanism for monitoring progress, for identifying failures to meet the schedules and the milestones, and for adjusting the future elements of the program in the event that such failures occur. In order to further enhance the resolution of technical uncertainties regarding rock thermal-geomechanics the Act provides for the establishment of a Test and Evaluation facility to carry out in-situ studies of rock at The Act also reduces uncertainties in the repository depth. institutional arrangements for the participation of affected states in the siting and development of repositories and in the long-term management, direction and funding of the repository program. The Commission's assessment of both the technical and institutional factors is discussed below.

A. Technical Uncertainties

The ability to construct and operate a mined geologic repository that will provide for the safe disposal of high-level radioactive waste and spent fuel by the years 2007-09 has been challenged by

In addition to the institutional issues which several participants. must be resolved, interrelated technical problems have to be solved in a coordinated and timely fashion. The Department of Energy is confident the technical problems can be solved as scheduled in the National Waste Terminal Storage Program plans (DOE PS p. III-86, CS p. III-13; DOE draft Mission Plan, April 1984). Other participants conclude that because of unresolved technical problems, DOE's schedule cannot be met (e.g., Consolidated Public Interest Group PHS pp. 2-7; Consolidated State Group PHS pp. 1-13). For convenience, we consider the technical controversy in two categories: (a) finding technically acceptable sites in a timely fashion, and (b) the timely development of waste packages and engineered barriers.

1. Finding Technically Acceptable Sites in a Timely Fashion. To assure the adequacy of a candidate site requires extensive onsite investigations including drilling or excavating, as well as analyses and technical evaluations. Although DOE has not yet begun subsurface site characterization to enable identification of an acceptable site, the record does indicate that DOE's site screening and selection program is providing information on site characteristics at a sufficiently large number and variety of sites and geologic media to support the expectation that one or more technically acceptable sites will be identified.

DOE is investigating four geologic media at a number of sites: domed salt (Gulf Interior Region); bedded salt (Paradox Basin, Permian Basin, Salina Basin); basalt (DOE's Hanford Site), and volcanic tuff (DOE's Nevada Test Site). Investigations in a fifth media (granite) are planned, but sites have not yet been determined (DOE PS Appendix B). Exploratory shaft excavation at three sites in different geologic media was to begin for basalt in April, 1983, for volcanic tuff in October, 1983, and for salt in December, 1983 (Tr. However, the Nuclear Waste Policy Act of 1982 (NWPA) pp. 241-242). imposed new conditions which made it necessary to revise this The NWPA specified that DOE had to prepare environmental schedule. assessments for each of five nominated sites, from which three sites would be recommended to the President for characterization. DOE's preparation of environmental assessments and recommendation of three sites were to be accomplished in keeping with the provisions of the repository siting guidelines required by the NWPA. The Commission's concurrence in DOE's siting guidelines on July 3, 1984, enables DOE to proceed to nominate and recommend repository sites for characterization. DOE has recently published a revised schedule for site selection milestones in its April, 1984 draft Mission Plan. As described in its Mission Plan, the current status of DOE's site selection schedule calls for the issuance of environmental assessments for five nominated sites and the recommendation of three of those sites for characterization by December, 1984. DOE's schedule for work in the various geologic media is summarized below.

Salt: Resolution of the identified key screening issues in FY 1984 is expected to permit nomination of a candidate salt dome site in December, 1984. DOE is still choosing from among several salt domes in the Gulf Coast interior region (Tr. pp. 243-244; DOE Draft Mission Plan, April, 1984). For bedded salt, primary effort has been focused on the Palo Duro Basin in Texas, the Paradox Basin in Utah, and the Permian Basin, particularly the Delaware basin in the Los Medanos area, the site considered for the proposed WIPP. The Bureau of Land Management issued the report "Environmental Assessment of DOE Proposed Location and Baseline Studies in the Paradox Basin, Utah-Final" UT-060-51-2-11, in July, 1982. Each of the seven potentially acceptable salt sites has been evaluated for environmental conditions, and a site characterization plan is expected to be issued for salt in September, 1985. DOE will start land access and permitting activities for salt after negotiating agreements with affected states and Indian tribes (DOE Draft Mission Plan, April, 1984).

Basalt: The basalt formations at the Hanford reservation in the center of the Pasco basin (Columbia Plateau, central Washington) are prime candidates for repository sites. DOE expects to issue a site characterization plan for basalt in January, 1985 and start drilling for the exploratory shaft in March, 1985 (DOE Draft Mission Plan, April 1984).

Volcanic Tuff: The Nevada Test Site offers several suitable candidates for *34674 waste repository siting. The primary focus is welded tuff on Yucca Mountain, where DOE has begun a program of drilling and geophysical evaluation. DOE expects to issue site characterization plan for tuff in March, 1985 and begin shaft work in September 1985 (DOE Draft Mission Plan, April 1984).

Granite: Granite and other crystalline rock media are being considered for the second repository (DOE Draft Mission Plan, April 1984). DOE has conducted only limited investigations of granite at the Nevada Test Site (DOE PS pp. B-66, B-72), but is developing data on the potential of granite as a repository medium in collaboration with Swedish investigators (DOE PS p. II-258). This project has already produced a large amount of rock thermal-mechanics data at repository depth for use in repository designs in granite media in this county (DOE PS pp. II-258 to II-260).

As indicated in our discussion of technical feasibility, the identification of technically acceptable sites is a key problem and the date of successful solution of this problem is a critical milestone in the repository program. Those participants who believe DOE could not meet its site selection schedule asserted that determination of the acceptability of proposed repository sites requires information that will not be available when needed. They maintained that DOE's knowledge is seriously incomplete with respect to all of the potential sites considered to date. Further, they asserted that because new information could disqualify any of the potential sites, as it did at the Palestine dome, there is, as yet, no basis for reasonable assurance that an acceptable repository site will be available in the time period under consideration (NRDC PS p. NECNP PS p. 24). The Commission recognizes that if the DOE 44; program were further along, e.g., in the middle of exploratory shaft work, there would be much more site-specific information available (including the results of in-situ tests) and a firmer basis for assessing whether DOE's revised schedule can be met. However, the Commission can make a reasonable prediction with the information now before it.

Underlying the pessimism of some participants is apparently a belief that DOE's past record in solving technical problems undermines the possibility of finding confidence in DOE's ability to solve the waste disposal problems in a timely way. The Commission acknowledges that in the past the waste programs of DOE and its predecessor organizations have experienced difficulty in making timely progress toward a solution of the nuclear waste problem. However, the Commission need not rely on this past record in making its confidence The DOE program is now adequately addressing the determination. issues yet to be resolved in identifying an acceptable site and DOE's schedule is a reasonable one (see the discussion in Section 2.2 B.4 of this document). The qualifications and professional experience of the many scientists and engineers on the overview committees and peer review groups who advise and consult on the DOE program should provide confidence in DOE's efforts (DOE CS Appendix D). The support of the USGS in the earth sciences field (USGS PS Appendix A) clearly

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contributes to confidence that the technical problems associated with identifying an acceptable repository site will be solved. As noted before, no fundamental technical breakthroughs are necessary. Rather, completing the program is a matter of step-by-step evaluation and development based on ongoing site studies and research programs.

The Commission believes that the enactment of the Nuclear Waste Policy Act of 1982 provides impetus to that program and helps ensure that it will be completed on a schedule consistent with the Commission's findings. The Nuclear Waste Policy Act establishes a detailed step-by-step plan for developing a waste repository. The Act directs DOE to prepare a comprehensive Mission Plan which will establish programmatic milestones for research, development, technology demonstration and systems integration. The Act also requires the various Federal agencies involved in the program to coordinate their activities. Involved agencies must report their progress, or lack thereof, to Congress, explain any slip in schedule and set a new schedule for activities. Thus, the Act provides a framework and schedule for developing a repository.

The schedule set forth in the Act calls for the identification of adequate sites in time to meet the final decision date on construction authorization by the NRC and well before the time at which such action would be necessary to assure repository operation within the time period discussed in this decision. The time between sinking of an exploratory shaft and the completion of site characterization contemplated by the Act (Sec. 112, 114) is 26 months, with an extension to 38 months under certain conditions; the DOE schedule for these activities is generally compatible with this schedule (see Section 2.2 B.4 below).

The Nuclear Waste Policy Act also puts in place procedures (Sec. <u>115</u>, <u>116</u>, <u>117</u>, <u>118</u>, <u>119</u>) which the Commission believes will help to resolve potential institutional problems that might affect the schedule for site selection. These are discussed in detail hereafter. The Commission believes that the provisions of the Act should also provide resources (Sec. <u>302</u>, <u>303</u>) to adequately fund the site selection and characterization work.

Given all of these considerations, the Commission concludes that there is reasonable assurance that technical uncertainties--unsolved technical problems and information gaps--will be removed in time for DOE to meet its proposed schedule. DOE's program is adequate and its schedule is reasonable. The Act provides a greater degree of confidence than existed previously that site selection will proceed within the general time frame that DOE has described in its position statement.

2. Timely Development of Waste Packages and Engineered Barriers. Some participants have expressed strong reservations concerning DOE's ability to develop waste forms, packages, and engineered barriers in a timely fashion. The DOE technical effort to solve problems was characterized as only just being defined in many significant areas, including the prevention of corrosion of waste canisters (NRDC PS p. Other participants contended that: the design and evaluation 18). studies of penetration seals and backfill material might not be completed soon enough to meet the goal of achieving an operational repository by 1997 to 2006; the long-term effects of heat and radiation on the integrity of the seal materials are not known; tests of cement seals with epoxy resin in bedded salt deposits are insufficient to assure stability of such seals over a period of 10,000 years; and field tests of liquid permeability during a period of three months cannot provide confidence concerning the stability of seals during a period of 10,000 years. Participants also contended that no information had yet been provided which specified the type of backfill material most suitable for specific geological media and capable of withstanding thermal stress (CDC PS pp. 19-22).

Although technical problems associated with the development of waste packages and engineered barriers could delay DOE's schedule, DOE believes that the uncertainties surrounding the waste package would be resolved or bounded as a result of implementation of its program (DOE PS p. II-160, CS p. II-96). The DOE Waste Package Program Plan (ONWI-96) *34675 which was issued in August 1980, updated in June 1981 (NWTS-96) and updated further in DOE's April, 1984 Draft Mission Plan, sets forth details of DOE's program. Waste package performance criteria will be developed in the near future. Final action on the criteria will be contingent upon the final issuance of NRC's technical criteria (10 CFR Part 60, Subpart E), the publication of the relevant regulatory guides on waste packages, and the ONWI-33 series of criteria documents, i.e., the reports DOE/NWTS-33 (1), (2), (3), "NWTS Program Criteria For Mined Geologic Disposal of Nuclear Wastes."

Earlier, DOE had planned to complete the waste package preliminary designs for salt in September 1982, for basalt in June 1985, for tuff

in June 1984, for granite in September 1984, and for argillaceous rock in December 1984, and to establish a baseline for waste form specifications by June 1983 (ONWI-96). According to DOE's April, 1984 draft Mission Plan, the current reference canister material for basalt is carbon steel. Alternative materials include an ironchromium-molybdenum alloy, copper and a copper-nickel alloy. On the basis of preliminary corrosion-test results, carbon steel has also been selected as the reference canister material for salt. The titanium alloy Tricode 12 has been designated as an alternative Type 304L stainless steel has been identified as the material. reference container material for tuff; other austenitic stainless steels, Inconel and copper are alternatives. Waste-package conceptual designs have been developed for basalt, salt and tuff. (The conceptual design for tuff is based on saturated conditions; conceptual design for the unsaturated zone will be available in late FY 84 [DOE draft Mission Plan, April 1984]).

Tests with spent fuel and borosilicate glass have been initiated under site-specific conditions for basalt, salt and tuff. Preliminary waste acceptance requirements have been developed for basalt and salt. In addition, for salt media, interim wasteacceptance requirements for borosilicate glass and draft waste acceptance requirements for spent fuel were prepared in FY 83. Preliminary requirements for tuff will be prepared in FY 84. DOE intends to submit the baseline waste form specifications developed during the conceptual design studies for acceptance by NRC. The specifications will be subjected to configuration control for application throughout the waste processing and disposal program.

According to the DOE Draft Mission Plan the complete waste package performance model will be verified and validated by September 1989. Further, the program plan calls for completion of the waste package final design that takes into account the selected site environmental conditions, after completion of in-situ testing in FY 89 and FY 90. Packing material is included in the reference waste package only for basalt. The reference packing material for basalt is a mixture of crushed basalt and sodium-bentonite clay. Ongoing physical property testing of reference packing material is expected to be completed in FY 87 and ongoing radionuclide sorption, solubility and diffusion testing are to be completed by September, 1989.

Some participants' statements are pessimistic assessments based on the fact that the DOE program has not yet reached the critical milestones--e.g., establishment of waste form specifications, completion of waste package preliminary designs, verification of a waste package performance model, and qualification of barrier However, the Commission believes that these technical materials. problems will be solved without delaying a repository schedule. DOE has put in place an extensive nuclear waste research program that addreses each of these technical problems. Research results already reported on waste form packaging and barrier materials indicate that these research efforts, although not yet completed, can reasonably be expected to provide solutions to those problems when those solutions are needed to meet the DOE schedule (DOE PS pp. II-129 to II-197, CS pp. II-93 to II-100).

The Commission's positive assessment is strengthened by provisions in the Nuclear Waste Policy Act of 1982. Title II of the Act authorizes DOE to undertake steps leading to the construction, operation and maintenance of a deep geologic test and evaluation facility and to establish a focused and integrated research, development and demonstration program. In the area of waste package design, the Act directs that DOE's Mission Plan identify a process for solidifying high-level radioactive waste or packaging spent fuel with an analysis of the data to support selection of the solidification process or packaging technique. The Act calls for a schedule for implementing such a plan and for an aggressive research and development program to provide a high-integrity disposal package at a reasonable price (Sec. 301(a)(8)). The Commission notes that DOE's published Draft Mission Plan (April, 1984) addresses these Congressional authorization of those programs, issues in detail. together with the assurance of necessary funding, provides the Commission additional confidence that the required research work will be done in a timely manner.

The Commission also notes that the programs to solve the major technical problems relating to the timely development of waste forms, waste packages, and engineered barriers can proceed in parallel. Because the waste repository must be designed as a system, the problems are interrelated; however, the relationships are such that solving one problem need not await the solution of another. DOE could proceed for a number of years on waste package development before making a decision on the form of the waste, without affecting the repository availability schedule.

B. Institutional Uncertainties

The principal institutional issues that affect the schedule for availability of a mined geologic repository include: measures for dealing with Federal-state disputes; an assured funding mechanism that will be sufficient over time to cover the period for developing a repository; an orginizational capability for managing the highlevel waste program, whether this be DOE or a successor organization; and a firm schedule and establishment of responsibilities which will lead to repository development in a reasonable period of time. Each of these is discussed in turn.

1. Measures for Dealing with Federal-State-Local Concerns. The President and Congress have recognized the need to involve state and local governments in the decision-making process and have taken steps, including enactment of the Nuclear Waste Policy Act of 1982, to establish an institutional framework to accomplish this end. DOE pointed out that Presidents Carter and Reagan have considered state involvement in site selection an important aspect of the high-level President Carter, in his radioactive waste disposal program. message to Congress, directed "the Secretary of Energy to provide financial and technical assistance to States and other jurisdictions to facilitate full participation of State and local government in review and licensing proceedings." He committed the Federal Government to work with state, tribal and local governments in the siting of high level waste repositories. Within a framework of "consultation and concurrence," a host state would have a continuing role in Federal decision-making involving the siting, design and construction of a high-level waste *34676 repository (DOE CS pp. II-11, 13-14). President Reagan's statement of October 8, 1981 similarly instructed DOE to work closely with industry and state governments in developing methods of storing and disposing of commercial high-level waste.

Although industry groups believed that DOE had made substantial progress in cooperating with state and local authorities by encouraging their direct participation in planning and preliminary site selection activities (UNWMG-EEI CS pp. V-27, V-28), states and environmental groups were skeptical that the mechanisms proposed by DOE for incorporating state and local views (e.g., consultation and concurrence) would work satisfactorily. Many states asserted a lack of confidence in DOE's claims that it would be able to gain agreement from states by persuasive measures (e.g. Ohio PS p. 5; NY PS p. 74; Wis PS Kelly p. 5) and noted that information sharing was inadequate to reduce or overcome a state's resistance to a repository

(e.g., NY PS p. 74; NRDC PS p. 69). The states also believed that DOE had underestimated potential state and local opposition to the siting of a repository (CEC PS p. 27, Ohio PS p. 12) and that consultation and concurrence must include a mechanism for resolving intergovernmental disputes (Vt PS p. 3). Other participants argued that many states had already imposed bans on waste disposal (NECNP PS p. 32) and that DOE had presented no means for resolving state nonconcurrence (NRDC PS p. 69). Still others claimed that the state's role in the site selection process must be specifically defined (Del PS p. 6); but the DOE had provided no basis for optimism that this could be done (NECNP PS p. 69). Some participants suggested that local opposition to waste repositories could be overcome by providing financial compensation to nearby communities (AIChE PS p. 6) but that DOE had not adequately considered compensation to host communities for socioeconomic impacts (Ohio PS p. 14).

The recently-enacted Nuclear Waste Policy Act of 1982 defines the roles of the states and Indian tribes in repository site selection, and thereby reduces some of the uncertainties in settling disputes between the Federal government and affected states and Indian tribes. By providing for information exchange, for financial and technical assistance, and for processes of consultation, cooperation, negotiation and binding written agreement, the Act should help to minimize the potential for more formal objections and confrontations.

Specifically, the Act requires DOE to identify the states with one or more potentially acceptable sites for a repository and to notify the governing bodies of the affected states or Indian tribes of those sites (Sec. 116(a)). The Act establishes detailed procedures for consultation with the states and Indian tribes regarding repository sites selection (Sec. 117). DOE, NRC and other agencies involved in the construction, operation, or regulation of any aspect of a repository in a state must provide to the state and to any affected Indian tribe, timely and complete information regarding plans made with respect to the site characterization, development, design, licensing, construction, operation, regulation, or decommissioning of such a repository (Sec. 117(a)(1)). If DOE fails to provide such information requested by the state or affected Indian tribe in a timely manner, it must cease operations at the site (Sec. 117(a)(2)). The Act also provides that DOE must consult and cooperate (Sec. 117(b)) with the affected states and Indian tribes and must enter into a binding written agreement (Sec. 117(c)) setting forth the procedures under which information transfer, consultation and

cooperation is to be conducted.

Following consultation with affected states and Indian tribes, the Secretary of Energy is to recommend to the President three sites suitable for characterization as candidates for selection as the first and second repositories (by July 1, 1985 and July 1, 1989 respectively) (Sec. 112(b), (B), (C)). The President must then submit to Congress his recommendation of sites gualified for construction authorization for a first and second repository (no later than March 31, 1987 and March 31, 1990 respectively) (Sec. 114(a)(2)(A)). Following submission by the President of a recommended site to Congress, the Governor or legislature of the state, or the Indian tribe in which such site is located may disapprove the site designation and submit (within 60 days) a notice of disapproval to Congress (Sec. 116(b)(2)). The site is disapproved unless Congress passes a joint resolution within 90 days to override the state or Indian tribe disapproval (Sec. 115 (c)). The Commission recognizes that the latter provision may create uncertainty in gaining the needed approvals of repository sites from the affected states or Indian tribes. Nevertheless, the Commission believes that, on balance, this Congressional action to establish a detailed process for state and tribal involvement in the development of repositories will reduce overall uncertainties by encouraging Federal-state cooperation and by limiting the potential for formal state or Indian tribe objections that could lead to disruption of project plans and schedules. This conclusion is consistent with the views expressed by state participants in this proceeding that a mechanism for state participation, including the resolution of state objections and nonconcurrences, is necessary for state cooperation and for progress in repository development (Tr. pp. 117, 119, 120). Further, the Act fixes the point in time at which a state may raise Once that time has passed, this should reduce formal objections. uncertainties at later stages.

The Act stipulates that DOE will reimburse costs incurred by affected states and Indian tribes in participating in the activities identified above. The Act provides that the Secretary of Energy shall make financial grants (Secs. 116, 118) to each state or affected Indian tribe notified by DOE that a potentially acceptable repository site exists within its jurisdiction. These grants are made to enable the state or affected Indian tribe to participate in the review and approval activities required by the Act (Secs. 116, 117), or authorized by written agreement entered into with DOE. Further,

DOE is to make financial grants (Secs. 116, 118) to each state or affected Indian tribe where a candidate site for a repository is approved, to enable the state or Indian tribe to conduct the following activities: (a) Review activities taken for purposes of determining impacts of such a repository, (b) develop a request for impact assistance, (c) engage in site monitoring, testing or evaluation, (d) provide information to its residents, and (e) request information. In addition, the Act specifies that financial assistance will be provided to mitigate any economic, social, public health and safety, or environmental impacts of the development of a The Act also provides that state and local government repository. units shall receive payments equal to the amount they would receive from taxing such site charaterization and repository development activities in the same manner that they tax other real property and industrial activities (Sec. 116). By providing a tangible benefit to those localities or Indian reservations where repository sites are being investigated, this provision should address one concern frequently expressed by state and tribal organizations, and may result in a more willing acceptance of a repository site.

In sum, the Commission believes that the provisions of the Nuclear Waste *34677 Policy Act of 1982 reduce uncertainties regarding the role of affected states and Indian tribes in repository site selection and evaluation, and minimize the potential for direct confrontation between the Federal government and the states or tribal organizations with respect to the disposal of commercial high-level waste and spent fuel. By reducing these uncertainties, the Act should help minimize the potential that differences between the Federal government and states or Indian tribes will substantially disrupt or delay the repository program. Further, as discussed previously in this Section, the decision-making process set up by the Act provides a detailed, step-by-step approach which builds in regulatory involvement. This should also provide confidence to states and Indian tribes that the program will proceed on a technically sound and acceptable basis.

2. Continuity of the Management of the Waste Program. The Commission recognizes that the waste disposal program involves activities conducted over a period of decades. Thus, there is a need for long-term stability of management and organization. The Commission's Second Prehearing Memorandum and Order of November 6, 1981, sought comments on the implications of the possible dismantling of the DOE and assignment of its functions to other Federal agencies. In

response, DOE stated: "The ability of the Federal Government to implement the waste isolation program would not be affected by the President's September 24, 1981 proposal to dismantle DOE. As demonstrated by his Nuclear Policy Statement of October 8, 1981 . . . the President is committed to the swift deployment of means of storing and disposing of commercial high-level nuclear waste. Thus, some governmental unit will continue the program aggressively if DOE is dismantled" (DOE PHS p. 8). The DOE statement was amplified by the Deputy Secretary of Energy in the oral presentations on January 11, 1982: " . . . as far as the reorganization is concerned, the plan is not, I think, to do away with the activities of the Department of Energy. The plan, as it has been announced so far, is to in fact merge the activities, in particular, these activities into the Department of Commerce. And we do not visualize at this time any significant changes in the way in which the program relating to waste management would be altered, either technically or from a management point of view" (Tr. p. 13).

The nuclear industry participants agreed with DOE's view on this question (Consolidated Industry Group PHS p. 18; AIF PHS p. 7; SE2 PHS p. 6; ANS PHS p. 8, UG p. 2). However, state participants and intervenor groups disputed the DOE view. They saw the potential dismantlement of DOE as leading to further delay in resolution of the radioactive waste disposal problem and asserted that DOE's possible abolition made representations regarding the future success of its waste program useless (Consolidated State Group PHS, pp. 2, 9; Minn PHS pp. 6-8).

The Commission does not believe that the Administration's proposal to transfer the activities of the Department of Energy to the Department of Commerce introduces substantial new uncertainties regarding the continuity of Federal management of the nuclear waste program. As the Department of Energy stated, the Administration's proposal, if adopted, would simply transfer the nuclear waste program functions from one Federal agency to another. Moreover, Congressional action is needed to adopt the Administration's Yet, in the three years since the Administration's proposal. proposal to dismantle DOE was made, there has been no discernible action by the Congress to proceed with adoption of the proposal. Because the Congress has not taken action toward adoption of the Administration's proposal, and because the proposal, even if adopted, would consist of only a transfer of the program from one agency to another, the Commission does not believe that the Administration's

proposal constitutes a significant source of management uncertainty for the nuclear waste program.

The Commission believes that residual uncertainties regarding the continuity of Federal management of the nuclear waste program have also been reduced by the Nuclear Waste Policy Act of 1982. The Act provides for the establishment of an Office of Civilian Radioactive Waste Management within the Department of Energy. This Office is to be headed by a Director appointed by the President, with Senate confirmation, who will report directly to the Secretary of Energy (Sec. 304). Further, the Act raises the activities of this Office to a high level of visibility and accountability by stipulating that an annual comprehensive report of the activities and expenditures of the Office will be submitted to Congress and that an annual audit of the Office will be conducted by the Comptroller General, who will report the results to Congress. The Act also requires two additional elements that provide added assurance of continuity: à "Mission Plan" and a schedule of activities for DOE. The Mission Plan is a detailed and comprehensive report which is intended to provide "an informational basis sufficient to permit informed decisions to be made in carrying out the repository program and the research, development, and demonstration programs required under this Act." The Secretary of Energy has already submited a draft Mission Plan to the states, the afffected Indian tribes, the Commission and appropriate government agencies for their comments; after revising the plan, DOE must submit it to the appropriate Congressional committees (Sec. 301 (a) and (b)). The schedule of DOE's activities in conducting this program was discussed in Section 2.2 A.1 above. Taken together, the provisions of the Nuclear Waste Policy Act establish a detailed management framework for the conduct of the repository program that should help ensure both sound management and continuity -- whether the responsibility for the repository program is retained in DOE or is transferred to another Federal agency.

3. Continued Funding of the Nuclear Waste Management Program. There is general agreement among all participants that the program to develop a mined geologic repository for nuclear wastes will require more than a decade of effort at a total cost of several billion dollars. A steady source of funding will be needed to assure the timely success of the program. DOE pointed out that it would request an adequate level of funding for the National Waste Terminal Storage (NWTS) Program as stated in the Department's Position Statement (DOE CS p. II-30). In addition, DOE stated that Congress' commitment to the commercial waste disposal program was demonstrated by the continuous increase in the level of funding since 1976. The funding level was increasd by more than a factor of 10 between 1976 and 1980 (DOE CS p. II-30). Some participants disagreed with DOE's optimism concerning the future availability of funds and pointed out the competing priorities for Federal funds could deprive DOE of the necessary resources (CDC PS p. 7; Lewis PS p. 9; NRDC PS p. 28; Tr. p. 203).

Congress passed a continuing resolution for FY 1983 funding of DOE's nuclear waste program at the level of \$259.4 million. This is about \$10 million more than DOE's earlier FY 1983 request of \$249 million. Additionally, the Nuclear Waste Policy Act authorizes the Secretary of Energy to enter into contracts and collect a fee of 1 mill per kilowatt-hour of electricity generated by nuclear reactors in return for the Federal *34678 government's acceptance of title, subsequent transportation, and disposal of high-level radioactive waste or spent In order to be able to use a Federal fuel (Sec. 302(a)(2)). repository, the Act required the generator or owner of such waste or spent fuel to enter into a contract by June 30, 1983 or the date on which generation is commenced or title is taken, whichever occurs later (Sec. 302(b)(2)). The Commission must require the negotiation of such contracts as a precondition to the issuance or renewal of a license (Sec. 302(b)(1)(B)). The Commission notes that all such contracts have been executed. DOE testified in the January 11, 1982 hearing that it expected the funds collected under such a program would allow support of the DOE waste program at an initial level of \$185 million. Under the program subsequently adopted by the Congress, these funds are to be placed into a nuclear waste fund to support DOE's repository program. The general approach prescribed by the Act is to operate DOE's nuclear waste program on a full cost recovery basis. In this regard, the Act provides that DOE must annually review the amount of the fees established to evaluate whether collection of the fees will provide sufficient revenues to offset the costs expected. In the event DOE determines that the revenues being collected are less than the amount needed in order to recover the costs, DOE must propose to Congress an adjustment to the The Act also provides (Sec. fee to insure full cost recovery. 302(e)(5)) that, if at any time, the monies available in the Waste Fund are insufficient to support DOE's nuclear waste program, DOE will have the authority to borrow from the Treasury. The Commission believes that the long-term funding provisions of the Act should provide adequate financial support for DOE's nuclear waste program.

4. DOE's Schedule for Repository Development. The DOE reference schedule described in its April, 1984 draft Mission Plan establishes the earliest date of repository availability as 1998 and delineates the logic and the period of activities that are deemed achievable under current program assumptions. While DOE acknowledges that contingency time is required in the schedule to accommodate such factors as institutional uncertainties, public hearings, or possible project reorientation, it believes that an appropriate amount of time has, in fact, been allowed in the reference schedule. Under the reference schedule, DOE expects that disposal facilities will be operational in 1998 (DOE draft Mission Plan, April 1984). DOE's updated repository development schedule specifies the critical milestones prior to commencing construction of the first repository as:

March 1985 (basalt), September 1985 (tuff), ----- (salt) Commencement of exploratory shaft work* at three sites (three different media: salt, basalt and tuff).** August 1990 for submission of application for authorization to construct the first repository. August 1993autorization for the first repository. * Including borehole drilling. ** An October, 1982 update of this information indicated that a pilot borehole was started in September 1982 for an exploratory shaft in tuff at the Nevada Test Site. In May 1982, DOE initiated work on surface preparation, construction of drilling pads and support buildings for the drilling operation at the BWIP basalt site. In January 1982, a borehole was begun at a point 300 feet from the BWIF planned exploratory shaft location to provide

data for planning the shaft excavation. No exploratory shaft work has begun

at the Paradox Basin bedded salt site. As noted in the siting discussion

under the Second Commission Finding, the Nuclear Waste Policy Act of 1982

requires DOE to complete certain actions before site characterization. These

include issuance of siting guidelines concurred in by NRC, preparation of

environmental assessments, notification of state and affected Indian tribes

where sites are located, and holding of public hearings in the vicinity of

each site.

The Commission concurred in DOE's repository siting guidelines on July 3, 1984,

enabling DOE to proceed to complete the other site selection tasks. The

Commission notes that DOE's draft Mission Plan (April 1984) anticipated the

completion of the siting guidelines by Mid-Summber 1984 and DOE revised its

site selection schedule accordingly. Final environmental assessments for five

nominated sites (including salt, basalt and tuff media) are to be completed

in December 1984, at which time three of the five sites will be recommended

for characterization.

NRC's construction authorization (under 10 CFR Part 60) would mark the end of the site selection process.

Some participants believe that DOE cannot have a waste disposal facility available by 2007. These participants concluded that DOE's slow progress in the past suggests that DOE may be unable to solve the many problems that will arise in the future and that DOE's schedule for repository development is unduly optimistic (e.g., Minn. PS p. 6; Ill. PS p. 2; OCTLA PS pp. 8-9; CDC PS p. 7).

One of the primary purposes of the recently enacted Nuclear Waste

Policy Act of 1982 is "to establish a schedule for the siting, construction, and operation of repositories that will provide reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and such spent nuclear fuel as may be disposed of in a repository." (Sec. 111(b)(1)). The Commission recognizes that, if fundamental technical breakthroughs were necessary, it would not be possible for Congress to legislate their solution or specify schedules for their accomplishment. However, as discussed previously, such breakthroughs are not necessary. Rather, the remaining uncertainties are reflected in the need for step-by-step evaluation and development based on ongoing site studies and research The Commission believes the Act provides means for programs. resolution of those institutional and technical issues most likely to delay repository development, both because it provides an assured source of funding and other significant institutional arrangements, and because it provides detailed procedures for maintaining progress, coordinating activities and rectifying weaknesses. For these reasons, the Commission believes that the selection and characterization of suitable sites and the construction of repositories will be accomplished within the general time frame established by the Act, or within a few years thereafter.

The provisions of the Nuclear Waste Policy Act of 1982 that establish schedules for repository development are elaborate and allow for various contingencies. A number of steps are involved before NRC considers authorization of construction. DOE is to nominate five sites it believes suitable for site characterization for possible repository development (Sec. 112(b)). DOE is to recommend for site characterization three candidate sites to the President (Sec. 112(b)(1)(B); the President is to recommend one of the characterized sites to the Congress (Sec. 114(a)(2)(A)); the affected state or Indian tribe is given an opportunity to submit a notice of disapproval of the Congress (Secs. 115(b), (116)(b)(2), 118(a)); the Congress may overturn a state or Indian tribe's disapproval of the site by passing a resolution of approval (Sec. 115(c)); and, if Congress approves or no notice of disapproval is submitted by a state or Indian tribe, then DOE is to apply for construction authorization (Sec. 114(b).

DOE's revised reference schedule (DOE draft Mission Plan, April 1984) states that the application for repository construction authorization will be submitted to the Commission in August 1990. Under the terms of the Act the Commission is expected to reach a decision within 3 years of the application date, or by August 1993 (<u>Sec. 114</u>) (under certain conditions, extension by 1 year would be permitted). If the NRC decision is favorable, the repository would be constructed and begin operation, according to DOE's "reference schedule," in January 1998. Earlier dates can be achieved if the Presidential review time is reduced, if DOE promptly files the construction authorization application, if NRC provides a construction authorization in less than 3 years, or if DOE constructs the repository in a shorter period than provided in its estimated schedule. However, it is prudent to assume that ***34679** such a contraction of the schedule will not be realized.

The Nuclear Waste Policy Act of 1982 establishes "not later than January 31, 1998" as the date when DOE is to begin disposal of highlevel radioactive waste or spent fuel (Sec. 302(a)(5)(B)). This is consistent with the current dates of the DOE schedules discussed above and with the detailed step-by-step milestones established by the Act. The schedule established by the Act would assure the operation of the first repository well before the years 2007-2009, i.e., the period of concern in the present proceeding.

Despite the delays in DOE's earlier milestones, the Commission believes that the program established by the Act is generally consistent with the schedule presented by DOE in this proceeding and that DOE's milestones are generally both realistic and achievable. Achievement of the scheduled first date of repository operation is further assured by other provisions of the Act which specify means for resolution of those institutional and technical issues most likely to delay repository completion. In addition to those provisions discussed previously, the Commission notes that the Act clarifies how the requirements of the National Environmental Policy Act are to be met (e.g., Secs. 113 (c), (d); 114 (a), (f); 119(a); The Act also requires that any Federal agency determining 121(c)). that it cannot comply with the repository decision schedule in the Act must notify both the Secretary of Energy and Congress, explaining the reasons for its inability to meet the deadlines. The agency must also submit recommendations for mitigating the delay (Sec. These provisions of the Act, as well as those that 114(e)(2). support the technical program -- the provisions for research, development, and demonstration efforts regarding waste disposal (Title II of the Act), increase the prospects for having the first repository in operation not later than the first few years of the

next century.

The Commission also finds reasonable assurance that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of commercial high-level radioactive waste and spent fuel generated up to that time. The Nuclear Waste Policy Act of 1982 establishes Federal responsibility and a clearly defined Federal policy for the disposal of such waste and spent fuel and creates a Nuclear Waste Fund to implement Federal policy. The Act establishes as a matter of national policy that this responsibility is a continuing one, and provides means for the Secretary of Energy to examine periodically the adequacy of resources to accomplish this end.

The Commission notes that as of September 30, 1982, the generating capacity of all commercial nuclear power plants in the U.S. with operating licenses or construction permits was 131 electrical gigawatts (GWe) and the capacity of those under construction permit review was about 5 GWe (NUREG-0871, Vol 1, No. 4, p. 2, 8). DOE, in its letter of March 27, 1981 to the presiding officer of this proceeding, provided an estimate of 180 GWe for the capacity of operating LWRs in the year 2000. This value is significantly lower than the value (276 GWe) presented in DOE's 1980 position statement (DOE PS p. V-4) and lower than that (202 GWe) presented in the NRC's Generic Environmental Impact Statement on spent fuel handling and storage (NUREG-0575, Vol. 1, p. 2-4). The validity of the latter predictions has been affected by the cancellations of a number of proposed units during the past two years. The DOE 1981 estimate of 180 GWe in the year 2000 appears to be a reasonable estimate of the likely installed capacity at that time. On this basis, during the 40 years of operation of each plant, using as a realistic assumption a 60 percent capacity factor, the electrical energy generation would be about 4300 GWe-years. Assuming 38 metric tons of heavy metal (MTHM) is discharged for each qigawatt-year (IRG Final Report p. D-6; NUREG-0575, Vol. 1 p. 2-4) the total discharged spent fuel from these plants would likely be about 160,000 metric tons. The capacity of each proposed repository will depend on such factors as the thermal loading limit in waste emplacement, space limitations within the host rock, nuclear power generation capacity in the region to be serviced by the repository, and economy of scale considerations (DOE PS pp. III-70 to 79; IRG Final Report p. D-21). In its cross statement DOE's estimate that three to six repositories might be needed was based on the assumption that nuclear power generation capacity grows to 250 GWe by the year 2000 and remains at that level until 2040 (DOE

CS p. II-53). The representative characteristics of each repository used by DOE were 2000 acres and a 40 to 100 kW/acre loading, corresponding to a repository capacity of about 70,000 to 170,000 metric tons of uranium, respectively (DOE PS p. III-76). Reflecting the reduction in nuclear power projections, DOE estimated in the January 1982 hearing that the ultimate reactor capacity would be about 200 GWe (Tr. p. 236). DOE then assumed a repository capacity of 100,000 metric tons and concluded that "between two and three" repositories would be needed (Tr. p. 237). To accommodate the 160,000 metric tons we have assumed, two repositories each with 100,000 metric tons capacity would appear to be sufficient.

Repository completion and operation at three-year intervals would result in having adequate capacity about three years after initial operation of the first repository (DOE PS p. III-86). As noted earlier, emplacement of spent fuel in the first repository should begin not later than the first few years of the next century. Thus. if the first repository begins to receive spent fuel in the year 2005, the second may begin operation as early as 2008, in which case all spent fuel would be emplaced by about 2026, assuming DOE's estimated receiving rates (DOE PS p. III-71) and operation of each repository as completed. Because the rate of waste emplacement during the first five years of operation would be about 1800 metric tons per year (DOE PS p. III-71), only 5400 metric tons would be emplaced in the first repository by the time the second began This would satisfy the requirements of Section 114(d) of operation. the Nuclear Waste Policy Act, i.e., the prohibition of emplacement of more than 70,000 metric tons in the first licensed repository before the second repository is in operation. If the DOE estimated emplacement rates (which would increase to 6000 metric tons/year after the first five years) are realized, it will take about 15 years to emplace 70,000 metric tons in the first repository.

For the foregoing reasons, the Commission finds reasonable assurance that one or more mined geologic repositories for commercial highlevel radioactive waste and spent fuel will be available by the years 2007-09, and that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of commerical high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

2.3 Third Commission Finding

The Commission finds reasonable assurance that high-level
radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level radioactive waste and spent fuel.

Nuclear power plants whose operating licenses expire after the years *34680 2007-09 will be subject to NRC regulation during the entire period between their initial operation and the availability of a waste repository. The Commission has reasonable assurance that the spent fuel generated by these licensed plants will be managed by the Compliance with the NRC regulations and licensees in a safe manner. any specific license conditions that may be imposed on the licensees will assure adequate protection of the public health and safety. Regulations primarily addressing spent fuel storage include 10 CFR Part 50 for storage at the reactor facility and 10 CFR Part 72 for storage in independent spent fuel storage installations (ISFSI). Safety and environmental issues involving such storage are addressed in licensing reviews under both Parts 50 and 72, and continued storage operations are audited and inspected by NRC. NRC's experience in more than 80 individual evaluations of the safety of spent fuel storage shows that significant releases of radioactivity from spent fuel under licensed storage conditions are extremely remote (see discussion in Section 2.4).

Some nuclear power plant operating licenses expire before the years 2007-09. For technical, economic or other reasons, other plants may choose, or be forced, to terminate operation prior to 2007-09 even though their operating licenses have not expired. For example, the existence of a safety problem for a particular plant could prevent further operation of the plant or could require plant modifications that make continued plant operation uneconomic. The licensee, upon expiration or termination of its license, may be granted (under 10 CFR Part 50 or Part 72) a license to retain custody of the spent fuel for a specified term (until repository capacity is available and the spent fuel can be transferred to DOE under Sec. 123 of the Nuclear Waste Policy Act of 1982) subject to NRC regulations and license conditions needed to assure adequate protection of the public. Alternatively, the owner of the spent fuel, as a last resort, may apply for an interim storage contract with DOE, under Sec. 135(b) of the Act, until not later than 3 years after a repository or monitored retrievable storage facility is available for spent fuel. For the reasons discussed above, the Commission is confident that in every case the spent fuel generated by those plants will be managed safely during the period between license expiration or termination and the

availability of a mined waste repository for disposal.

To assure the continuity of safe management of spent fuel, the Commission, in a separate action, is preparing an amendment to 10 CFR Part 50 which would require licensees of operating nuclear power reactors to submit, no later than 5 years before expiration of the reactor operating license, written notification to the Commission, for its review and approval, of the actions which the licensee will take to manage and provide funding for the management of all irradiated fuel at the reactor site following expiration of the reactor operating license, until ultimate disposal of the spent fuel in a repository. The licensee's notification will be required to specify how the licensee will fund the financial costs of extended storage or other disposition of spent fuel. It is possible for the funding of the storage to be provided by an internal reserve fund or special assessment during that 5-year period to cover the costs of storage of the spent fuel after the expiration of the reactor operating license. The storage costs are not large relative to power generation costs. A representative figure is \$1-million/year for storage of spent fuel in reactor basins beyond the operating license expiration [Addendum 2 to "Technology, Safety and Costs of Decommissioning a Reference BWR Power Station," NUREG/CR 0130 (July 1983); Addendum 1 to Technology, Safety and Costs of Decommissioning a Reference PWR Power Station," NUREG/CR 0672 (July 1983)].

Additional assurance that the conditions necessary for safe storage will be maintained until disposal facilities are available is provided by the Commission's authority to require continued safe management of the spent fuel past the operating license expiration or termination (10 CFR 50.82). If a utility should have technical problems in continuing its commitment to maintain safe storage of its spent fuel, NRC as the cognizant regulatory agency would intervene and the utility would be required to assure safe storage. If a licensee fails financially, or otherwise must cease its operations, the cognizant state public utility commission would be likely to require an orderly transfer to another entity. The successor would take over the licensee's facilities and, provided the conditions for transfer of licenses prescribed in NRC regulations (10 CFR 50.80) were met by the succeeding entity, operation of the original licensee's facilities would be permitted to continue. Moreover, an orderly transfer to a successor organization would be mandatory to protect the substantial capital investment. Further, the Commission believes that the possibility of a need for Federal action to take

over stored spent fuel from a defunct utility or from a utility that lacked technical competence to assure safe storage is remote, but the authority for such action exists (sections 186c and 188 of the Atomic Energy Act of 1954, as amended; 42 U.S.C. 2236, 2238).

Interim storage capacity may be required for plants whose operating licenses expire or are terminated before sufficient repository capacity is available. As discussed in the rationale for the fifth finding, the Nuclear Waste Policy Act of 1982 includes a number of provisions to assure the availability of interim storage capacity for spent fuel during the period before repository operation (Secs. 131 through 137). Provisions are made for Federal government supplied interim storage capacity (up to 1900 metric tons) for civilian power reactors whose owners cannot reasonably provide adequate storage capacity.

In all cases where the interim storage is at a licensee's site, safe management will be assured by compliance with NRC regulations and specific license conditions. Where DOE provides the interim storage capacity, except in the use of existing capacity at Government-owned facilities, DOE is to "comply with any applicable requirements for licensing or authorization" (Sec. 135(a)(4)). If existing federally-owned storage facilities are used, NRC is required to determine "that such use will adequately protect the public health and safety" (Sec. 135(a)(1)). These provisions of the Act would assure that spent fuel will be managed in a safe manner until repository capacity is available. Facilities for reprocessing highlevel waste, should any be constructed or become operational before a repository is available, would be licensed under 10 CFR Part 50, and solidification and interim storage of high level waste would be provided for at such facilities. For the foregoing reasons, the Commission finds reasonable assurance that high-level waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available for its safe disposal.

2.4 Fourth Commission Finding

The Commission finds 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 expiration of that reactor's operating license at that ***34681** reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

Although the Commission has reasonable assurance that at least one mined geologic repository will be available by the years 2007-09, the Commission also realizes that for various reasons, including insufficient capacity to immediately dispose of all existing spent fuel, spent fuel may be stored in existing or new storage facilities for some periods beyond 2007-09. The Commission believes that this extended storage will not be necessary for any period longer than 30 years beyond the term of an operating license. For this reason, the Commission has addressed on a generic basis in this decision the safety and environmental impacts of extended spent fuel storage at reactor spent fuel storage basins or at either onsite or offsite spent fuel storage installations. The Commission finds that spent fuel can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of reactor To ensure that spent fuel which remains in operating licenses. storage will be managed properly until transferred to DOE for disposal, the Commission is proposing an amendment to its regulations The amendment will require the licensee to notify (10 CFR Part 50). the Commission, five years prior to expiration of its reactor operating license, how the spent fuel will be managed until disposal.

The Commission's finding is based on the record of this proceeding which indicates that significant releases of radioactivity from spent fuel under licensed storage conditions are highly unlikely. It is also supported by the Commission's experience in conducting more than 80 individual safety evaluations of storage facilities.

The safety of prolonged spent fuel storage can be considered in terms of four major issues: (a) The long-term integrity of spent fuel under water pool storage conditions, (b) structure and component safety for extended facility operation, (c) the safety of dry storage, and (d) potential risks of accidents and acts of sabotage at spent fuel storage facilities. Each of these issues is discussed separately below, in light of the information provided by the participants in this proceeding, and NRC experience in regulating storage of spent fuel.

A. Long-Term Integrity of Spent Fuel Under Water Pool Storage Conditions

The Commission finds that the cladding which encases spent fuel is highly resistant to failure under pool storage conditions. As noted

by DOE in its Position Statement, there are up to 18 years of continuous storage experience for zircaloy-clad fuel and 12 years continuous storage experience for stainless-clad fuel (DOE PS p. IV-73). Corrosion studies of irradiated fuel at 20 reactor pools in the United States suggest that there is no detectable degradation of zircaloy cladding. Data from corrosion studies of spent fuel stored in Canadian pools also support this finding (A.B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage," (UC-70) Battelle Pacific Northwest Laboratories (BNWL-2256, September, 1977) pp. 10-11, 17).

The long-term integrity of spent fuel in storage pools, which has been confirmed by observation and analysis, was cited by industry participants (e.g., Consolidated Industry Group: PHS pp. 3-6; UNWMG-EEI PS Doc. 4, p. 8; UG p. 2). No degradation has been observed in commercial power reactor fuel stored in onsite pools in Extrapolation of corrosion data suggests that the United States. only a few hundredths of a percent of clad thickness would be corroded after 100 years (A.B. Johnson, Jr., "Utility Spent Fuel Storage Experience," PNL-SA-6863, presented at the American Nuclear Society's Executive Conference on Spent Fuel Policy and its Implications, Buford, Georgia (April 2- 5, 1978). The American Nuclear Society cited a study (G. Vesterbend and T. Olsson, BNWL-TR-320, May 1978, English Translation of RB78-29), which concluded that degradation mechanisms such as general corrosion, local corrosion, stress corrosion, hydrogen embrittlement, and delayed hydrogen cracking are not expected to produce degradation to any significant extent for 50 years (ANS PS p. 34).

Canadian experience, including occasional examination during 17 years of storage, has indicated no evidence of significant corrosion or other chemical degradation. Even where the uranium oxide pellets were exposed to pool water as a result of prior damage of the fuel assembly, the pellets have been inert to pool water, an observation also confirmed by laboratory studies ("Canadian Experience with Wet and Dry Storage Concepts," presented at the American Nuclear Society's Executive Conference on Spent Fuel Policy and Its Implications, Buford, Georgia (April 2-5, 1978)). Another Canadian study concluded that "50 to 100 years under water should not significantly affect their [spent fuel bundles] integrity" (Walker, J.F., "The Long-Term Storage of Irradiated CANDU Fuel Under Water," AECL-6313 Whiteshell Nuclear Research Establishment, January 1979). This appraisal was based on findings such as no deterioration by corrosion or mechanical damage during 16 years of storage in water, no release of fission products from the uranium dioxide matrix during 11 years of storage in water, and no fission-product induced stress corrosion cracking anticipated during water storage at temperatures below 100 C (Hunt C.E.L., J.C. Wood and A.S. Bain, "Long-Term Storage of Fuel in Water" AECL-6577, Chalk River Nuclear Laboratories, June 1979).

The ability of spent fuel to withstand extended water basin storage is also supported by metallurgical examination of Canadian zircaloy clad fuel after 11 years of pool storage, metallurgical examination of zircaloy clad PWR and BWR high burn-up fuel after five and six years in pool storage, and return of Canadian fuel bundles to a reactor after 10 years of pool storage. Periodic hot cell examination of high burn-up PWR and BWR bundles over 6 years of pool storage at the WAK Fuel Reprocessing Plant in Germany has also confirmed that spent fuel maintains integrity under pool storage conditions. Other countries having favorable experience with pool storage of zircaloy-clad spent fuel include: the United Kingdom, 13 years; Belgium, 12 years; Japan, 11 years; Norway, 11 years; West Germany, 9 years; and Sweden, 7 years (op. cit., A. B. Johnson, Jr., Programs of monitoring spent fuel storage are being p. 7). conducted in Canada, the United Kingdom and the Federal Republic of Germany (DOE PS pp. IV--59 to IV-61; UNWMG-EEI PS Doc. 4, p. 23).

The only fuel failures which have occurred in spent fuel pools involved types of fuel and failure mechanisms not found at U.S. commercial reactor facilities, e.g., degradation of zircaloy-clad metallic uranium fuel from the Hanford N-Reactor as a result of cladding damage in the fuel discharge system. The system differs from the fuel discharge systems of commercial reactors. Moreover, metallic uranium fuel is not used in commercial power reactors. NRDC cited some conclusions drawn by Mr. Justice Parker regarding his lack of confidence in long-term storage of spent fuel, based on the Windscale Inquiry in Great Britain in 1978, which involved stainlesssteel-clad gas-cooled reactor fuel (NRDC PS p. 92). This is not pertinent to pool storage of commercial spent fuel since the high temperature conditions in a gas-cooled reactor which can cause sensitization of the cladding are not experienced by fuel in boiling or pressurized water reactors (op. cit., A.B. Johnson, Jr., pp. 17-18).

Some participants did not agree that there is an adequate basis for

*34682 confidence in safe extended-term spent fuel storage. Although agreeing with the extent of experience cited by DOE and other participants, the Natural Resources Defense Council, for example, stressed that more experience is needed before one can be confident of safe extended storage. NRDC considered the length of storage experience cited by DOE as insufficient to establish that spent fuel can be stored safely for periods well in excess of 40 years (NRDC PS pp. 88-92). A similar position was taken by the State of Minnesota (Minn PHS pp. 8-9). NRDC referred to the problem of the long-term storage of spent fuel reported in the Windscale Inquiry Report by the Hon. Mr. Justice Parker, Vol. 1, pp. 29-30. However, the conclusion quoted from the report, when taken in context, refers only to irradiated fuel from AGR (advanced gascooled) nuclear power plants. As noted earlier, the conditions to which the fuel cladding is exposed in gas-cooled reactors differs from those in U.S. commercial light water reactors. Moreover, the cladding of AGR fuel is identified as stainless steel in the Windscale Inquiry Report. Only two commercial LWR nuclear power plants operating in the U.S. today use stainless steel clad. Most U.S. nuclear fuel is zircaloy clad, and reactor operators have not seen evidence of degradation of LWR spent fuel, either zircaloy or stainless steel clad, in storage pools (Nuclear Technology, "Spent Fuel Storage Experience, " A.B. Johnson, Jr., p. 171, Vol. 43, Mid-Further, as stated earlier, cladding degradation April 1979). caused by stainless steel sensitization in an AGR high temperature environment is not pertinent to the lower temperature environment of LWR's. Therefore, the problem of long-term storage of spent fuel reported in the Windscale Inquiry is not relevant to U.S. spent fuel.

After expiration of a reactor operating license, the fuel storage pools at the reactor site would be licensed under 10 CFR Part 72. The requirements of 10 CFR Part 72 provide for operation under conditions involving a careful control of pool water chemistry to minimize corrosion. The required monitoring of the pool water would provide an early warning of any problems with defective cladding, so that corrective actions may be taken. Experience indicates that, under licensed storage conditions, significant releases of radioactivity are highly unlikely. The Commission is confident that the regulations now in place will assure adequate protection of the public health and safety and the environment during the period when the spent fuel is in storage ("Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," NUREG-0575, August 1979: Vol. 1, pp. ES-12, 4-10 to 4-17). Although confidence that spent fuel will maintain its integrity during storage for an additional 30 years beyond the facility's license expiration date involves an extrapolation of experience by a factor of two or three in time, the extrapolation is made for conditions in which corrosion mechanisms are well understood. Technical studies cited above support the conclusion that corrosion would have a negligible effect during several decades of extended pool storage. The Commission finds that this extrapolation is reasonable and is consistent with standard engineering practice.

B. Structure and Component Safety for Extended Facility Operation For Storage of Spent Fuel in Water Pools

Questions were raised concerning the adequacy of structural materials and components of spent fuel storage basins to function effectively during periods that are double those assumed in the base This concern was expressed in connection with the possible design. necessity for longer storage times if permanent disposal is not available by the year 2006 (Del PS p. 4). The experience at the General Electric Company Morris Operation in Illinois, where a mechanical failure caused contaiminated water to leak into the environment, was cited as an example of an unforeseen failure that could jeopardize the safety of spent fuel storage (NECNP PS p. 65). A generic problem regarding pipe cracks in borated water systems at PWR plants was also cited as evidence of uncertainty that long-term interim storage would be safely accomplished without modification and fuel shuffling NECNP PS p. 64). The Commission notes that the latter problem was discussed in detail in the Atomic Safety and Licensing Board Notification, "Pipe Cracks in Stagnant Borated Water Systems at PWRs" dated August 14, 1979, in the ASLB consideration of a proposed licensing amendment to permit modification of a spent fuel storage pool [11 NRC 245 (1980)]. The Notification referred to by NECNP indicated that cracks had occurred in safety-related type-304 stainless steel piping systems which contained stagnant borated Apparently, the cracking was attributable to stress water. corrosion caused by the residual welding stresses in heat-affected zones. The NRC staff review found that such cracking was not directly related to spent fuel pool modifications, and that necessary repairs could be readily made. The staff concluded that cracks in low-pressure spent fuel cooling system do not have safety significance.

Extensive experience with storage pool operation has demonstrated the ability of pool components to withstand the operating environment (DOE CS pp. II-145 to II-148). In the relatively few cases of equipment failure, pool operators have been able to repair the equipment or replace detective components promptly (UNWMG-EEI PS Doc. 4, p. 25; UG p. 2). The Commission finds no reason why spent fuel storage basins would not be capable of performing their cooling and storage functions for a number of years past the design-basis period of 40 years if they are properly maintained.

As one participant pointed out," . . . the pool structure as well as the racks are designed to withstand extreme physical conditions set forth in NRC licensing requirements. These include seismic, hydrologic, meteorological and structural requirements" (UNWMG-EEI PS Doc. 4 p. 25; UG p. 2). The design requirements are set forth in 10 CFR Parts 50 and 72. The design-basis siting conditions for storage pools at reactor sites are those of the reactor itself. 8Siting conditions are reviewed by the NRC staff, the Advisory Committee or Reactor Safeguards and the Atomic Safety and Licensing Board at the construction permit stage and then reviewed again in connection with the issuance of the facility's operating license. In issuing a power reactor operating license, the Commission is, in effect, expressing its confidence that the design-basis siting conditions will not be exceeded during the 40-year license period. If pool storage facilities were used to store spent fuel after expiration of reactor operating licenses, the utilities would be able, as part of their continuing maintenance of storage facilities, to replace defective components in a timely way, if needed, so as to avoid any safety problems. Some participants (e.g., NECNP PS pp. 63-63; Minn PHS pp. 8-9; and Del PS p. 4), do not place the same weight which the Commission does on experience at spent fuel storage facilities and on studies cited by DOE and certain others which support the argument that the structural integrity of these basins can be readily maintained (DOE CS pp. II-145, III-13; UNWMG-EEI PS Doc. 4 p. 19). The disagreements appear to center largely on the extent to which present experience may be relied upon as a basis for predicting the safety of spent *34683 fuel storage over a period two or three times the design period.

The degradation mechanisms involved in spent fuel pool storage are well understood. The resulting changes in fuel cladding and pool systems and components are gradual and thus provide sufficient time for the identification and development of remedial action without subjecting plant personnel or the public to significant risk. The fuel storage racks are designed to maintain their integrity for many decades; if they fail in any way, they may be replaced. There are a number of routine and radiologically safe methods for maintenance at spent fuel storage basins to ensure their continued effective performance. These include replacing racks or other components, or moving spent fuel to another storage facility. The Commission finds that the extensive operating experience with many storage pools adequately supports predictions of long-term integrity of storage basins.

The Commission concludes that the experience with spent fuel storage provides an adequate basis for confidence in the continued safe storage of spent fuel in water pools either at or away from a reactor site for at least 30 years after expiration of the plant's license.

C. Safety of Dry Storage of Spent Fuel

While the record of this proceeding has focussed on water pool storage, the Commission notes that dry storage of spent fuel has also been addressed to a limited extent (e.g., DOE PS pp. IV-12 to IV-22 and IV-63 CS p. II-147, PHS p. 9; UNWMG-PS Doc 4 pp. 16-17 and CS III-6-7; Tr. pp. 69-72). The NRC's regulation 10 CFR Part 72 pp. specifically covers dry storage of spent fuel (Section 72.2(c)), and experience with dry storage was a subject of public comment in the rulemaking ("Analysis of Comments on 10 CFR Part 72," NUREG-0587, pp. NRC reports, the "Final Generic Environmental II-12 to II-13). Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575) and "Dry Storage of Spent Nuclear Fuel, A Preliminary Survey of Existing Technology and Experience" (NUREG/CR-1223) which have been referenced in this proceeding, examined potential environmental impacts and experience with interim dry The GEIS (Final Generic Environmental Impact storage of spent fuel. Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0575, Vol. 1, p. 8-2, August 1979) contained the conclusion that the use of alternative dry passive storage techniques for aged fuel, now being investigated by the Department of Energy, appears to be as feasible and environmentally acceptable as storage of spent fuel in water basins. Prior to the adoption of Part 72, dry storage of irradiated fuel had been licensed under Part 50 at the Hallam sodium graphite reactor. Dry storage is also presently licensed under Part 50 at the Ft. St. Vrain high temperature gas reactor.

Although the number of years of experience with dry storage systems is less than that with water pool storage, the understanding of some of the material degradation processes experienced in water pool storage should be applicable to dry storage. As discussed below, dry storage involves a simpler technology than that represented by water basin storage systems. [FN5] Water basin storage relies upon active systems such as pumps, renewable filters, and cooling systems to maintain safe storage. Favorable water chemistry must also be maintained to retard corrosion. On the other hand, dry storage reduces reliance upon active systems and does not need water which together with impurities may corrode spent fuel cladding. With convective circulation of an inert atmosphere in a sealed dry system, there is little opportunity for corrosion. [FN6] For these reasons, the Commission believes that safe dry storage should be achievable without undue difficulty. New dry storage experience with light water reactor (LWR) fuel is becoming available for examination, and the evaluations discussed below suggest that the favorable results of up to almost two decades of dry storage experience with non-LWR spent fuel can also be obtained for LWR spent fuel in adequately designed dry storage installations.

FN5 See, for example, K. Einfeld and J. Fleish, "Fuel Storage in the Federal Republic of Germany; and R.J. Steffen and J.B. Wright, "Westinghouse Advanced Energy Systems Division," Proceedings of the American Nuclear Society's Topical Meeting on Options for Spent Fuel Storage, in Savannah, Georgia, September 26 through 29, 1982; also A.B. Johnson, Jr., E.R. Gilbert, and R.J. Guenther, "Behavior of Spent Nuclear Fuel and Storage System Components in Dry Interim Storage," PNL-4189, August 1982.

FN6 K. Einfeld and J. Fleisch, Ibid, p. 3.

A recent review of dry storage experience by A.B. Johnson, Jr., et al. in "Behavior of Spent Nuclear Fuel and Storage Components in Dry Interim Storage" (PNL-4189, August 1982), provides an update of dry storage activities, particularly with respect to zircaloy-clad spent fuel. In this report, (pp. 18-24) the experimental data base for non-zircaloy-clad spent fuel, including stainless steel clad fuel and the data base for zircaloy-clad fuel are discussed. Tests conducted to verify the integrity of zircaloy cladding have not indicated any degradation in dry storage (p. 27). In summary, the report states (pp. 44-45): Operating information is available from fueled dry well, silo, vault, and metal cask storage facilities. Maximum operational histories are:

All times related to 1982.

Operational history with interim storage in metal casks is minimal; however, there is extensive experience with metal shipping casks. In addition, metal storage casks have been designed and tested, and cask tests with irradiated fuel are currently under way in the Federal Republic of Germany and are planned in Switzerland and the United States. The integrity of zircaloy-clad fuel in a given demonstration test is relevant to predicting fuel behavior in other dry storage concepts under similar conditions.

Information on experience with dry cask storage in other countries is also becoming available. K. Einfeld and J. Fleisch's paper, "Fuel Storage in the Federal Republic of Germany" discussed the results of dry storage research on spent fuel in an inert atmosphere. They note on page 3 of their report:

Several tests have been conducted to verify the integrity of LWR spent fuel cladding in dry storage. To date none of the integrity tests has indicated that the cladding is degrading during long-term storage. Even under conditions more severe than in the casks, the fuel shows no cladding failures. From the tests listed in Table II it can be concluded that dry storage under cask conditions even with starting temperatures to 400 C is not expected to cause cladding failures over the interim storage period. Einfeld and Fleisch continue, in their report (pp. 3-4) to comment on the successful demonstration of cask storage:

A technical scale demonstration program with a fuel CASTOR cask is underway in the FRG since March 1982. The 16 assemblies which are subject to that program originate from the Wurgassen boiling water reactor. They resided in the core during 4 cycles of operation, burning up to about 27.8 GWD/t U.

The general objectives of the demonstration with a fully instrumented cask and fuel bundles are the verification of cask design parameters, the operational experience in cask handling and the expansion of the data base on fuel performance. Fig. 2 shows a schematic ***34684** drawing of the cask design and the axial thermocouple locations.

The operational experiences and corresponding test data confirm the assumptions made about the cask concept and the cask loading and handling procedure. In addition, the technology data base for operating an interim storage plant could be expanded.

--In-pool loading of a large storage cask and specific cask handling has been successfully demonstrated.

--The passive heat transfer capabilities of the cask and fuel cladding integrity have been verified. The maximum local fuel rod temperatures for fuel with about one year decay time were within the expected range.

--The total radiation shielding characteristics (<10 mrem/h) are verified in practice" (references deleted).

The authors conclude:

The realization of the transport/storage cask concept, which is well under way in the Federal Republic of Germany, will provide sufficient interim spent fuel storage capacity with the facilities planned or under construction. Dry interim storage is a proven technology and thus it constitutes an essential step in closing the backend of the nuclear fuel cycle.

R.J. Steffens and J.B. Wright's paper [FN7], "Drywell Storage

Potential," discussed drywell storage experience with pressurized water reactor spent fuel at the Nevada Test site. On page 6 of the paper, the authors note:

FN7 Proceedings of the American Nuclear Society's Topical Meeting on Options for Spent Fuel Storage, in Savannah, Georgia, September 26 through 29, 1982.

Another drywell performance assessment method being employed during the demonstration storage period is that of periodically monitoring the storage canister atmosphere for fission products, specifically krypton-85 gas. Samples drawn to date have shown no detectable concentrations of this product after approximately 3 years of storage, indicating a maintenance of the fuel cladding integrity.

A third paper presented at the same Topical Meeting, by E.R. Gilbert and A.B. Johnson, Jr., "Assessment of the Light-Water Reactor Fuel Inventory for Dry Storage," focuses on dry spent fuel storage with respect to an acceptable temperature range for storage in air. They conclude on page 8 of their report:

Dry storage demonstrations now in progress suggest that by 1986 a major fraction of the U.S. PWR spent fuel inventory that was placed in water storage before 1981 can be stored in dry storage facilities below 150 to 200 C.

The LWR fuel inventory offers good prospects that the thermal characteristics of consolidated fuel will be acceptable for dry storage by proper selection of fuel.

Dry storage of LWR fuel with defective cladding may be tolerable in inert cover gases or at temperatures below the threshold for significant oxidation in oxidizing cover gases. The range of acceptable storage temperatures is being investigated.

With respect to dry storage of spent fuel, the Commission notes the summary statement from A.B. Johnson, Jr., et al., "Behavior of Spent Nuclear Fuel and Storage Components in Dry Interim Storage" (PNL-4189), page xvii:

Operational problems in vaults and dry wells have been minor after up to 18 yr. of operation (in 1982); and 7 yr of silo experience suggests that decades of satisfactory operation can be expected. Demonstration tests with irradiated fuel in metal storage casks are just beginning, but metal shipping casks with mild steel chambers have been used since the mid-1940s. Metal storage/shipping casks have successfully survived fire, drop, and crash tests.

Thus, with respect to the storage of spent fuel under dry conditions at storage installations located either at reactor sites or away from reactor sites, the Commission believes that current dry-storage technology is capable of providing safe storage for spent nuclear fuel. The modular character of dry storage installations enhances the ability to perform maintenance or to correct mechanical defects, if any should occur. The Commission is confident that its regulations will assure adequate protection of the public health and safety and the environment during the period when the spent fuel is in storage.

The Commission notes that section 211(2)(B) of the Nuclear Waste Policy Act authorizes the Secretary of Energy to carry out research on, and to develop facilities to demonstrate, dry storage of spent nuclear fuel. Although this provision indicates a judgment on the part of the Congress that additional research and demonstration is needed on the dry storage of spent fuel, the Commission believes the information discussed above is sufficient to reach a conclusion on the safety and environmental effects of extended dry storage. All areas of safety and environmental concern (e.g., maintenance of systems and components, prevention of material degradation, protection against accidents and sabotage) have been addressed and shown to present no more potential for adverse impact on the environment and the public health and safety than storage of spent fuel in water pools.

The technical studies cited above support the conclusion that corrosion would have a negligible effect during several decades of extended dry storage. The Commission's confidence in the safety of dry storage is based on an understanding of the material degradation processes, rather than merely on extrapolation of storage experience--together with the recognition that dry storage systems are simpler and more readily maintained. For these reasons, the Commission is confident that dry storage installations can provide continued safe storage of spent fuel at reactor sites for at least 30 years after expiration of the plant's license.

D. Potential Risks of Accidents and Acts of Sabotage at Spent Fuel

Storage Facilities

The Commission finds that the risks of major accidents at spent fuel storage pools resulting in off-site consequences are remote because of the secure and stable character of the spent fuel in the storage pool environment, and the absence of reactive phenomena -- "driving forces"--which may result in dispersal of radioactive material. Reactor storage pools and independent spent fuel storage installations have been designed to safely withstand accidents caused either by natural or man-made phenomena. Even remote natural risks such as earthquakes and tornados and the risks of human error such as in handling or storing spent fuel are addressed in the design and operational activities of storage facilities and in NRC's licensing reviews thereof under its regulations. Under 10 CFR Parts 50 and 72, spent fuel is stored in facilities structurally designed to withstand accidents and external hazards, such as those cited above, and to preclude radiation and radioactive material emissions from spent fuel that would significantly endanger the public health and In order to preclude the possibility of criticality under safety. normal or accident conditions, the spent fuel is stored in racks designed to maintain safe geometric configurations under seismic The spent fuel itself consists of solid ceramic pellets conditions. which are encapsulated in metal clad rods held in gridded assemblies and stored underwater in reinforced concrete structures or in sealed dry storage installations such as concrete dry wells, vaults and silos or massive metal casks. The properties of the spent fuel (which in extended storage has decayed to the point where individual fuel assemblies have a heat generation rate of several hundred watts or less) and of the benign storage environment result in spent fuel storage being an activity with very little potential for *34685 adversely affecting the environment and the public health and safety. While any system employing high technology is subject to some equipment breakdowns or accidents, water pool storage facilities have operated with few serious problems (DOE PS at IV-56 to IV-57; UNWMG-EEI PS Doc. 4 p. 26). In these cases, the events at spent-fuel pools have been manageable on a timely basis. Similarly, dry storage of spent fuel, as discussed in Section C above, appears to be at least as safe as water pool storage. A discussion of risks related to spent fuel storage is provided below.

Comments from participants on the subject of accidents and their potential consequences at spent-fuel storage facilities included a description of nonspecific references to numerous "accidents" in

spent-fuel storage facilities, a discussion of cases of leaks and inadvertent releases of contaminated storage pool water, and a suggestion that waste storage should be physically separated from reactor operation to reduce the risk of damage to the storage facility in the event of a reactor accident, and vice versa (NY PS pp. 102-107; OCTLA PS p. 12). The State of New York, in its discussion of possible accidents at spent-fuel storage pools, cited reports of an accident in the Soviet Union that is believed to have involved reprocessing plant wastes stored in tanks at a waste storage facility (NY PS pp. 107-108). The situation, as reconstructed from limited data, cannot be compared to the storage of ceramic fuel in metal cladding, placed in water storage pools. The issue raised, therefore, is not relevant to this proceeding. The need for continued management of pool storage facilities over an extended time period was considered by some participants as creating a potential hazard because of the increased possibility of human errors or mismanagement (NRDC PS pp. 89- 90). The State of New York characterized the Three Mile Island reactor accident as caused by multiple technical and human failures, and postulated that such failures are possible at storage facilities, and would result in serious off-site consequences (NY PS p. 107).

These observations do not appear to take account of the numerous safety analyses that have been made of water pool storage and of alternative long-term storage methods which have demonstrated storage to be both safe and environmentally acceptable. Of course, the possibility of human error cannot be completely eliminated. However, Commission regulations (e.g., 10 CFR Part 55; 10 CFR Part 72, Subpart I) include explicit requirements for operator training, the use of written procedures for all safety-related operations and functions in the plant, and certification or licensing of operators, with the objective of minimizing the opportunity for human error. Unlike the accident at the Three Mile Island reactor, human error at a spent fuel storage installation does not have the capability to create a major radiological hazard to the public. The absence of high temperature and pressure conditions that would provide a driving force essentially eliminates the likelihood that an operator error would lead to a major release of radioactivity (DOE CS pp. II-156 to 158). In addition, features incorporated in storage facilities are designed to mitigate the consequences of accidents caused by human error or otherwise (DOE PS IV-34).

The possibility of terrorist attacks on nuclear facilities was

advanced as an argument against the acceptability of extended interim storage of spent fuel (NRDC PS p. 90). The intentional sabotage of a storage pool facility is possible, and NRC continues to implement actions to further improve security at such facilities. The consequences would be limited by the realities that, except for some gaseous fission products, the radioactive content of spent fuel is in the form of solid ceramic material encapsulated in high-integrity metal cladding and stored underwater in a reinforced concrete Under these conditions, the radioactive content of spent structure. fuel is relatively invulnerable to dispersal to the environment (Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0575, Vol. 1.). Similarly, dry storage of spent fuel in dry wells, vaults, silos and metal casks is also relatively invulnerable to sabotage and natural disruptive forces, because of the weight and size of the sealed, protective enclosures which may include 100-ton steel casks, large concrete lined near-surface caissons and surface concrete silos (NUREG/CR-1223, p. IV-C-2).

E. Summary

In summary, the Commission finds that spent fuel can be stored safely at independent spent fuel storage installations or at reactor sites for at least 30 years beyond the expiration of reactor operating licenses. This finding is based on extensive experience and on many factors that are not site-specific. These factors include the substantial capability of the fuel cladding to maintain its integrity under storage conditions, a capability verified in extensive technical studies and experience; the extreme thermal and chemical stability of the fuel form, enriched uranium oxide pellets; the long-term capability of spent fuel storage facilities to dissipate spent fuel heat and retain any radioactive material and the relatively straightforward techniques and leakage; procedures for repairing spent fuel storage structures, replacing defective components or equipment, or undertaking other remedial actions to assure containment of radioactivity (A.B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage", (UC-70) Battelle Pacific Northwest Laboratories (BNWL-2256, September 1977)). These factors contribute to the assurance that spent fuel can be stored for extended periods without significant impact on the public health and safety and the environment. Moreover, any storage of spent fuel at independent spent fuel storage installations or reactor sites beyond the operating license expiration will be subject to licensing

and regulatory control to assure that operation of the storage facilities does not result in significant impacts to the public health and safety.

For the reasons discussed previously (Sections 2.4 A through D above), the Commission also concludes, from the record of this proceeding, that storage of spent fuel either at or away from a reactor site for 30 years beyond the operating license expiration would not result in a significant impact to the environment or an adverse effect on the public health and safety. The Commission's findings are also supported by NRC's experience in more than 80 individual safety evaluations of spent fuel storage facilities conducted in recent years. The record indicates that significant releases of radioactivity from spent fuel under licensed storage conditions are highly unlikely. This is primarily attributable to the resistance of the spent fuel to corrosive mechanisms and the absence of any conditions that would result in offsite dispersal of radioactive material. The Commission concludes that the possibility of a major accident or sabotage with off-site radiological impacts at a spent-fuel storage facility is extremely remote because of the characteristics of spent-fuel storage. These include the inherent properties of the spent fuel itself, the benign nature of the water pool or dry storage environment, and the absence of any conditions that would provide a driving force for dispersal of radioactive Moreover, there are no *34686 significant additional nonmaterial. radiological impacts which could adversely affect the environment if spent fuel is stored beyond the expiration of operating licenses for reactors. The non-radiological environmental impacts associated with site preparation and construction of storage facilities are, and will continue to be, considered by the NRC at the time applications are received to construct these facilities, which are licensed under NRC's regulations in either 10 CFR Part 50 for reactors or 10 CFR Part 72 for independent spent fuel storage facilities. The procedure to be followed in implementing the Commission's generic determination is the subject of rulemaking which the Commission has conducted.

2.5 Fifth Commission Finding

The Commission finds reasonable assurance that safe independent onsite spent fuel storage or offsite spent fuel storage will be made available if such storage capacity is needed.

The technology for independent spent fuel storage installations as discussed under the fourth Commission Finding, is available and The regulations and licensing procedures are in demonstrated. Such installations can be constructed and licensed within a place. five-year time interval. Before passage of the Nuclear Waste Policy Act of 1982 the Commission was concerned about who, if anyone, would take responsibility for providing such installations on a timely While the industry was hoping for a government commitment, basis. the Administration had discontinued efforts to provide those storage facilities (Tr. pp. 157-158). The Nuclear Waste Policy Act of 1982 establishes a national policy for providing storage facilities and thus helps to resolve this issue and assure that storage capacity will be available.

Prior to March 1981, the DOE was pursuing a program to provide temporary storage in off-site, or away-from-reactor (AFR), storage installations. The intent of the program was to provide flexibility in the national waste disposal program and an alternative for those utilities unable to expand their own storage capacities (DOE PS p. I-11; DOE CS p. II-66).

Consequently, the participants in this proceeding assumed that, prior to the availability of a repository, the Federal government would provide for storage of spent fuel in excess of that which could be stored at reactor sites. Thus, it is not surprising that the record of this proceeding prior to the DOE policy change did not indicate any direct commitment by the utilities to provide AFR storage. On March 27, 1981 DOE placed in the record a letter to the Commission stating its decision "to discontinue its efforts to provide Federal government-owned or controlled away-from-reactor storage facilities." The primary reasons for the change in policy were cited as new and lower projections of storage requirements and lack of Congressional authority to fully implement the original policy.

The record of this proceeding indicates a general commitment on the part of industry to do whatever is necessary to avoid shutting down reactors or derating them because of filled spent fuel storage pools. While industry's incentive for keeping a reactor in operation no longer applies after expiration of its operating license, utilities possessing spent fuel are required to be licensed and to maintain the fuel in safe storage until removed from the site. Industry's response to the change in DOE's policy on federally-sponsored away-fromreactor (AFR) storage was basically a commitment to do what is required of it, with a plea for a clear unequivocal Federal policy (Tr. pp. 157-159). The Nuclear Waste Policy Act of 1982 has now provided that policy.

The Nuclear Waste Policy Act defines public and private responsibilities for spent fuel storage and provides for a limited amount of federally-supported interim storage capacity. The Act also includes provisions for monitored retrievable storage facilities and for a research, development and demonstration program for dry storage. The Commission believes that these provisions provide added assurance that safe independent onsite or offsite spent fuel storage will be available if needed.8

In Subtitle B of the Act, "Interim Storage Program," Congress found that owners and operators of civilian power reactors "have the primary responsibility for providing interim storage of spent nuclear fuel from such reactors" by maximizing the use of existing storage facilities onsite and by timely additions of new onsite storage The Federal government is responsible for encouraging and capacity. expediting the effective use of existing storage facilities and the addition of new storage capacity as needed. In the event that the operators cannot reasonably provide adequate storage capacity to assure the continued operation of such reactors, the Federal government will assume responsibility for providing interim storage capacity for up to 1900 metric tons of spent fuel (Sec. 131(a)). Such interim storage capacity is to be provided by the use of available capacity at one or more Federal facilities, the acquisition of any modular or mobile storage equipment including spent fuel storage racks, and/or the construction of new storage capacity at any reactor site (Sec. 135(a)(1)).

The Nuclear Waste Policy Act authorizes the Secretary of Energy to enter into contracts with generators or owners of spent fuel to provide for storage capacity in the amount provided in the Act (Sec. 136(a)(1)). However, such contracts may be authorized only if the NRC determines that the reactor owner or operator cannot reasonably provide adequate and timely storage capacity and is pursuing licensed alternatives to the use of Federal storage capacity (Sec. 135(b)). [FN8] Further, any spent fuel stored in the "interim storage program" is to be removed from the storage site on facility "as soon as practicable" but in no event later than 3 years following the availability of a repository or monitored retrievable storage facility (Sec. 135(e)). The Act establishes an "Interim Storage Fund" for use in activities related to the development of interim storage facilities, including the transportation of spent fuel and impact assistance to state and local governments (Sec. 136(d)).

FN8 Accordingly, the Commission has published proposed "Criteria and Procedures for Determining the Adequacy of Available Spent Nuclear Fuel Storage Capacity," 10 CFR Part 53 (48 FR 19382, April 29, 1983).

In addition to providing for interim storage capacity, Congress found that "the long-term storage of high level radioactive waste or spent nuclear fuel in monitored retrievable storage facilities is an option for providing safe and reliable management of such waste or spent fuel." By June 1, 1985, the Secretary of Energy must complete a detailed study of the need for, and feasibility of, such a facility and submit to Congress a proposal for the construction of one or more The Act also directs the Secretary of Energy to such facilities. establish a demonstration program, in cooperation with the private sector, for the dry storage of spent nuclear fuel at reactor sites and provide consultative and technical assistance on a cost-sharing basis to assist utilities lacking interim storage capacity to obtain the construction, authorization and appropriate license from the NRC. Such assistance may include the establishment of a research and development program for the dry storage of no more than 300 metric tons of spent fuel at federally-owned facilities (Sec. 218, (a) (b) (c)).

The Commission's confidence that independent on-site and/or off-site *34687 storage capacity for spent fuel will be available as needed is further supported by the strong likelihood that only a portion of the total spent fuel generated will require storage outside of reactor storage basins (DOE PS pp. V-3 to V-13). Estimates of the amount of spent fuel requiring storage away from reactors have declined significantly over the duration of this proceeding (DOE March 27, 1981 letter from O. Brown II, DOE Office of General Counsel, to M. Miller NRC, Presiding Officer in this proceeding).

DOE reported that cummulative spent fuel discharges, previously estimated as 100,000 metric tons of uranium (MTU), dropped to 72,000 MTU through the year 2000. Projected requirements for additional spent fuel storage capacity begin in 1986 (instead of 1981) and increase to 9500 MTU per year by 1997. Earlier projections indicated a need for 16,000 MTU per year for additional storage capacity in 1997. [FN9] DOE pointed out that additional storage requirements could be satisfied in a number of ways, including: (a) Use of private existing AFR storage facilities; (b) construction of new water basins at reactor facilities or away from reactor facilities by private industry or the utilities; (c) transshipment of spent fuel between reactors operated by different utilities; (d) disassembly of spent fuel and storage of spent fuel rods in canisters; and (e) dry storage at reactor sites.

FN9 DOE's planning-base studies assume maximum basin re-racking at reactors and the maintenance of full-core reserve in reactor basins.

Subsequently, DOE published new estimates for additional spent fuel storage capacity ("Spent Fuel Storage Requirements", DOE/RL-82-1, June, 1982). These estimates show a maximum required away-fromreactor (AFR) storage capacity of 8610 metric tons uranium of spent This is a decline from DOE's previously fuel in the year 1997. published planning-base case. The information in Table 1 below is excerpted from DOE/RL-83-1 and provides a range of projections of additional storage capacity needs. The first column is a projection of storage capacity needed over and above the currently existing and planned storage capacity. The second column provides projected values of additional storage capacity needed if maximum re-racking is conducted at existing or planned reactor basin storage pools. The storage capacity needs shown in the second column are somewhat smaller than in the first column. A further decrease in additional needed storage capacity is shown in the third column, which takes into account the possibility of transshipment of fuel from one reactor basin to another basin owned by the same utility. The projected values of needed storage capacity in the first and third columns provide a range of upper and lower bound values, The most likely outcome expected by DOE corresponds respectively. to the values in the second column. This was formerly known as the planning base case and is now termed the reference case. All projections shown in the table assume the maintenance of a full core reserve. The magnitude of need for additional spent fuel storage capacity projected by DOE has continued to decline, even though DOE has not assumed the use of newly developed technology, such as fuel rod consolidation.

The cumulative amount of spent fuel to be disposed of in the year 2000 is expected to be 58,000 metric tons of uranium [Spent Fuel

Storage Requirements (Update of DOE/RL-82-1) DOE/RL-83-1, published January, 1983]. The additional required storage capacity of 13,000 metric tons of uranium projected in the second column for the year 2000 is less than 25% of the total quantity of spent fuel projected to be in storage. It is expected that additional storage will be provided at the reactor site, with some smaller portion to be moved offsite.

Table 1.--Additional Cumulative Spent Fuel Storage Requirements, Over and Above

Uranium) [FN1]

Current and Planned Storage at Reactor Storage Basins (Metric Tons of

No change in Use maximum reracking Maximum reracking current or of current and plus planned storage planned storage transshipment capacity capacity ____ Year: 1982 0 0 Δ 1983 0 0 0 1984 13 13 0 1985 13 13 \cap 1986 110 110 3 1988 550 490 90 1990 1,500 1,360 310 1995 5,610 5,060 3,000 2000 14,760 13,090

10,370

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1 Spent Fuel Storage Requirements (Update of DOE/RL-82-1) DOE/RL-83-1,

published January, 1983.

In response to the Commission's Second Prehearing Memorandum and Order (Nov. 6, 1981) the participants commented on the significance to the proceeding of issues resulting from the DOE policy change on spent fuel storage. The utilities generally limited their written responses to a restatement of the safety of interim storage and an affirmation of the technical and practical feasibility of the alternatives to Federal AFR storage facilities. An implied commitment by industry to implement AFR storage if necessary using one of the several feasible spent fuel storage alternatives is evident from the responses of the utilities, the nuclear industry, and associated groups (i.e., Tr. p. 159).

Based upon the foregoing, the Commission has, then, reasonable assurance that safe independent onsite or offsite spent fuel storage will be available if needed. The technology is demonstrated and the licensing procedures in place. The Nuclear Waste Policy Act establishes a national policy on interim storage of spent fuel and provides for contingency Federal storage capacity to augment that provided by industry. Further, the amount of fuel which may have to be stored in independent spent fuel storage facilities is less than was originally thought.

Reference Notation

The following abbreviations have been used for the reference citations in the Appendix:

PS Position Statement

CS Cross-Statement

PHS Pre-Hearing Statement

Tr. Transaction* of January 11, 1982 public meeting with the Commissioners

FN*The Commission considers this transcript to be part of the administrative record in this rulemaking. However, the transcript has not been reviewed for accuracy by the Commission on the participants, and therefore is only an informal record of the matters discussed.

Participants have been identified by the following citations:

Citation and Participant

AIChE--American Institute of Chemical Engineers

ANS--American Nuclear Society

AEG--Association of Engineering Geologists

AIF--Atomic Industrial Forum, Inc.

--Bech--Bechtel National, Inc.

CDC--California Department of Conservation

CEC--California Energy Commission

CPC--Consumers Power Company

Del--State of Delaware

DOE--U.S. Department of Energy

ECNP--Environmental Coalition on Nuclear Power

GE--General Electric Company

Ill--State of Illinois (PS includes Roy affidavit)

Lewis--Marvin I. Lewis

Lochstet--Dr. William A. Lochstet

Minn--State of Minnesota

MAD--Mississippians Against Disposal

NECNP--New England Coalition on Nuclear Pollution

NfE--Neighbors for the Environment (PS includes papers by Dornsife, Rae, and Strahl)

NRDC--Natural Resources Defense Council, Inc.

NY--State of New York

*34688 OCTLA--Ocean County and Township of Lower Alloway Creek

Ohio--State of Ohio

SC--State of South Carolina

SE2--Scientists and Engineers for Secure Energy, Connecticut Chapter

SHL--Safe Haven, Ltd.

SMP--Sensible Main Power, Inc.

TVA--Tennessee Valley Authority

UNWMG-EEI--Utility Nuclear Waste Managment Group--Edison Electric Institute

USGS--United States Geological Survey

Vt--State of Vermont

Wis--State of Wisconsin (PS includes comments by Deese, Mudrey, Kelly, and Leverance)

UG--The Utilities Group (Niagara Mohawk Power Corp., Omaha Public Power District, Power Authority of the State of New York, and Public Service Company of Indiana, Inc.)

[FP Doc. 84-23182 Filed 8-30-84; 8:45 am]

BILLING CODE 7590-01-M

49 FR 34658-01, 1984 WL 118011 (F.R.)

END OF DOCUMENT

Attachment 5

Volume 53 of the Federal Register including pages 31651-31683 (Aug. 19, 1988), Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste

Westlaw

53 FR 31651-01, 1988 WL 265640 (F.R.)

RULES and REGULATIONS

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 2, 19, 20, 21, 51, 70, 72, 73, 75 and 150

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste

Friday, August 19, 1988

*31651 AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The Nuclear Waste Policy Act of 1982, as amended (NWPA) requires that monitored retrievable storage facilities (MRS) for spent nuclear fuel and high-level radioactive waste (HLW) be subject to licensing by the Nuclear Regulatory Commission (NRC). The NRC is adding language to its regulations in 10 CFR Part 72 to provide for licensing the storage of spent nuclear fuel and HLW in an MRS. The Commission intends to have the appropriate regulation to fulfill the requirements of the NWPA in place in a timely manner. The rule would also clarify certain issues that have arisen since Part 72 was made effective on November 28, 1980 and incorporate other changes resulting from public comments received.

EFFECTIVE DATE: September 19, 1988.

ADDRESSES: Copies of NUREG-0575, NUREG-1092, and NUREG-1140 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013-7082. Copies are also available from the National Technical Information Service, 5282 Port Royal Road, Springfield, VA 22161. A copy of each NUREG is also available for public *31652 inspection and/or copying at the NRC Public Document Room, 1717 H Street NW., Washington, DC.

FOR FURTHER INFORMATION CONTACT:Keith G. Steyer or C.W. Nilsen, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301)492-3824 or 492-3834, respectively.

SUPPLEMENTARY INFORMATION: On May 27, 1986, following Commission approval, the proposed revision to 10 CFR Part 72 relating to MRS licensing was published in the Federal Register (51 FR 19106) for comment. The comment period expired on August 25, 1986.

The NRC received 195 comment letters from utilities, engineering companies, State offices, environmental groups, private citizens, and a member of the U.S. House of Representatives. The comment letters from private citizens numbered about 145. (Some of these were signed by several individuals or were submitted on behalf of private business firms.) From the comment letters received, the staff identified 27 separate topics to which specific responses were directed. Comments were also received which addressed the original rule, not the proposed amendment. In response to the comments, several changes have been made to the proposed rule. The majority of these changes are mainly clarifying in nature.

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Page 1

In order to provide sufficient space to accommodate possible future amendments to Part 72, the sections of the final rule have been renumbered. To aid the reader in following the discussion of comments in the preamble of the final rule, each reference to a specific section of the final rule is followed by a bracketed reference to the parallel section of the proposed rule.

A compilation of the issues raised as a result of public comment and the accompanying Commission response follow:

1. Backfitting

Comment: Several commenters indicated that the proposed rule should incorporate the sense of the reactor back-fitting rule set out in 10 CFR 50.109.

Response: Although these storage facilities are not like reactors but are, for the most part, static by nature with very little need for design changes, the staff has revised the backfitting requirements of 10 CFR 72.62 (\S 72.42). The change is being made to conform \S 72.62 (\S 72.42) more closely to \S 50.109 as modified by the court decision in Union of Concerned Scientists, et al., v. U.S. Nuclear Regulatory Commission, et al., Nos. 85-1757 and 86-1219, 824 F.2d 108 (U.S.C.A.D.C. August 4, 1987).

2. Opportunity for Hearing Prior to the First Receipt of Spent Fuel or High-Level Radioactive Waste (HLW)

Comment: A new proposed § 72.46(c) (§ 72.34(c)) was added to 10 CFR Part 72 specifically providing that the Commission may, upon its own initiative, issue a notice of opportunity for hearing prior to the first receipt of spent fuel or high-level radio-active waste at an MRS if it finds this to be in the public interest. In the supplementary information in the May 27, 1986 Proposed Rule, the Commission indicated its own considerations on this topic and expressed particular interest in receiving public comment on (1) the need to make a finding before MRS operation that construction conforms to the license application, (2) provisions for second stage hearing rights to address specific new issues which could not have been litigated at the first stage and/or new information which has been revealed since issuance of the license, and (3) the format of the hearing, if held. Of the comment letters that addressed these points, some expressed no preference, some favored the provisions, some thought the provisions were unnecessary.

The principal reasons given by proponents of these provisions are that the public will have more confidence that the MRS will be operated safely and that there should be a clear opportunity to examine new issues which could be raised. Other comments of proponents were that the Department of Energy has had poor public performance in the past, that the degree of hazard is similar to nuclear power reactors which require a two-stage process, and that the opportunity for a second hearing could be an appropriate time to examine technical/financial information. Additional comments suggested that the rule require a second mandatory hearing and that funding be provided for nonprofit groups to participate in a second hearing.

On the topic of a finding it was suggested that (1) criteria be set forth for any finding the Commission may make, and (2) the NRC inspections should certify quality assurance and completeness of construction in an inspection report prior to initiation of operation. One comment suggested that start-up of the MRS should be linked to the repository authorization as an issue at a second hearing.

The principal reasons given by those opposed to the new provisions for a second hearing were that (1) it would cause unnecessary delay, (2) the Commission's regulations in 10 CFR Part 2 were sufficient to examine any new

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issues, (3) the NRC's normal systematic inspections are adequate to assure that construction was proper, (4) the nature of the MRS is such that all issues could be covered by the opportunity for public review prior to issuing a license and starting construction, and (5) the backfitting provision (§ 72.62 (§ 72.42)) provides additional assurance that significant issues may be raised by staff after the license is issued. Other reasons offered in objection to the new provisions were that (6) there was no basic difference between an MRS and an Independent Spent Fuel Storage Installation (ISFSI), (7) the small amount of solidified high-level waste which could be received could not justify any change in procedure from an ISFSI, and (8) the Safety Analysis Report (SAR) update procedure will assure that any new issue will be known and understood by NRC staff.

Response: The Commission specifically added the new provision and requested comments in order to obtain as complete an understanding as possible of whether or not any benefits would accrue to the public from such a procedure. This was done with full knowledge that the Atomic Energy Act of 1954, as amended, only requires one hearing and that under the procedures in 10 CFR Part 2 the opportunity always exists for any member of the public to bring any new issues to the Commission's attention.

In the comments received from the public there was no indication that there were likely to be any new safety issues brought forward which could not have been fully addressed on the occasion of the hearing held prior to issuance of the license. The licensing process of Part 72 supports one-stage licensing as it requires that all information needed for the licensing action be available and complete before a license is issued, i.e., final design, quality assurance/control procedures, operator training procedures, operating technical specifications, etc. Unlike a reactor license where a construction permit is issued prior to final design, an MRS application for license contains a final and complete design and therefore one-stage licensing is achievable. As to conformance of construction with the application and license, the Commission believes that, unlike reactors, construction of Part 72 type facilities will be simple and straightforward. Accordingly, in the Commission's judgment, there will be no need, as part of the safety review prior to license issuance, to require an applicant to *31653 "prove" conformance of the as-built facility with the application. NRC would audit construction progress and, in the event some problems were found, enforcement action could be taken to correct them and, if necessary, halt the receipt of spent fuel until they were corrected. In this regard, § 72.82(c)(3) (§ 72.56(c)(3)) provides for establishing an NRC resident inspection program if warranted.

3. Interaction with States

Comment: Comments were received concerning providing of information to State and local governments and their interaction in the licensing process with DOE and the Commission.

Response: Under § 72.200 (§ 72.310) of the proposed rule, the Governor and legislature of any State in which a monitored retrievable storage installation may be located and the governing body of any affected Indian tribe will be provided timely and complete information regarding determinations or plans made by the Commission with respect to siting, development, design, licensing, construction, operation, regulation or decommissioning of such monitored retrievable storage facility. In response to the comment, the Commission will change § 72.200 (§ 72.310) "Provision of MRS Information" to require that the above information will also be provided to each affected unit of local government and to the Governors of any contiguous States. The definition of "affected unit of local government" which has been added to § 72.3 tracks the definition used in the Nuclear Waste Policy Amendments Act of 1987. (Sec. 5002, Pub. L. 100-203, 101 Stat. 1330-227 (42 U.S.C. 10101 (31)).) Participation by persons, including States, in license reviews is as provided for in 10 CFR Part 2, Subpart G.

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4. High Burn-Up Fuel

Comment: In response to a 1980 petition for rulemaking, the Commission agreed (51 FR 23233, June 26, 1986) to prepare an environmental assessment on high burn-up fuel. The Commission's response concerning impacts of high burn-up fuel should be provided.

Response: The Commission issued an environmental assessment addressing the subject of high burn-up fuel in February 1988 "Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors" (NUREG/CR-5009). The assessment concluded "Environmentally, this burnup increase would have no significant impact over normal burnup."

5. Emergency Planning

Comment: As discussed in supplementary information to the proposed revisions to 10 CFR Part 72 the rule was rewritten to set forth explicit requirements appropriate to an ISFSI or an MRS, rather than refer to Appendix E to CFR Part 50, which is specific to nuclear power reactors. Responders commented on this change. Several thought that there should be a wider dissemination of the emergency plan which an applicant would have to prepare pursuant to the rewritten § 72.32 (§ 72.19), as well as a comment period longer than the specified 60 days. Another responder thought that 60 days was adequate. Other comments were that (1) sabotage of casks and terrorism, sabotage and military attack scenarios should be considered in an emergency plan, (2) a fully developed and tested offsite emergency plan should be developed, (3) the new version of § 72.32 (§ 72.19) implies a need for offsite protective actions which is incorrect, (4) the supplementary information which will accompany the issuance of the final rule should discuss worldwide experience and previous reviews and studies as support for the new emergency planning provisions, and (5) the emergency plan should continue to be the same as that for nuclear power reactors.

Response: The basic concept of emergency planning in § 72.32 (§ 72.19) has not been changed. None of the respondents provided any additional information to the staff or questioned the staff analyses such as to change the basis for the staff's approach to emergency planning for an ISFSI or an MRS. Moreover, in view of the relatively passive nature of facilities for the receipt, handling and storage of spent fuel and high-level radioactive waste, as compared to operating power reactors, emergency plans for ISFSI and MRS need not be equivalent to emergency plans for reactors.

Since the proposed revision of Part 72 was published for comment on May 27, 1986, the NRC has published proposed amendments to 10 CFR Parts 30, 40, and 70 [FN1] which would require certain NRC fuel cycle and other radioactive materials licensees that engage in activities that may have the potential for a significant accidental release of NRC-licensed materials to establish and maintain approved emergency plans for responding to such accidents. Although applicable to persons licensed under different parts of the Commission's regulations, the proposed requirements for emergency plans in Parts 30, 40, and 70 contain substantially identical provisions because they are designed to protect the public against similar radiological hazards. The proposed revision of Part 72 as published for comment also requires applicants for an ISFSI or MRS license to submit an emergency plan (see § 72.32 (§ 72.19).) Although the texts of proposed § 72.19 (redesignated § 72.32) and the parallel provisions of the proposed Emergency Preparedness rule are not identical, these provisions have the same purpose and use the same approach. In both cases, the proposed regulations require onsite emergency planning with provisions for offsite emergency response in terms of coordination and communication with offsite authorities and the public. It is therefore appropriate that in both cases these requirements should be expressed in the same way.

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1 Proposed rule on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees, 52 FR 12921, April 20, 1987.

Until the Commission promulgates the Emergency Preparedness rule in final form, it is not possible to ascertain exactly the language that should be used. In view of these circumstances and since there is every expectation that this period of uncertainty will be of relatively short duration, we believe the prudent course of action is to reserve § 72.32 (§ 72.19), Emergency plan, in the final rule with the understanding that the text of this section will be promulgated in final form as a conforming amendment when the Commission adopts and promulgates the final Emergency Preparedness rule or shortly thereafter. We should point out that the temporary absence from Part 72 of requirements respecting emergency plans does not present any difficulties from a regulatory standpoint. To date, only three licenses have been issued under Part 72. Two licensees also hold Part 50 licenses and are required to comply with the provisions respecting emergency plans set out in the Part. The Part 72 license held by the third licensee contains conditions relating to emergency planning with which that licensee must comply.

Sabotage, terrorism, and military attacks are not treated as emergency preparedness issues. The Commission's established practice with respect to dangers of enemy action is that the protection of the United States against hostile enemy acts is a responsibility of the nation's defense establishment and the various agencies having internal security functions. Acts other than military are covered under a planning system included in Subpart H of Part 72, *31654 which contains requirements respecting physical security and safeguards contingency plans that are specifically designed to preclude the occurrence of such acts. The primary purpose of an emergency response plan is to prescribe measures to be taken to mitigate the effects of accidental releases of radioactivity, irrespective of their cause. Thus, in the unlikely event that there should be an accidental release of radioactivity by reason of an act of terrorism or an act of sabotage, protective actions would be taken as prescribed in the emergency response plan, just as they would be taken in the case of accidental release arriving from other causes.

6. Department of Energy as Licensee for the MRS

Comment: Respondents commented on several aspects of the licensing of the Department of Energy for the MRS. One commenter requested that in every instance in which there would be a difference in requirement between the Department and other licensees, that that difference should be specifically defined in Part 72. Other commenters pointed out that the funding for the MRS was from the Nuclear Waste Fund as stipulated in the NWPA and, therefore, the Department should be required, through Part 72, to show how these funds will be adequate for operation and decommissioning. A further commenter questioned the Department's authority pursuant both to Part 72 and its own orders to delegate quality assurance responsibilities to its contractor(s). One commenter suggested that Part 72 should permit revocation or suspension of the Department's license for the MRS since the NRC could not impose civil penalties for license violations.

Response: As discussed in the supplementary information to the proposed revisions to Part 72, the Department of Energy is exempted from certain financial reports, creditor information and financial plans for decommissioning. As pointed out in the comment above, funding for the MRS will be from the Nuclear Waste Fund, separately accountable from public funds. Consistent with the principle of full cost recovery in section 302 of the NWPA (96 Stat. 2257, 42 U.S.C. 10222) this fund will provide all financial resources for the MRS, i.e., licensing, construction, operation and decommissioning. Since DOE is a federal agency and the status of the NWPA waste fund is reported to and reviewed by the Congress yearly, the Commission believes that Congress will as-

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sure that adequate funds are available and appropriated for DOE to carry out its statutory responsibility. Under these circum stances additional NRC oversight is unnecessary and inappropriate.

As to possible conflicts in the licensing and regulatory process between orders and procedures of the Department of Energy and NRC requirements, two government agencies, the commenter provided no specifics and the Commission is not aware of any such conflict. The Department will be provided the same latitude as any other licensee pursuant to § 72.142 (§ 72.101) wherein it is stated that "the licensee may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, but shall retain responsibility for the program."

The Energy Reorganization Act of 1974, as amended, and the Nuclear Waste Policy Act of 1982, as amended, provide that upon authorization by Congress an MRS shall be subject to licensing by the Commission. Accordingly, no exemptions from the provisions of § 72.60 (§ 72.41), "Modification, revocation, and suspension of licenses" and § 72.84 (§ 72.57), "Violation" are shown for the Department. In the exercise of this broad statutory authority and consistent with its customary practice in regulating other Federal licensees, the Commission may impose penalties on the Department if there is sufficient justification. The Commission knows of no other differences between the Department and other licensees for which a change in Part 72 is warranted. (The commenters recommended no specific changes in this area.)

7. Minimum Decay Period (Age) for Receipt of Spent Fuel

Comment: It was noted that there is a seeming discrepancy between the minimum decay period (age) of spent fuel as specified in § 72.2 (one year) and a reference to the environmental analysis in NUREG-1140, "A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees" (five-year decay assumed).

Response: The minimum one-year decay period in § 72.2 is based on assuring the decay of radioisotopes having half-lives on the order of a few days or less. In actuality, the decay periods are likely to be much longer than one year. Accordingly, the NUREG-1140 analyses were based on the more realistic, but still conservative, assumption that five or more years of decay would have taken place for the spent fuel for which an accident in a dry cask was assumed. This is not a discrepancy since different purposes are being served in each instance. In choosing a nominal decay period of 10 years and a five-year minimum decay period in the design parameters for the MRS the Department of Energy (DOE) is merely exercising its own prerogative to use a longer decay criterion for purposes of fuel receipt. Selection of a five-year minimum decay period also reflects DOE's understanding that the spent fuel to be received at the MRS will already have decayed for periods of time likely to be even much greater than five years at individual power reactor sites. The original analysis for Part 72 was based on one-year decay.

8. Physical Security Plan

Comment: A few commenters were concerned about the proposed change in the requirements of the physical security plan for the Department of Energy in that the Department must provide a certification that it will provide at the MRS "such safeguards as it requires at comparable surface DOE facilities to promote the common defense and security."The concerns were that this was an added requirement imposed only on the Department and that there was no definition of what a "comparable" DOE facility would consist of.

Response: For all licensees physical security plans are designed for two purposes: (1) To protect against sabot-

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age and (2) to promote the common defense and security. The change in the requirements of the physical security plan is intended to be consistent with 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," wherein it is recognized that the Department already carries these responsibilities for all of its facilities.

The Department in carrying out its responsibility to promote the common defense and security of all its facilities can best identify the surface DOE facilities to which the MRS is most comparable for purposes of physical security without the unnecessary burden of an NRC definition of "Comparable." Comparability in this context is a function of the kinds and quantities of nuclear materials held at the facilities and the potential consequences of theft or sabotage. However, the NRC staff believes that the Receiving Basin for Off-Site Fuel at the Savannah River Plant may be an appropriately comparable facility.

9. Continous Cask Monitoring Provision

Comment: Several commenters pointed out that the wording of the provision in § 72.122(h)(4) (§ 72.92(h)(4)) for monitoring of storage confinement ***31655** systems was inconsistent with section 141(b)(1)(B) of the NWPA (96 Stat. 2242, 42 U.S.C. 10161(b)(1)(B)) wherein it is required that an MRS facility shall be designed to permit continous monitoring. Another commenter suggested that the State should participate in the monitoring.

Response: The difference in wording between section 141(b)(1)(B) of the NWPA (96 Stat. 2242, 42 U.S.C. 10161(b)(1)(B)) and § 72.122(h)(4) (§ 72.92(h)(4)) was inadvertent. The staff has corrected the wording of § 72.122(h)(4) (§ 72.92(h)(4)) in the final rule to agree with the NWPA. As to State participation in monitoring, this is a matter to be resolved with the Department or as indicated in Response Number 3.

10. Inspection and/or Monitoring

Comment: In § 72.44(c)(3) (§ 72.33(c)(3)) the words "inspection and monitoring" have been changed to "inspection or monitoring."

Response: The proposed change serves no useful purpose. The degree and method of inspection and monitoring will be dependent upon design and operational limits for specific cases. The words "inspection and monitoring" will be reinstated.

11. Foreign Fuel

Comment: One commenter expressed objection to the processing and storage of foreign spent fuel or HLW at the MRS and stated that it should be specifically prohibited.

Response: The reference to foreign fuel in § 72.78 (§ 72.54) of the proposed rule was limited to material transfer report requirements and was not intended either to restrict or to permit such processing or storage. Section 302(a) of the NWPA (96 Stat. 2257, 42 U.S.C. 10222(a)) does specify only "high-level radioactive waste, or spent nuclear fuel of domestic origin" and therefore the reference to foreign fuel at an MRS will be removed.

12. Tornado Missile

Comment: Commenters have disagreed with the deletion of the exemption regarding protection against tornado missile impact, that is, as expressed in the existing rule, "* * * An ISFSI need not be protected from tornado missiles * * *". Another commenter who favors the deletion concerning protection from tornado missiles would

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also have the restriction limiting its scope to "* * * structures, systems, and components important to safety" deleted.

Response: The explanation of the exemption for tornado missiles, set out in the preamble of the existing rule (45 FR 74693, November 12, 1980) states that radionuclide releases from spent fuel which has undergone at least a year of radioactive decay would not be significant in the event of tornado missile impact, citing an accident evaluation from NUREG-0575 "Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuels" with gaseous radionuclide releases from water pool storage. With the continuing development of dry storage technologies, which include metal casks, concrete silos, dry wells, and air-cooled vaults, the Commission decided the designs should take into account tornado missile protection, unless it is shown that tornado missiles will not have any effect on structures, systems and components important to safety. While offsite gaseous release impacts from fuel rod rupture due to a tornado missile incident would remain insignificant, it is important to assure that design criteria for dry storage designs continue to address maintaining confinement of particulate material. All safety reviews for storage licensed under Part 72, both water pool and dry storage, have evaluated designs with respect to tornado missile impact. Since safety considerations drive the concern with respect to the tornado missile phenomenon, it is not necessary to expand that concern beyond "structures, systems, and components important to safety."

13. Use of Part 50 Criteria

Comment: To expedite the licensing process for facilities proposed on sites which currently possess a 10 CFR Part 50 license, it was proposed that the applicable siting evaluation factors and general design criteria which have been reviewed and approved by the NRC for the Part 50 license be directly adopted for the Part 72 facility without additional review, hearings or approvals. Adequate reviews and approvals have been completed, and any change to those previously approved should be treated as a backfit.

Response: The storage of an increased amount of spent fuel on a reactor site, over that covered under an existing Part 50 license, requires staff action through safety and environmental reviews. In taking this action to authorize additional storage capacity for spent fuel, the staff will apply criteria from Part 50 or Part 72, depending on the type of licensing action being sought. Licensing action for an ISFSI would use criteria contained in Part 72 and Part 50 would be used for amending an existing reactor license. Storage of spent fuel on a reactor site outside of an existing reactor basin is already regulated under the criteria of Part 72 and these criteria have been used in reviewing applications for additional fuel storage at reactor sites.

14. Cladding

Comment: Opposition is expressed to any lowering of fuel cladding protection, as provided for in the existing $\frac{1}{2,122(h)(1)}$ ($\frac{1}{2,22(h)(1)}$).

Response: The revision of this provision (i.e., § 72.122(h)(1) (§ 72.92(h)(1))) addressed confinement of fuel material, which is the purpose of protecting the fuel cladding. The revised provision specifically provides for additional alternative means of accomplishing this objective. This serves to enhance confinement protection capability rather than diminish it.

15. Rod Consolidation

Comment: Comments were received concerning the Department of Energy's plan to consolidate rods from spent

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Response: Rod consolidation is the most elaborate operation contemplated for the MRS. The Department of Energy in its proposal and elsewhere has indicated its intention to fully develop the rod consolidation process for installation and operation. The rod consolidation system must meet all applicable portions of the general design criteria. There is no precedent for the preparation of an environmental impact statement in connection with a single system of a facility for which a complete environmental impact statement will be prepared. The aspect of rod consolidation will be covered in that statement, as well as in the safety review and evaluation by the staff in connection with the application for an MRS. The NRC does expect to be kept informed by the Department of its developmental activities prior to receipt of an application.

The insertion of the word "chemically" as suggested has been accepted by the staff for the final rule.

*31656 16. Accident Analysis For Two Barriers

Comment: A comment was received regarding engineered barriers such as canisters, "* * the design basis accident scenario (i.e., release of gap activity from all fuel contained in a dry cask) should be revised to account for cases in which canister or other engineered barriers are incorporated."

Response: Most cask designs do not incorporate canistering of spent fuel assemblies. Therefore, for purposes of this rulemaking, choice of a lesser accident scenario assuming canistering is not appropriate for a bounding analysis. In a safety review involving a specific design, which incorporates an additional engineered barrier, the design basis accident scenario should, of course, consider this addition in the review analysis.

17. Records

Comment: Comments were received concerning archiving of records; by whom and how long?

Response: The proposed rule is consistent with current NRC policy concerning retention periods for records. The specific details of their physical storage is action taken at time of licensing.

18. Operator Safety

Comment: Comments were received concerning design for ALARA.

Response: The licensee is responsible for meeting the requirements of 10 CFR Part 20 "Standards for Protection Against Radiation," and all its provisions for maintaining ALARA. In addition § 72.24 (§ 72.15) Contents of Application: Technical Information requires applicants for a license to supply information for maintaining ALARA for occupational exposure.

19. MRS Collocation with Waste Repository

Comment: Commenter suggested expanding limitation for collocation with repository to include other facilities.

Response: The collocation restrictions in § 72.96 (§ 72.75) are specifically included in order to comply with sec-

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tions 141(g) and 145(g) of the NWPA (96 Stat. 2243, 42 U.S.C. 10161(g); 101 Stat. 1330-235, 42 U.S.C. 10165(g)). (See also section 135(a)(2), 96 Stat. 2232, 42 U.S.C. 10155(a)(2).)

20. MRS Collocation with Other Nuclear Facilities

Comment: Commenter was concerned about other nuclear facilities that are not licensed.

Response: The licensing process considers all activities and facilities, licensed or unlicensed, that could increase the probability or consequences of safety significant events at licensed facilities.

21. Definition of High-Level Radioactive Waste

Comment: Some commenters noted that the definition of "high-level radioactive waste" used in Part 72 was not the same as the definition used in 10 CFR Part 60 and expressed the view that the two definitions should be consistent.

Response: Since it was first promulgated in November 1980 for the purpose of establishing licensing requirements for the storage of spent fuel in an independent spent fuel storage installation, Part 72, unlike Part 60, has always contained a separate definition of spent fuel. In revising Part 72 to provide for licensing the storage of spent fuel and high-level radioactive waste in an MRS, the Commission has revised the definition of spent fuel to conform more closely to the definition set out in section 2(23) of the Nuclear Waste Policy Act of 1982, as amended (96 Stat. 2204, 42 U.S.C. 10101(23)). The Commission has also amended § 72.3 by adding a definition of "high-level radioactive waste" which conforms to the language used in section 2(12) of that Act (42 U.S.C. 10101(12)). The definitions of spent fuel and high-level radioactive waste used in Part 72, though not identical to the definition of high-level radioactive waste used in 10 CFR Part 60 which encompasses "irradiated reactor fuel," are not inconsistent with that definition. It should be noted, however, that as explained in the Commission's advance notice of proposed rulemaking relating to the definition of high-level radioactive waste (52 FR 5992, February 27, 1987), the definition of high-level radioactive waste used in Part 60 serves a jurisdictional function, specifically identification of the class of Department of Energy facilities that, under section 202 of the Energy Reorganization Act of 1974 (42 U.S.C. 5842) are subject to the licensing and related regulatory authority of the Commission.

22. High Level Liquid Waste

Comment: Several commenters were concerned about the storage of liquid High-Level Waste (HLW).

Response: The MRS will be designed and licensed for the storage of irradiated fuel and solidified waste from the processing of fuel. The MRS will not receive liquid HLW and the form of the solid waste stored will be that which is compatible with the requirements for permanent disposal in a repository.

Any liquid wastes generated at the MRS will be handled in accordance with existing regulations.

23. Quality Assurance—Quality Control

Comment: Comments were associated with the apparent difference between the quality assurance criteria proposed and the previous quality assurance criteria.

Response: The proposed rule quality assurance subpart was written to incorporate the previously referenced 10

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CFR Part 50, Appendix B quality assurance criteria specifically into Part 72. There was no intent to change the criteria. Minor conforming changes have been made in the final rule.

24. Criticality

Comment: A comment was received concerning the removal of the requirement for verifying continued efficacy of solid neutron poisons.

Response: Several changes have been made to the criticality section of the final rule to make it correspond to other Parts of the Commission's regulations and standard criticality review practices. Verification of solid neutron poisons has been retained. Double contingency criteria and requirements for criticality monitors have been added. It is not the intent of the revision concerning criticality monitors to require monitors in the open areas where loaded casks are positioned for storage as that system is static. Monitors are required where the systems are dynamic.

25. MRS Storage Capacity

Comment: Commenters questioned the MRS storage capacity as stated in the proposed rule in \$ 72.1 and 72.96 (\$ 72.1 and 72.75).

Response: In the proposed rule, MRS storage capacity values are based on the NWPA, as approved by Congress. (See section 135(a)(1)(A), 96 Stat. 2232, 42 U.S.C. 10155(a)(1)(A) and section 114(d), 96 Stat. 2215 as amended by 101 Stat. 1330-230, 42 U.S.C. 10134(d) and section 141(g), 96 Stat. 2243, 42 U.S.C. 10161(g)). In addition, the Nuclear Waste Policy Amendments Act of 1987 provides that the MRS authorized by section 142(b) of NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)) shall be subject to the storage capacity limits specified in sections 148(d) (3) and (4) (101 Stat. 1330-236, 42 U.S.C. 10168(d)(3) and (4)). These requirements have been incorporated in new § 72.44(g) which has been added to the final rule.

*31657 26. The Term—"Temporary Storage"

Comment: Comments objected to the removal of the term "Temporary Storage" from § 72.3 Definitions and the removal of the word "temporary" from § 72.2 Scope.

Response: In making these changes, the Commission does not intend to change the scope of Part 72 which relates to the licensing of ISFSI and MRS for the purpose of storage only. Part 72 does not nor is it intended to cover permanent disposal. Accordingly, use of the word "temporary" in the rule is non-definitive and unneces- sary

27. MRS Rule Making

Comment: Many commenters (approximately 150), through the use of form letters or paraphrasing, did not want the MRS in Tennessee, did not support any form of rulemaking until Congress had authorized the MRS through funding appropriation, and made reference to "license it twice."

Response: The Nuclear Waste Policy Amendments Act of 1987 authorizes the Department of Energy to site, construct and operate one MRS and prescribes procedures for the selection of an appropriate site. The Act expressly annuls and revokes the Department's proposal "to locate a monitored retrievable storage facility at a site on the Clinch River in the Roane County portion of Oak Ridge, Tennessee, with alternative sites on the Oak

Ridge Reservation of the Department of Energy and on the former site of a proposed nuclear powerplant in Hartsville, Tennessee * * *" (Section 142(a), 101 Stat. 1330-232, 42 U.S.C. 10162(a)). The Commission's regulations are promulgated to permit the Commission to carry out its mandate of providing for the health and safety of the public. Except for the siting limitations in § 72.96 (§ 72.75) of the final rule, which, among other things, prohibits an MRS authorized by section 142(b) of NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)) from being constructed in Nevada, the Commission's regulations are silent on the location of an MRS. The "license it twice" concept is addressed in Response Number 2.

28. Increase of Licensing Period for the MRS

Comment: Comments questioned the Commission's basis, as described in the statement of considerations for the proposed changes to Part 72, for providing a longer license term for an MRS (40 years) than for an ISFSI (20 years). Comments also included (1) the term should start with the receipt of spent fuel, and (2) ISFSI should also have a 40-year license term. Further explanation of the basis for the license term was also requested. All of the commenters seemed to concentrate on a license for the spent fuel rather than a license covering a facility for storage.

Response: An MRS as described in the NWPA is intended for storage, but nor necessarily for the same fuel since fuel will continually be moved in and out over the life of the facility in concert with operation of a repository. A longer license term is therefore appropriate for an MRS considering the purpose and mode of operation of the facility.

In contrast to the MRS, the spent fuel stored in an ISFSI at reactor sites or elsewhere will be collected until the Department of Energy waste disposal system is ready for its receipt. The current schedule indicates that this transfer from reactor sites to an MRS could begin to occur within about 10 years. The Commission has in place a license renewal process for ISFSI storage which provides an opportunity for extension of the 20-year license term, with staff reevaluation of safety and environmental aspects of the operation. In any event the systematic inspection program of the Commission wherein the licensee's adherence to all license conditions and technical specifications is continually being examined applies to both MRS and ISFSI storage over the entire period of a license. The Commission will provide a 40-year license term for an MRS in the final rule.

On December 22, 1987, the Nuclear Waste Policy Amendments Act of 1987 (Subtitle A of Title V of the Omnibus Budget Reconciliation Act for Fiscal Year 1988; Pub. L. 100-203, 101 Stat. 1330-227) was approved by the President and became public law. The 1987 amendments authorized the Secretary of the Department of Energy to site, construct and operate one monitored retrievable storage facility subject to certain statutory conditions (sec. 142(b), 101 Stat. 1330-232, 42 U.S.C. 10162(b)). As a result of these changes in the statute, it has been necessary to make certain conforming changes in the text of the final rule. Most of the changes are minor in nature. For example, references have been added to the authority section and conforming changes have been made in the following sections of the rule: §§ 72.22(d)(5), 72.40(b), 72.90(c) and 72.96(d) (§§ 72.14(d)(5), 72.31(b), 72.70(e) and 72.75(d)). A new paragraph (g) has been added to § 72.44 (§ 72.33), License conditions, to incorporate into the Commission's regulations the specific statutory conditions (see sec. 148(d) of the NWPA, 101 Stat. 1330-236, 42 U.S.C. 10168(d)) which must be included in a Commission license for the monitored retrievable storage installation authorized pursuant to section 142(b) of the NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)). For an explanation of these conditions, see 133 Cong. Rec. H11973-75 and S18683-84 (daily ed. December 21, 1987).

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Having considered all of the above, the Commission has determined that a final rule be promulgated. The text of the final rule has some changes as noted from the proposed rule.

Finding of No Significant Environmental Impact

The Commission has determined not to prepare an environmental impact statement for the proposed amendments to 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste."

NUREG-0575, "Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," August 1979, was issued in support of the final rule promulgating 10 CFR Part 72. "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation ISF-SI)," which became effective November 28, 1980. On January 7, 1983, the Nuclear Waste Policy Act of 1982 was signed into law. On December 22, 1987, the Act was amended by the Nuclear Waste Policy Amendments Act of 1987 (Pub. L. 100-203, Title V, Subtitle A, 101 Stat. 1330-227). Section 142(b) of the amended Act (101 Stat. 1330-232, 42 U.S.C. 10162(b)) authorized the Secretary of the Department of Energy to site, construct and operate one MRS. NWPA also established procedures which a State or an Indian tribe may use to negotiate an agreement with the Federal Government under which the State or Indian tribe would agree to host an MRS within the State or reservation. Following enactment of legislation to implement the negotiated agreement, the Secretary of the Department of Energy could proceed to evaluate appropriate sites. As in the case of the MRS authorized by section 142(b) of NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)), DOE must also obtain an NRC license for an MRS authorized by Congress pursuant to a negotiated agreement. The NRC staff has concluded that although existing 10 CFR Part 72 is generally applicable to the design, construction, operation, and decommissioning of MRS, additions are necessary to explicitly cover the licensing of spent nuclear fuel and high-level radioactive waste storage in an MRS. In August 1984, the NRC published *31658 an environmental assessment for this proposed revision of Part 72, NUREG-1092, "Environmental Assessment for 10 CFR Part 72, Licensing Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste."NUREG-1092 discusses the major issues of the rule and the potential impact on the environment. The findings of the environmental assessment are "(1) past experience with water pool storage of spent fuel establishes the technology for long-term storage of spent fuel without affecting the health and safety of the public, (2) the proposed rulemaking to include the criteria of 10 CFR Part 72 for storing spent nuclear fuel and high-level radioactive waste does not significantly affect the environment, (3) solid high-level waste is comparable to spent fuel in its heat generation and in its radioactive material content on a per metric ton basis, and (4) knowledge of material degradation mechanisms under dry storage conditions and the ability to institute repairs in a reasonable manner without endangering the health [and safety] of the public shows dry storage technology options do not significantly impact the environment."The assessment concludes that, among other things, there are no significant environmental impacts as a result of promulgation of these revisions of 10 CFR Part 72.

Based on the above assessment the Commission concludes that the rulemaking action will not have a significant incremental environmental impact on the quality of the human environment.

Paperwork Reduction Act Statement

This final rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). These requirements were approved by the Office of Management and Budget approval number 3150-0132.

Regulatory Analysis

The NRC has prepared a regulatory analysis on this final rule. The analysis examines the benefits and alternatives considered by the NRC. The analysis is available for inspection in the NRC Public Document Room, 1717 H Street NW., Washington, DC. Single copies of the analysis may be obtained from C.W. Nilsen, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555 (301-492-3834).

Regulatory Flexibility Certification

In accordance with the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)), the Commission certifies that this rule will not have a significant economic impact on a substantial number of small entities. This final rule affects only the licensing and operation of independent spent fuel storage installations and of monitored retrievable storage installations. The owners of these installations, nuclear power plant utilities or DOE, do not fall within the scope of the definition of "small entities" set forth in section 601(3) of the Regulatory Flexibility Act or within the definition of "small business" in section 3 of the Small Business Act, 15 U.S.C. 632, or within the Small Business Size Standards set out in regulations issued by the Small Business Administration at 13 CFR Part 121.

List of Subjects

10 CFR Part 2

Administrative practice and procedure, Antitrust, Byproduct material, Classified information, Environmental protection, Nuclear materials, Nuclear power plants and reactors, Penalty, Sex discrimination, Source material, Special nuclear material, Waste treatment and disposal.

10 CFR Part 19

Environmental protection, Nuclear materials, Nuclear power plants and reactors, Occupational safety and health, Penalty, Radiation protection, Reporting and recordkeeping requirements, Sex discrimination.

10 CFR Part 20

Byproduct material, Licensed material, Nuclear materials, Nuclear power plants and reactors, Occupational safety and health, Packaging and containers, Penalty, Radiation protection, Reporting and recordkeeping requirements, Special nuclear material, Source material, Waste treatment and disposal.

10 CFR Part 21

Nuclear power plants and reactors, Penalty, Radiation protection, Reporting and recordkeeping requirements.

10 CFR Part 51

Administrative practice and procedure, Environmental impact statement, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

10 CFR Part 70

Hazardous materials-transportation, Material control and accounting, Nuclear materials, Packaging and con-

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tainers, Penalty, Radiation protection, Reporting and recordkeeping requirements, Scientific equipment, Security measures, Special nuclear material.

10 CFR Part 72

Manpower training programs, Nuclear materials, Occupational safety and health, Reporting and recordkeeping requirements, Security measures, Spent fuel.

10 CFR Part 73

Hazardous materials—transportation, Incorporation by reference, Nuclear materials, Nuclear power plants and reactors, Penalty, Reporting and recordkeeping requirements, Security measures.

10 CFR Part 75

Intergovernmental relations, Nuclear materials, Nuclear power plants and reactors, Penalty, Reporting and recordkeeping requirements, Security measures.

10 CFR Part 150

Hazardous materials—transportation, Intergovernmental relations, Nuclear materials, Penalty, Reporting and recordkeeping requirements, Security measures, Source material, Special nuclear material.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, 5 U.S.C. 552 and 553, and the Nuclear Waste Policy Act of 1982, as amended, the NRC is adopting the following revision to 10 CFR Part 72 and related conforming amendments to 10 CFR Parts 2, 19, 20, 21, 51, 70, 73, 75, and 150

1. 10 CFR Part 72 is revised to read as follows:

PART 72—LICENSING REQUIREMENTS FOR THE INDEPENDENT STORAGE OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTESubpart A—General Provisions

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72.2 Scope.

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72.8 Denial of licensing by Agreement States.

72.9 Information collection requirements: OMB approval.

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72.160 Licensee inspection.

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Authority: Secs. 51, 53, 57, 62, 63, 65, 69, 81, 161, 182, 183, 184, 186, 187, 189, 68 Stat. 929, 930, 932, 933, 934, 935, 948, 953, 954, 955, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2071, 2073, 2077, 2092, 2093, 2095, 2099, 2111, 2201, 2232, 2233, 2234, 2236, 2237, 2238, 2282); sec. 274, Pub. L. 86-373, 73 Stat. 688, as amended (42 U.S.C. 2021); sec. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846); Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332); secs. 131, 132, 133, 135, 137, 141, Pub. L. 97-425, 96 Stat. 2229, 2230, 2232, 2241, sec. 148, Pub. L. 100-203, 101 Stat. 1330-235 (42 U.S.C. 10151, 10152, 10153, 10155, 10157, 10161, 10168).

Section 72.44(g) also issued under secs. 142(b) and 148 (c), (d), Pub. L. 100-203, 101 Stat. 1330-232, 1330-236 (42 U.S.C. 10162(b), 10168 (c), (d)). Section 72.46 also issued under sec. 189, 68 Stat. 955 (42 U.S.C. 2239); sec. 134, Pub. L. 97-425, 96 Stat. 2230 (42 U.S.C. 10154). Section 72.96(d) also issued under sec. 145(g), Pub. L. 100-203, 101 Stat. 1330-235 (42 U.S.C. 10165(g)). Subpart J also issued under secs. 2(2), 2(15), 2(19), 117(a), 141(h), Pub. L. 97-425, 96 Stat. 2202, 2203, 2204, 2222, 2244 (42 U.S.C. 10101, 10137(a), 10161(h)).

10 CFR § 72.6
10 CFR § 72.22
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10 CFR § 72.26
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For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273); §§ 72.6, 72.22, 72.24, 72.26, 72.28(d),

72.30, 72.32, 72.44 (a)(b)(1), (4), (5), (c), (d)(1), (2), (e), (f), 72.48(a), 72.50(a), 72.52(b), 72.72 (b), (c), 72.74 (a)(b), 72.76, 72.78, 72.104, 72.106, 72.120, 72.122, 72.124, 72.126, 72.128, 72.130, 72.140 (b), (c), 72.148, 72.156, 72.160, 72.166, 72.168, 72.170, 72.172, 72.176, 72.180, 72.184, 72.186 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); § 72.10 (a), (e), 72.22, 72.24, 72.26, 72.28, 72.30, 72.32, 72.44 (a), (b)(1), (4), (5), (c), (d)(1), (2)(e), (f), 72.48(a), 72.50(a), 72.52(b), 72.90 (a)-(d), (f), 72.92, 72.94, 72.98, 72.100, 72.102 (c), (d), (f), 72.104, 72.106, 72.120, 72.122, 72.124, 72.126, 72.128, 72.130, 72.140 (b), (c), 72.142, 72.144, 72.146, 72.148, 72.150, 72.152, 72.154, 72.156, 72.158, 72.160, 72.162, 72.164, 72.166, 72.168, 72.170, 72.172, 72.176, 72.180, 72.182, 72.184, 72.186, 72.190, 72.192, 72.194 are issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201(i)); and § 72.10(e), 72.11, 72.16, 72.22, 72.24, 72.26, 72.28, 72.30, 72.32, 72.34, (b)(3), (c)(5), (d)(3), (c), (f), 72.48 (b), (c), 72.50(b), 72.54 (a), (b), (c), 72.56, 72.70, 72.72, 72.74 (a), (b), 72.76(a), 72.78(a), 72.80, 72.82, 72.92(b), 72.94(b), 72.140 (b), (c), (d), 72.144(a), 72.146, 72.148, 72.156, 72.166, 72.152, 72.154 (a), (b), 72.152, 72.154 (a), (b), 72.152, 72.154 (a), (b), 72.152, 72.154 (a), (b), 72.164, 72.146, 72.148, 72.156, 72.150, 72.152, 72.144 (b)(3), (c)(5), (d)(3), (c), (f), 72.48 (b), (c), 72.50(b), 72.54 (a), (b), (c), 72.56, 72.70, 72.72, 72.74 (a), (b), 72.76(a), 72.78(a), 72.82, 72.92(b), 72.94(b), 72.140 (b), (c), (d), 72.144(a), 72.146, 72.148, 72.156, 72.150, 72.152, 72.154 (a), (b), 72.152, 72.154 (a), (b), 72.156, 72.160, 72.162, 72.168, 72.170, 72.172, 72.174, 72.176, 72.180, 72.184, 72.186, 72.192 are issued under sec. 1610, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

Subpart A-General Provisions10 CFR § 72.1

§ 72.1 Purpose.

The regulations in this part establish requirements, procedures, and criteria for the issuance of licenses to receive, transfer, and possess power reactor spent fuel and other radioactive materials associated with spent fuel storage in an independent spent fuel storage installation (ISFSI) and the terms and conditions under which the Commission will issue such licenses, including licenses to the U.S. Department of Energy (DOE) for the provision of not more than 1900 metric tons of spent fuel storage capacity at facilities not owned by the Federal Government on January 7, 1983 for the Federal interim storage program under Subtitle B—Interim Storage Program of the Nuclear Waste Policy Act of 1982 (NWPA). The regulations in this part also establish requirements, procedures, and criteria for the issuance of licenses to DOE to receive, transfer, package, and possess power reactor spent fuel, high-level radioactive waste, and other radioactive materials associated with the spent fuel and highlevel radioactive waste storage, in a monitored retrievable storage installation (MRS).

10 CFR § 72.2

*31660 § 72.2 Scope.

(a) Except as provided in § 72.6(b), licenses issued under this part are limited to the receipt, transfer, packaging, and possession of:

(1) Power reactor spent fuel to be stored in a complex that is designed and constructed specifically for storage of power reactor spent fuel aged for at least one year, and other radioactive materials associated with spent fuel storage in an independent spent fuel storage installation (ISFSI); or

(2) Power reactor spent fuel to be stored in a monitored retrievable storage installation (MRS) owned by DOE that is designed and constructed specifically for the storage of spent fuel aged for at least one year, high-level radioactive waste that is in a solid form, and other radioactive materials associated with spent fuel or high/level radioactive waste storage.

The term "Monitored Retrievable Storage Installation" or "MRS," as defined § 72.3, is derived from the NWPA and includes any installation that meets this definition.

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(b) The regulations in this part pertaining to an independent spent fuel storage installation (ISFSI) apply to all persons in the United States, including persons in Agreement States. The regulations in this part pertaining to a monitored retrievable storage installation (MRS) apply only to DOE.

(c) The requirements of this regulation are applicable, as appropriate, to both wet and dry modes of storage of (1) spent fuel in an independent spent fuel storage installation (ISFSI) and (2) spent fuel and solid high-level radioactive waste in a monitored retrievable storage installation (MRS).

(d) Licenses covering the storage of spent fuel in an existing spent fuel storage installation shall be issued in accordance with the requirements of this part as stated in § 72.40, as applicable.

(e) As provided in section 135 of the Nuclear Waste Policy Act of 1982, Pub. L. 97-425, 96 Stat. 2201 at 2232 (42 U.S.C. 10155) the U.S. Department of Energy is not required to obtain a license under the regulations in this part to use available capacity at one or more facilities owned by the Federal Government on January 7, 1983, including the modification and expansion of any such facilities, for the storage of spent nuclear fuel from civilian nuclear power reactors.

10 CFR § 72.3

§ 72.3 Definitions.

As used in this part:

"Act" means the Atomic Energy Act of 1954 (68 Stat. 919) including any amendments thereto.

"Affected Indian tribe" means any Indian tribe-

(1) Within whose reservation boundaries a monitored retrievable storage facility is proposed to be located;

(2) Whose federally defined possessory or usage rights to other lands outside of the reservation's boundaries arising out of congressionally ratified treaties may be substantially and adversely affected by the locating of such a facility: Provided, That the Secretary of the Interior finds, upon the petition of the appropriate governmental officials of the tribe, that such effects are both substantial and adverse to the tribe.

"Affected unit of local government" means any unit of local government with jurisdiction over the site where an MRS is proposed to be located.

"As low as is reasonably achievable" (ALARA) means as low as is reasonably achievable taking into account the state of technology, and the economics of improvement in relation to—

(1) Benefits to the public health and safety,

(2) Other societal and socioeconomic considerations, and

(3) The utilization of atomic energy in the public interest.

"Atomic energy" means all forms of energy released in the course of nuclear fission or nuclear transformation.

"Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radio-

active by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

"Commencement of construction" means any clearing of land, excavation, or other substantial action that would adversely affect the natural environment of a site, but does not mean:

(1) Changes desirable for the temporary use of the land for public recreational uses, necessary borings or excavations to determine subsurface materials and foundation conditions, or other preconstruction monitoring to establish background information related to the suitability of the site or to the protection of environmental values;

(2) Construction of environmental monitoring facilities;

(3) Procurement or manufacture of components of the installation; or

(4) Construction of means of access to the site as may be necessary to accomplish the objectives of paragraphs (1) and (2) of this definition.

"Commission" means the Nuclear Regulatory Commission or its duly authorized representatives.

"Confinement systems" means those systems, including ventilation, that act as barriers between areas containing radioactive substances and the environment.

"Controlled area" means that area immediately surrounding an ISFSI or MRS for which the licensee exercises authority over its use and within which ISFSI or MRS operations are performed.

"Decommission" means to remove (as a facility) safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of license.

"Design bases" means that information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be restraints derived from generally accepted "state-of-the-art" practices for achieving functional goals or requirements derived from analysis (based on calculation or experiments) of the effects of a postulated event under which a structure, system, or component must meet its functional goals. The values for controlling parameters for external events include: (1) Estimates of severe natural events to be used for deriving design bases that will be based on consideration of historical data on the associated parameters, physical data, or analysis of upper limits of the physical processes involved and (2) estimates of severe external man-induced events to be used for deriving design bases that will be based on analysis of human activity in the region taking into account the site characteristics and the risks associated with the event.

"Design capacity" means the quantity of spent fuel or high-level radioactive waste, the maximum burnup of the spent fuel in MWD/MTU, the curie content of the waste, and the total heat generation in BTU per hour that the storage installation is designed to accommodate.

"DOE" means the U.S. Department of Energy or its duly authorized representatives.

"Floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands. Areas subject to a one percent or greater chance of flooding in any given year are included.

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"High-level radioactive waste" or "HLW" means (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; *31661 and (2) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.

"Historical data" means a compilation of the available published and unpublished information concerning a particular type of event.

"Independent spent fuel storage installation" or "ISFSI" means a complex designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. An ISFSI which is located on the site of another facility may share common utilities and services with such a facility and be physically connected with such other facility and still be considered independent: Provided, that such sharing of utilities and services or physical connections does not: (1) Increase the probability or consequences of an accident or malfunction of components, structures, or systems that are important to safety; or (2) reduce the margin of safety as defined in the basis for any technical specification of either facility.

"Indian Tribe" means an Indian tribe as defined in the Indian Self Determination and Education Assistance Act (Pub. L. 93-638).

"Monitored Retrievable Storage Installation" or "MRS" means a complex designed, constructed, and operated by DOE for the receipt, transfer, handling, packaging, possession, safeguarding, and storage of spent nuclear fuel aged for at least one year and solidified high-level radioactive waste resulting from civilian nuclear activities, pending shipment to a HLW repository or other disposal.

"NEPA" means the National Environmental Policy Act of 1969 including any amendments thereto.

"NWPA" means the Nuclear Waste Policy Act of 1982 including any amendments thereto.

"Person" means---

(1) Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the Commission or the Department of Energy (DOE), except that the DOE shall be considered a person within the meaning of the regulations in this part to the extent that its facilities and activities are subject to the licensing and related regulatory authority of the Commission pursuant to section 202 of the Energy Reorganization Act of 1974, as amended (88 Stat. 1244), and Sections 131, 132, 133, 135, 137, and 141 of the Nuclear Waste Policy Act of 1982 (96 Stat. 2229, 2230, 2232, 2241);

(2) Any State, any political subdivision of a State, or any political entity within a State;

(3) Any foreign government or nation, or any political subdivision of any such government or nation, or other entity; and

(4) Any legal successor, representative, agent, or agency of the foregoing.

"Population" means the people that may be affected by the change in environmental conditions due to the construction, operation, or decommissioning of an ISFSI or MRS.

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"Region" means the geographical area surrounding and including the site, which is large enough to contain all the features related to a phenomenon or to a particular event that could potentially impact the safe or environmentally sound construction, operation, or decommissioning of an independent spent fuel storage or monitored retrievable storage installation.

"Reservation" means-

(1) Any Indian reservation or dependent Indian community referred to in clause (a) or (b) of section 1151 of title 18, United States Code; or

(2) Any land selected by an Alaska Native village or regional corporation under the provisions of the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.).

"Site" means the real property on which the ISFSI or MRS is located.

"Source material" means-

(1) Uranium or thorium, or any combination thereof, in any physical or chemical form or

(2) Ores that contain by weight one-twentieth of one percent (0.05%) or more of:

(i) Uranium,

(ii) Thorium, or

(iii) Any combination thereof.

Source material does not include special nuclear material.

"Special nuclear material" means-

(1) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 51 of the 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.

"Spent Nuclear Fuel" or "Spent Fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year's decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.

"Structures, systems, and components important to safety" mean those features of the ISFSI or MRS whose function is:

(1) To maintain the conditions required to store spent fuel or high-level radioactive waste safely,

(2) To prevent damage to the spent fuel or the high-level radioactive waste container during handling and stor-

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age, or

(3) To provide reasonable assurance that spent fuel or high-level radioactive waste can be received, handled, packaged, stored, and retrieved without undue risk to the health and safety of the public.

10 CFR § 72.4

§ 72.4 Communications.

Except where otherwise specified, all communications and reports concerning the regulations in this part and applications filed under them should be addressed to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Communications, reports, and applications may be delivered in person at the Commission's Offices at 11555 Rockville Pike, Rockville, Maryland, or at 1717 H Street NW., Washington, DC.

10 CFR § 72.5

§ 72.5 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by an officer or employee of the Commission, other than a written interpretation by the General Counsel, will be recognized to be binding upon the Commission.

10 CFR § 72.6

§ 72.6 License required; types of licenses.

(a) Licenses for the receipt, handling, storage, and transfer of spent fuel or high-level radioactive waste are of two types: general and specific. Any general license provided in this part is effective without the filing of an application with the Commission or the issuance of a licensing document to a particular person. A specific license is issued to a named person upon application filed pursuant to regulations in this part.

(b) A general license is hereby issued to receive title to and own spent fuel or high-level radioactive waste without regard to quantity. Notwithstanding any other provision of this chapter, a general licensee under this paragraph is not authorized to acquire, deliver, receive, *31662 possess, use, or transfer spent fuel or high-level radioactive waste except as authorized in a specific license.

(c) Except as authorized in a specific license issued by the Commission in accordance with the regulations in this part, no person may acquire, receive, or possess—

(1) Spent fuel for the purpose of storage in an ISFSI; or

(2) Spent fuel, high-level radioactive waste, or radioactive material associated with high-level radioactive waste for the purpose of storage in an MRS.

10 CFR § 72.7

§ 72.7 Specific exemptions.

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The Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

10 CFR § 72.8

§ 72.8 Denial of licensing by Agreement States.

Agreement States may not issue licenses covering the storage of spent fuel in an ISFSI or the storage of spent fuel and high-level radioactive waste in an MRS.

10 CFR § 72.9

§ 72.9 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). OMB has approved the information collection requirements contained in this part under control number 3150-0132.

(b) The approved information collection requirements contained in this part appear in §§ 72.16, 72.22 through 72.34, 72.42, 72.44, 72.48 through 72.56, 72.62, 72.70 through 72.82, 72.90, 72.92, 72.94, 72.98, 72.100, 72.102, 72.104, 72.108, 72.120, 72.126, 72.140 through 72.176 72.180 through 72.186, and 72.192.

10 CFR § 72.10

§ 72.10 Employee protection.

(a) Discrimination by a Commission licensee, an applicant for a Commission license, or a contractor or subcontractor of a Commission licensee or applicant against an employee for engaging in certain protected activities is prohibited. Discrimination includes discharge and other actions that relate to compensation, terms, conditions, and privileges of employment. The protected activities are established in section 210 of the Energy Reorganization Act of 1974, as amended, and in general are related to the administration or enforcement of a requirement imposed under the Atomic Energy Act of 1954, as amended, or the Energy Reorganization Act.

(1) The protected activities include but are not limited to-

(i) Providing the Commission information about possible violations of requirements imposed under either of the above statutes;

(ii) Requesting the Commission to institute action against his or her employer for the administration or enforcement of these requirements; or

(iii) Testifying in any Commission proceeding.

(2) These activities are protected even if no formal proceeding is actually initiated as a result of the employee assistance or participation.

(3) This section has no application to any employee alleging discrimination prohibited by this section who, act-

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ing without direction from his or her employer (or the employer's agent), deliberately causes a violation of any requirement of the Energy Reorganization Act of 1974, as amended, or the Atomic Energy Act of 1954, as amended.

(b) Any employee who believes that he or she has been discharged or otherwise discriminated against by any person for engaging in the protected activities specified in paragrph (a)(1) of this section may seek a remedy for the discharge or discrimination through an administrative proceeding in the Department of Labor. The administrative proceeding must be initiated within 30 days after an alleged violation occurs by filing a complaint alleging the violation with the Department of Labor, Employment Standards Administration, Wage and Hour Division. The Department of Labor may order reinstatement, back pay, and compensatory damages.

(c) A violation of pa

ragraph (a) of this section by a Commission licensee, an applicant for a Commission license, or a contractor or subcontractor of a Commission licensee or applicant may be grounds for—

(1) Denial, revocation, or suspension of the license.

(2) Imposition of a civil penalty on the licensee or applicant.

(3) Other enforcement action.

(d) Actions taken by an employer, or others, which adversely affect an employee may be predicated upon nondiscriminatory grounds. The prohibition applies when the adverse action occurs because the employee has engaged in protected activities. An employee's engagement in protected activities does not automatically render him or her immune from discharge or discipline for legitimate reasons or from adverse action dictated by nonprohibited considerations.

(e)(1) Each licensee and each applicant shall post Form NRC-3, "Notice to Employees," on its premises. Posting must be at location sufficient to permit employees protected by this section to observe all copy on the way to or from their place of work. Premises must be posted no later than 30 days after an application is docketed and remain posted while the application is pending before the Commission, during the term of the license, and for 30 days following license termination.

(2) Copies of Form NRC-3 may be obtained by writing to the Regional Administrator of the appropriate U.S. Nuclear Regulatory Commission Regional Office listed in Appendix A, Part 73 of this chapter or the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

10 CFR § 72.11

§ 72.11 Completeness and accuracy of information.

(a) Information provided to the Commission by an applicant for a license or by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the applicant or the licensee shall be complete and accurate in all material respects.

(b) Each applicant or licensee shall notify the Commission of information identified by the applicant or licensee as having for the regulated activity a significant implication for public health and safety or common defense and

security. An applicant or licensee violates this paragraph only if the applicant or licensee fails to notify the Commission of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification shall be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information. This requirement is not applicable to information which is already required to be provided to the Commission by other reporting or updating requirements.

Subpart B-License Application, Form, and Contents 10 CFR § 72.16

§ 72.16 Filing of application for specific license.

(a) Place of filing. Each application for a license, or amendment thereof, under ***31663** this part should be filed with the Director, Division of Industrial and Medical Nuclear Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Applications, communications, reports, and correspondence may also be delivered in person at the Commission's offices at 11555 Rockville Pike, Rockville, Maryland, or at the NRC Public Document Room, 1717 H Street NW., Washington, DC.

(b) Oath or affirmation. Each application for a license or license amendment (including amendments to such applications), except for those filed by DOE, must be executed in an original signed by the applicant or duly authorized officer thereof under oath or affirmation. Each application for a license or license amendment (including amendments to such applications) filed by DOE must be signed by the Secretary of Energy or the Secretary's authorized representative.

(c) Number of copies of application. Each filing of an application for a license or license amendment under this part (including amendments to such applications) must include, in addition to a signed original, 15 copies of each portion of such application, safety analysis report, environmental report, and any amendments. Another 125 copies shall be retained by the applicant for distribution in accordance with instruction from the Director or the Director's designee.

(d) Fees. The application, amendment, and renewal fees applicable to a license covering the storage of spent fuel in an ISFSI are those shown in § 170.31 of this chapter.

(e) Notice of docketing. Upon receipt of an application for a license or license amendment under this part, the Director, Office of Nuclear Material Safety and Safeguards or the Director's designee will assign a docket number to the application, notify the applicant of the docket number, instruct the applicant to distribute copies retained by the applicant in accordance with paragraph (c) of this section, and cause a notice of docketing to be published in the Federal Register. The notice of docketing shall identify the site of the ISFSI or the MRS by locality and State and may include a notice of hearing or a notice of proposed action and opportunity for hearing as provided by § 72.46 of this part. In the case of an application for a license or an amendment to a license for an MRS, the Director, Office of Nuclear Material Safety and Safeguards, or the Director's designee, in accordance with § 72.200 of this part, shall send a copy of the notice of docketing to the Governor and legislature of any State in which an MRS is or may be located, to the Chief Executive of the local municipality, to the Governors of any contiguous States and to the governing body of any affected Indian tribe.

10 CFR § 72.18

§ 72.18 Elimination of repetition.

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In any application under this part, the applicant may incorporate by reference information contained in previous applications, statements, or reports filed with the Commission: Provided, That such references are clear and specific.

10 CFR § 72.20

§ 72.20 Public inspection of application.

Applications and documents submitted to the Commission in connection with applications may be made available for public inspection in accordance with provisions of the regulations contained in Parts 2 and 9 of this chapter.

10 CFR § 72.22

§ 72.22 Contents of application: General and financial information.

Each application must state:

(a) Full name of applicant;

(b) Address of applicant;

(c) Description of business or occupation of applicant;

(d) If applicant is:

(1) An individual: Citizenship and age;

(2) A partnership: Name, citizenship, and address of each partner and the principal location at which the partnership does business;

(3) A corporation or an unincorporated association:

(i) The State in which it is incorporated or organized and the principal location at which it does business; and

(ii) The names, addresses, and citizenship of its directors and principal officers;

(4) Acting as an agent or representative of another person in filing the application: The identification of the principal and the information required under this paragraph with respect to such principal.

(5) The Department of Energy:

(i) The identification of the DOE organization responsible for the construction and operation of the ISFSI or MRS, including a description of any delegations of authority and assignments of responsibilities.

(ii) For each application for a license for an MRS, the provisions of the public law authorizing the construction and operation of the MRS.

(e) Except for DOE, information sufficient to demonstrate to the Commission the financial qualifications of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the license is

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sought. The information must state the place at which the activity is to be performed, the general plan for carrying out the activity, and the period of time for which the license is requested. The information must show that the applicant either possesses the necessary funds, or that the applicant has reasonable assurance of obtaining the necessary; funds or that by a combination of the two, the applicant will have the necessary funds available to cover the following:

(1) Estimated construction costs;

(2) Estimated operating costs over the planned life of the ISFSI; and

(3) Estimated decommissioning costs, and the necessary financial arrangements to provide reasonable assurance prior to licensing that decommissioning will be carried out after the removal of spent fuel and/or high-level radioactive waste from storage.

10 CFR § 72.24

§ 72.24 Contents of application: Technical information.

Each application for a license under this part must include a Safety Analysis Report describing the proposed ISFSI or MRS for the receipt, handling, packaging, and storage of spent fuel or high-level radioactive waste, including how the ISFSI or MRS will be operated. The minimum information to be included in this report must consist of the following:

(a) A description and safety assessment of the site on which the ISFSI or MRS is to be located, with appropriate attention to the design bases for external events. Such assessment must contain an analysis and evaluation of the major structures, systems, and components of the ISFSI or MRS that bear on the suitability of the site when the ISFSI or MRS is operated at its design capacity. If the proposed ISFSI or MRS is to be located on the site of a nuclear power plant or other licensed facility, the potential interactions between the ISFSI or MRS and such other facility must be evaluated.

(b) A description and discussion of the ISFSI or MRS structures with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations.

(c) The design of the ISFSI or MRS in sufficient detail to support the findings in § 72.40, including:

(1) The design criteria for the ISFSI or MRS pursuant to Subpart F of this part, with identification and justification for any additions to or departures from the general design criteria;

*31664 (2) the design bases and the relation of the design bases to the design criteria;

(3) Information relative to materials of construction, general arrangement, dimensions of principal structures, and descriptions of all structures, systems, and components important to safety, in sufficient detail to support a finding that the ISFSI or MRS will satisfy the design bases with an adequate margin for safety; and

(4) Applicable codes and standards.

(d) An analysis and evaluation of the design and performance of structures, systems, and components important to safety; with the objective of assessing the impact on public health and safety resulting from operation of the

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(1) The margins of safety during normal operations and expected operational occurrences during the life of the ISFSI or MRS; and

(2) The adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents, including natural and manmade phenomena and events.

(e) The means for controlling and limiting occupational radiation exposures within the limits given in Part 20 of this chapter, and for meeting the objective of maintaining exposures as low as is reasonably achievable.

(f) The features of ISFSI or MRS design and operating modes to reduce to the extent practicable radioactive waste volumes generated at the installation.

(g) An identification and justification for the selection of those subjects that will be probable license conditions and technical specifications. These subjects must cover the design, construction, preoperational testing, operation, and decommissioning of the ISFSI or MRS.

(h) A plan for the conduct of operations, including the planned managerial and administrative controls system, and the applicant's organization, and program for training of personnel pursuant to Subpart I.

(i) If the proposed ISFSI or MRS incorporates structures, systems, or components important to safety whose functional adequacy or reliability have not been demonstrated by prior use for that purpose or cannot be demonstrated by reference to performance data in related applications or to widely accepted engineering principles, an identification of these structures, systems, or components along with a schedule showing how safety questions will be resolved prior to the initial receipt of spent fuel or high-level radioactive waste for storage at the ISFSI or MRS.

(j) The technical qualifications of the applicant to engage in the proposed activities, as required by § 72.28.

(k) A description of the applicant's plans for coping with emergencies, as required by 72.32.

(1) A description of the equipment to be installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations and expected operational occurrences. The description must identify the design objectives and the means to be used for keeping levels of radioactive material in effluents to the environment as low as is reasonably achievable and within the exposure limits stated in § 72.104. The description must include:

(1) An estimate of the quantity of each of the principal radionuclides expected to be released annually to the environment in liquid and gaseous effluents produced during normal ISFSI or MRS operations;

(2) A description of the equipment and processes used in radioactive waste systems; and

(3) A general description of the provisions for packaging, storage, and disposal of solid wastes containing radioactive materials resulting from treatment of gaseous and liquid effluents and from other sources.

(m) An analysis of the potential dose equivalent or committed dose equivalent to an individual outside the controlled area from accidents or natural phenomena events that result in the release of radioactive material to the

environment or direct radiation from the ISFSI or MRS. The calculations of individual dose equivalent or committed dose equivalent must be performed for direct exposure, inhalation, and ingestion occurring as a result of the postulated design basis event.

(n) A description of the quality assurance program that satisfies the requirements of Subpart G to be applied to the design, fabrication, construction, testing, operation, modification, and decommissioning of the structures, systems, and components of the ISFSI or MRS important to safety. The description must identify the structures, systems, and components important to safety. The program must also apply to managerial and administrative controls used to ensure safe operation of the ISFSI or MRS.

(o) A description of the detailed security measures for physical protection, including design features and the plans required by Subpart H. For an application from DOE for an ISFSI or MRS, DOE will provide a description of the physical security plan for protection against radiological sabotage as required by Subpart H. An application submitted by DOE for an ISFSI or MRS must include a certification that it will provide at the ISFSI or MRS such safeguards as it requires at comparable surface DOE facilities to promote the common defense and security.

(p) A description of the program covering preoperational testing and initial operations.

(g) A description of the decommissioning plan required under § 72.30.

10 CFR § 72.26

§ 72.26 Contents of application: Technical specifications.

Each application under this part shall include proposed technical specifications in accordance with the requirements of § 72.44 and a summary statement of the bases and justifications for these technical specifications.

10 CFR § 72.28

§ 72.28 Contents of application: Applicant's technical qualifications.

Each application under this part must include:

(a) The technical qualifications, including training and experience, of the applicant to engage in the proposed activities;

(b) A description of the personnel training program required under Subpart I;

(c) A description of the applicant's operating organization, delegations of responsibility and authority and the minimum skills and experience qualifications relevant to the various levels of responsibility and authority; and

(d) A commitment by the applicant to have and maintain an adequate complement of trained and certified installation personnel prior to the receipt of spent fuel or high-level radioactive waste for storage.

10 CFR § 72.30

§ 72.30 Decommissioning planning, including financing and recordkeeping.

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(a) Each application under this part must include a proposed decommissioning plan that contains sufficient information on proposed practices and procedures for the decontamination of the site and facilities and for disposal of residual radioactive materials after all spent fuel or high-level radioactive waste has been removed, in order to provide reasonable assurance that the decontamination and decommissioning of the ISFSI or MRS at the end of its useful life will provide adequate protection to the health and safety of the public. This plan must identify and discuss those design features of the ISFSI or MRS that facilitate its decontamination and *31665 decommissioning at the end of its useful life.

(b) The decommissioning funding plan must contain information on how reasonable assurance will be provided that funds will be available to decommission the ISFSI or MRS. This information must include a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (c) of this section, including means of adjusting cost estimates and associated funding levels periodically over the life of the ISFSI or MRS.

(c) Financial assurance for decommissioning must be provided by one or more of the following methods:

(1) Prepayment. Prepayment is the deposit prior to the start of operation into an account segregated from licensee assets and outside the licensee's administrative control of cash or liquid assets such that the amount of funds would be sufficient to pay decommissioning costs. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.

(2) A surety method, insurance, or other guarantee method. These methods guarantee that decommissioning costs will be paid should the licensee default. A surety method may be in the form of a surety bond, letter of credit, or line of credit. A parent company guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test are as contained in Appendix A of 10 CFR Part 30. A parent company guarantee may not be used in combination with other financial methods to satisfy the requirements of this section. Any surety method or insurance used to provide financial assurance for decommissioning must contain the following conditions:

(i) The surety method or insurance must be open-ended or, if written for a specified term, such as five years, must be renewed automatically unless 90 days or more prior to the renewal date, the issuer notifies the Commission, the beneficiary, and the licensee of its intention not to renew. The surety method or insurance must also provide that the full face amount be paid to the beneficiary automatically prior to the expiration without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Commission withing 30 days after receipt of notification or cancellation.

(ii) The surety method or insurance must be payable to a trust established for decomissioning 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.

(iii) The surety or insurance must remain in effect until the Commission has terminated the license.

(3) An external sinking fund in which deposits are made at least annually, coupled with a surety method or insurance, the value of which may decrease by the amount being accumulated in the sinking fund. An external sinking fund is a fund establishing and maintained by setting aside funds periodically in an account segregated from licensee assets and outside the licensee's administrative control in which the total amount of funds would

be sufficient to pay decommissioning costs at the time termination of operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. The surety or insurance provision must be as stated in paragraph (c)(2) of this section.

(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.

(5) In the case of electric utility licensees, the methods of § 50.75(e) (1) and (3) of this chapter.

(d) Each licensee shall keep records of information important to the safe and effective decommissioning of the facility in an identified location until the license is terminated by the Commission. If records of relevant information are kept for other purposes, reference to these records and their locations may be used. Information the Commission considers important to decommissioning consists of—

(1) Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records must include any known information on identification of involved nuclides, quantities, forms, and concentrations.

(2) As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used and/or stored, and of locations of possible inaccessible contamination such as buried pipes which may be subject to contamination. If required drawings are referenced, each relevant document need not be indexed individually. If drawings are not available, the licensee shall substitute appropriate records of available information concerning these areas and locations.

(3) Records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

10 CFR § 72.32

§ 72.32 Emergency plan.

(a) [Reserved]

(b) [Reserved]

(c) For an ISFSI that is located on the site of a nuclear power reactor licensed for operation by the Commission, the emergency plan required by 10 CFR 50.47 shall be deemed to satisfy the requirements of this section.

10 CFR § 72.34

§ 72.34 Environmental report.

Each application for an ISFSI or MRS license under this part must be accompanied by an Environmental Report which meets the requirements of Subpart A of Part 51 of this chapter.

Subpart C—Issuance and Conditions of License 10 CFR § 72.40

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§ 72.40 Issuance of license.

(a) Except as provided in paragraph (c) of this section, the Commission will issue a license under this part upon a determination that the application for a license meets the standards and requirements of the Act and the regulations of the Commission, and upon finding that:

(1) The applicant's proposed ISFSI or MRS design complies with Subpart F;

(2) The proposed site complies with the criteria in Subpart E;

(3) If on the site of a nuclear power plant or other licensed activity or facility, the proposed ISFSI would not pose an undue risk to the safe operation of such nuclear power plant or other licensed activity or facility;

(4) The applicant is qualified by reason of training and experience to conduct the operation covered by the regulations in this part;

(5) The applicant's proposed operating procedures to protect health and to minimize danger to life or property are adequate;

(6) Except for DOE, the applicant for an ISFSI or MRS is financially qualified to engage in the proposed activities in *31666 accordance with the regulations in this part;

(7) The applicant's quality assurance plan complies with Subpart G;

(8) The applicant's physical protection provisions comply with Subpart H. DOE has complied with the safeguards and physical security provisions identified in $\S.72.24(0)$;

(9) The applicant's personnel training program complies with Subpart I;

(10) Except for DOE, the applicant's decommissioning plan and its financing pursuant to \$ 72.30 provide reasonable assurance that the decontamination and decommissioning of the ISFSI or MRS at the end of its useful life will provide adequate protection to the health and safety of the public;

(11) The applicant's emergency plan complies with § 72.32;

(12) The applicable provisions of Part 170 of this chapter have been satisfied;

(13) There is reasonable assurance that: (i) The activities authorized by the license can be conducted without endangering the health and safety of the public and (ii) these activities will be conducted in compliance with the applicable regulations of this chapter; and

(14) The issuance of the license will not be inimical to the common defense and security.

(b) Grounds for denial of a license to store spent fuel in the proposed ISFSI or to store spent fuel and high-level radioactive waste in the proposed MRS may be the commencement of construction prior to (1) a finding by the Director, Office of Nuclear Materials Safety and Safeguards or designee or (2) a finding after a public hearing by the presiding officer, Atomic Safety and Licensing Board, Atomic Safety and Licensing Appeal Board, or the Commission acting as a collegial body, as appropriate. that the action called for is the issuance of the proposed license with any appropriate conditions to protect environmental values. This finding is to be made on the basis

of information filed and evaluations made pursuant to Subpart A of Part 51 of this chapter or in the case of an MRS on the basis of evaluations made pursuant to sections 141(c) and (d) or 148(a) and (c) of NWPA (96 Stat. 2242, 2243, 42 U.S.C. 10161(c), (d); 101 Stat. 1330-235, 1330-236, 42 U.S.C. 10168(a), (c)), as appropriate, and after weighing the environmental, economic, technical and other benefits against environmental costs and considering available alternatives.

(c) For facilities that have been covered under previous licensing actions including the issuance of a construction permit under Part 50 of this chapter, a reevaluation of the site is not required except where new information is discovered which could alter the original site evaluation findings. In this case, the site evaluation factors involved will be reevaluated.

10 CFR § 72.42

§ 72.42 Duration of license; renewal.

(a) Each license issued under this part must be for a fixed period of time to be specified in the license. The license term for an ISFSI must not exceed 20 years from the date of issuance. The license term for an MRS must not exceed 40 years from the date of issuance. Licenses for either type of installation may be renewed by the Commission at the expiration of the license term upon application by the licensee and pursuant to the requirements of this rule.

(b) Applications for renewal of a license should be filed in accordance with the applicable provisions of Subpart B at least two years prior to the expiration of the existing license. Information contained in previous applications, statements, or reports filed with the Commission under the license may be incorporated by reference: Provided, that such references are clear and specific.

(c) In any case in which a licensee, not less than two years prior to expiration of its existing license, has filed an application in proper form for renewal of a license, the existing license shall not expire until a final decision concerning the application for renewal has been made by the Commission.

10 CFR § 72,44

§ 72.44 License conditions.

(a) Each license issued under this part shall include license conditions. The license conditions may be derived from the analyses and evaluations included in the Safety Analysis Report and amendments thereto submitted pursuant to § 72.24. License conditions pertain to design, construction and operation. The Commission may also include additional license conditions as it finds appropriate.

(b) Each license issued under this part shall be subject to the following conditions, even if they are not explicitly stated therein;

(1) Neither the license nor any right thereunder shall be transferred, assigned, or disposed of in any manner, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Commission shall, after securing full information, find that the transfer is in accordance with the provisions of the Atomic Energy Act of 1954, as amended, and give its consent in writing.

(2) The license shall be subject to revocation, suspension, modification, or amendment in accordance with the

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procedures provided by the Atomic Energy Act of 1954, as amended, and Commission regulations.

(3) Upon request of the Commission, the licensee shall, at any time before expiration of the license, submit written statements, signed under oath or affirmation if appropriate, to enable the Commission to determine whether or not the license should be modified, suspended, or revoked.

(4) Prior to the receipt of spent fuel for storage at an ISFSI or the receipt of spent fuel and high-level radioactive waste for storage at an MRS, the licensee shall have in effect an NRC-approved program covering the training and certification of personnel that meets the requirements of Subpart I.

(5) The license shall permit the operation of the equipment and controls that are important to safety of the ISFSI or the MRS only by personnel whom the licensee has certified as being adequately trained to perform such operations, or by uncertified personnel who are under the direct visual supervision of a certified individual.

(6)(i) Each licensee shall notify the appropriate NRC Regional Administrator, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any Chapter of by or against:

(A) The licensee;

(B) An entity (as that term is defined in 11 U.S.C. 101(14)) controlling the licensee or listing the license or licensee as property of the estate; or

(C) An affiliate (as that term is defined in 11 U.S.C. 101(2)) of the licensee.

(ii) This notification must indicate:

(A) The bankruptcy court in which the petition for bankruptcy was filed; and

(B) The date of the filing of the petition.

(c) Each license issued under this part must include technical specifications. Technical specifications must include requirements in the following categories:

(1) Functional and operating limits and monitoring instruments and limiting control settings.

(i) Functional and operating limits for an ISFSI or MRS are limits on fuel or waste handling and storage conditions that are found to be necessary to protect the integrity of the stored fuel or waste container, to protect employees against occupational exposures and to guard against the uncontrolled release of radioactive materials; and

*31667 (ii) Monitoring instruments and limiting control settings for an ISFSI or MRS are those related to fuel or waste handling and storage conditions having significant safety functions.

(2) Limiting conditions. Limiting conditions are the lowest functional capability or performance levels of equipment required for safe operation.

(3) Surveillance requirements. Surveillance requirements include:

(i) Inspection and monitoring of spent fuel or high-level radioactive waste in storage;

(ii) inspection, test and calibration activities to ensure that the necessary integrity of required systems and components is maintained;

(iii) confirmation that operation of the ISFSI or MRS is within the required functional and operating limits; and

(iv) confirmation that the limiting conditions required for safe storage are met.

(4) Design features. Design features include items that would have a significant effect on safety if altered or modified, such as materials of construction and geometric arrangements.

(5) Administrative controls. Administrative controls include the organization and management procedures, recordkeeping, review and audit, and reporting necessary to assure that the operations involved in the storage of spent fuel in an ISFSI and the storage of spent fuel and high-level radioactive waste in an MRS are performed in a safe manner.

(d) Each license authorizing the receipt, handling, and storage of spent fuel or high-level radioactive waste under this part must include technical specifications that, in addition to stating the limits on the release of radioactive materials for compliance with limits of Part 20 of this chapter and the "as low as is reasonably achievable" objectives for effluents, require that:

(1) Operating procedures for control of effluents be established and followed, and equipment in the radioactive waste treatment systems be maintained and used, to meet the requirements of § 72.104;

(2) An environmental monitoring program be established to ensure compliance with the technical specifications for effluents; and

(3) An annual report be submitted to the appropriate regional office specified in Appendix A of Part 73 of this chapter, with a copy to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, within 60 days after January 1 of each year, specifying the quantity of each of the principal radionuclides released to the environment in liquid and in gaseous effluents during the previous 12 months of operation and such other information as may be required by the Commission to estimate maximum potential radiation dose commitment to the public resulting from effluent releases. On the basis of this report and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

(e) The licensee shall make no change that would decrease the effectiveness of the physical security plan prepared pursuant to § 72.180 without the prior approval of the Commission. A licensee desiring to make such a change shall submit an application for an amendment to the license pursuant to § 72.56. A licensee may make changes to the physical security plan without prior Commission approval, provided that such changes do not decrease the effectiveness of the plan. The licensee shall furnish to the Commission a report containing a description of each change within two months after the change is made, and shall maintain records of changes to the plan made without prior Commission approval for a period of 3 years from the date of the change.

(f) A licensee shall follow and maintain in effect an emergency plan that is approved by the Commission. The licensee may make changes to the approved plan without Commission approval only if such changes do not decrease the effectiveness of the plan. Within six months after any change is made, the licensee shall submit a report containing a description of any changes made in the plan to the appropriate NRC Regional Office specified

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in Appendix A to Part 73 of this chapter with a copy to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Proposed changes that decrease the effectiveness of the approved emergency plan must not be implemented unless the licensee has received prior approval of such changes from the Commission.

(g) A license issued to DOE under this part for an MRS authorized by section 142(b) of NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)) must include the following conditions:

(1) Construction of the MRS may not begin until the Commission has authorized the construction of a repository under section 114(d) of NWPA (96 Stat. 2215, as amended by 101 Stat. 1330-230, 42 U.S.C. 10134(d)) and Part 60 of this chapter;

(2) Construction of the MRS or acceptance of spent nuclear fuel or high-level radioactive waste at the MRS is prohibited during such time as the repository license is revoked by the Commission or construction of the repository ceases;

(3) The quantity of spent nuclear fuel or high-level radioactive waste at the site of the MRS at any one time may not exceed 10,000 metric tons of heavy metal until a repository authorized under NWPA and Part 60 of this chapter first accepts spent nuclear fuel or solidified high-level radioactive waste; and

(4) The quantity of spent nuclear fuel or high-level radioactive waste at the site of the MRS at any one time may not exceed 15,000 metric tons of heavy metal.

10 CFR § 72.46

§ 72.46 Public hearings.

(a) In connection with each application for a license under this part, the Commission shall issue or cause to be issued a notice of proposed action and opportunity for hearing in accordance with § 2.105 or § 2.1107 of this chapter, as appropriate, or, if the Commission finds that a hearing is required in the public interest, a notice of hearing in accordance with § 2.104 of this chapter.

(b)(1) In connection with each application for an amendment to a license under this part, the Commission shall, except as provided in paragraph (b)(2) of this section, issue or cause to be issued a notice of proposed action and opportunity for hearing in accordance with § 2.105 or § 2.1107 of this chapter, as appropriate, or, if the Commission finds that a hearing is required in the public interest, a notice of hearing in accordance with § 2.104 of this chapter.

(2) The Director, Office of Nuclear Material Safety and Safeguards, or the Director's designee may dispense with a notice of proposed action and opportunity for hearing or a notice of hearing and take immediate action on an amendment to a license issued under this part upon a determination that the amendment does not present a genuine issue as to whether the health and safety of the public will be significantly affected. After taking the action, the Director or the Director's designee shall promptly publish a notice in the Federal Register of the action taken and of the right of interested persons to request a hearing on whether the action should be rescinded or modified. If the action taken amends an MRS license, the Director or the Director's designee shall also inform the appropriate State and local officials.

*31668 (c) The notice of proposed action and opportunity for hearing or the notice of hearing may be included

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in the notice of docketing required to be published by § 72.16 of this part.

(d) If no request for a hearing or petition for leave to intervene is filed within the time prescribed in the notice of proposed action and opportunity for hearing, the Director, Office of Nuclear Material Safety and Safeguards or the Director's designee may take the proposed action, and thereafter shall promptly inform the appropriate State and local officials and publish a notice in the Federal Register of the action taken. In accordance with § 2.764(c) of this chapter, the Director, Office of Nuclear Material Safety and Safeguards shall not issue an initial license for the construction and operation of an ISFSI or an MRS until expressly authorized to do so by the Commis-sion.

10 CFR § 72.48

§ 72.48 Changes, tests, and experiments.

(a)(1) The holder of a license issued under this part may:

(i) Make changs in the ISFSI or MRS described in the Safety Analysis Report,

(ii) Make changes in the procedures described in the Safety Analysis Report, or

(iii) Conduct tests or experiments not described in the Safety Analysis Report, without prior Commission approval, unless the proposed change, test or experiment involves a change in the license conditions incorporated in the license, an unreviewed safety question, a significant increase in occupational exposure or a significant unreviewed environmental impact.

(2) A proposed change, test, or experiment shall be deemed to involve an unreviewed safety question-

(i) If the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the Safety Analysis Report may be increased;

(ii) If a possibility for an accident or malfunction of a different type than any evaluated previously in the Safety Analysis Report may be created; or

(iii) If the margin of safety as defined in the basis for any technical specification is reduced.

(b)(1) The licensee shall maintain records of changes in the ISFSI or MRS and of changes in procedures made pursuant to this section if these changes constitute changes in the ISFSI or MRS or procedures described in the Safety Analysis Report. The licensee shall also maintain records of tests and experiments carried out pursuant to paragraph (a) of this section. These records must include a written safety evaluation that provides the bases for the determination that the change, test, or experiment does not involve an unreviewed safety question. The records of changes in the ISFSI or MRS and of changes in procedures and records of tests must be maintained until the Commission terminates the license.

(2) Annually, or at such shorter interval as may be specified in the license, the licensee shall furnish to the appropriate regional office, specified in Appendix A of Part 73 of this chapter, with a copy to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, a report containing a brief description of changes, tests, and experiments made under paragraph (a) of the section, including a summary of the safety evaluation of each. Any report submitted by a licensee pursuant to this para-

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graph will be made a part of the public record pertaining to this license.

(c) The holder of a license issued under this part who desires-

(1) To make changes in the ISFSI or MRS or the procedures as described in the Safety Analysis Report, or to conduct tests or experiments not described in the Safety Analysis Report, that involve an unreviewed safety question, a significant increase in occupational exposure, or significant unreviewed environmental impact, or

(2) To change the license conditions shall submit an application for amendment of the license, pursuant to $\frac{5}{72.56}$.

10 CFR § 72.50

§ 72.50 Transfer of license.

(a) No license or any part included in a license issued under this part for an ISFSI or MRS shall be transferred, assigned, or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Commission gives its consent in writing.

(b)(1) An application for transfer of a license must include as much of the information described in \S 72.22 and 72.28 with respect to the identity and the technical and financial qualifications of the proposed transferee as would be required by those sections if the application were for an initial license. The application must also include a statement of the purposes for which the transfer of the license is requested and the nature of the transaction necessitating or making desirable the transfer of the license.

(2) The Commission may require any person who submits an application for the transfer of a license pursuant to the provisions of this section to file a written consent from the existing licensee, or a certified copy of an order or judgment of a court of competent jurisdiction, attesting to the person's right—subject to the licensing requirements of the Act and these regulations—to possession of the radioactive materials and the storage installation involved.

(c) After appropriate notice to interested persons, including the existing licensee, and observance of such procedures as may be required by the Act or regulations or orders of the Commission, the Commission will approve an application for the transfer of a license, if the Commission determines that:

(1) The proposed transferee is qualified to be the holder of the license; and

(2) Transfer of the license is consistent with applicable provisions of the law, and the regulations and orders issued by the Commission.

10 CFR § 72.52

§ 72.52 Creditor regulations.

(a) This section does not apply to an ISFSI or MRS constructed and operated by DOE.

(b) Pursuant to section 184 of the Act, the Commission consents, without individual application, to the creation of any mortgage, pledge, or other lien on special nuclear material contained in spent fuel not owned by the United States that is the subject of a license or on any interest in special nuclear material in spent fuel; Provided:
(1) That the rights of any creditor so secured may be exercised only in compliance with and subject to the same requirements and restrictions as would apply to the licensee pursuant to the provisions of the license, the Atomic Energy Act of 1954, as amended, and regulations issued by the Commission pursuant to said Act; and

(2) That no creditor so secured may take possession of the spent fuel pursuant to the provisions of this section prior to either the issuance of a license from the Commission authorizing possession or the transfer of the li-cense.

(c) Any creditor so secured may apply for transfer of the license covering spent fuel by filing an application for transfer of the license pursuant to § 72.50(b). The Commission will act upon the application pursuant to § 72.50(c).

(d) Nothing contained in this regulation shall be deemed to affect the means of acquiring, or the priority of, any tax lien or other lien provided by law.

(e) As used in this section, "creditor" includes, without implied limitation, the trustee under any mortgage, pledge, or *31669 lien on spent fuel in storage made to secure any creditor; any trustee or receiver of spent fuel appointed by a court of competent jurisdiction in any action brought for the benefit of any creditor secured by such mortgage, pledge, or lien; any purchaser of the spent fuel at the sale thereof upon foreclosure of the mort-gage, pledge, or lien or upon exercise of any power of sale contained therein; or any assignee of any such purchaser.

10 CFR § 72.54

§ 72.54 Application for termination of license.

(a) Any licensee may apply to the Commission for authority to surrender a license voluntarily and to decommission the ISFSI or MRS. This application must be made within two years following permanent cessation of operations, and in no case later than one year prior to expiration of the license. Each application for termination of license must be accompanied, or preceded, by a proposed final decommissioning plan.

(b) The proposed final decommissioning plan must include—

(1) The choice of the alternative for decommissioning with a description of activities involved. An alternative is acceptable if it provides for completion of decommissioning without significant delay. Consideration will be given to an alternative which provides for delayed completion of decommissioning only when necessary to protect the public health and safety. Factors to be considered in evaluating an alternative which provides for delayed completion of decommissioning include unavailability of waste disposal capacity and other site specific factors affecting the licensee's capability to carry out decommissioning safely, including presence of other nuclear facilities at the site.

(2) A description of controls and limits on procedures and equipment to protect occupational and public health and safety;

(3) A description of the planned final radiation survey; and

(4) An updated detailed cost estimate for the chosen alternative for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and plan for assuring the availability of adequate funds for

completion of decommissioning including means for adjusting cost estimates and associated funding levels over any storage or surveillance period.

(5) A description of technical specifications and quality assurance provisions in place during decommissioning.

(c) For final decommissioning plans in which the major dismantlement activities are delayed by first placing the ISFSI or MRS in storage, planning for these delayed activities may be less detailed. Updated detailed plans must be submitted and approved prior to the start of such activities.

(d) If the final decommissioning plan demonstrates that the decommissioning will be performed in accordance with the regulations in this chapter and will not be inimical to the common defense and security or to the health and safety of the public, and after notice to interested persons, the Commission will approve the plan subject to such conditions and limitations as it deems appropriate and necessary and issue an order authorizing the decommissioning.

(e) The Commission will terminate the license if it determines that-

(1) The decommissioning has been performed in accordance with the approved final decommissioning plan and the order authorizing decommissioning; and

(2) The terminal radiation survey and associated documentation demonstrates that the ISFSI or MRS and site are suitable for release for unrestricted use.

10 CFR § 72.56

§ 72.56 Application for amendment of license.

Whenever a holder of a license desires to amend the license, an application for an amendment shall be filed with the Commission fully describing the changes desired and the reasons for such changes, and following as far as applicable the form prescribed for original applications.

10 CFR § 72.58

§ 72.58 Issuance of amendment.

In determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations that govern the issuance of initial licenses.

10 CFR § 72.60

§ 72.60 Modification, revocation, and suspension of license.

(a) The terms and conditions of all licenses are subject to amendment, revision, or modification by reason of amendments to the Atomic Energy Act of 1954, as amended, or by reason or rules, regulations, or orders issued in accordance with the Act or any amendments thereto.

(b) Any license may be modified, revoked, or suspended in whole or in part for any of the following:

(1) Any material false statement in the application or in any statement of fact required under section 182 of the

Act;

(2) Conditions revealed by the application or statement of fact or any report, record, inspection or other means which would warrant the Commission to refuse to grant a license on an original application;

(3) Failure to operate an ISFSI or MRS in accordance with the terms of the license;

(4) Violation of, or failure to observe, any of the terms and conditions of the Act, or of any applicable regulation, license, or order of the Commission.

(c) Upon revocation of a license, the Commission may immediately cause the retaking of possession of all special nuclear material contained in spent fuel held by the licensee. In cases found by the Commission to be of extreme importance to the national defense and security or to the health and safety of the public, the Commission prior to following any of the procedures provided under sections 551-558 of Title 5 of the United States Code, may cause the taking of possession of any special nuclear material contained in spent fuel held by the licensee.

10 CFR § 72.62

§ 72.62 Backfitting.

(a) As used in this section, "backfitting" means the addition, elimination, or modification, after the license has been issued, of:

(1) Structures, systems, or components of an ISFSI or MRS, or

(2) Procedures or organization required to operate an ISFSI or MRS.

(b) The Commission will require backfitting of an ISFSI or MRS if it finds that such action is necessary to assure adequate protection to occupational or public health and safety, or to bring the ISFSI or MRS into compliance with a license or the rules or orders of the Commission, or into conformance with written commitments by a licensee.

(c) The Commission may require the backfitting of an ISFSI or MRS if it finds:

(1) That there is a substantial increase in the overall protection of the occupational or public health and safety to be derived from the backfit, and

(2) That the direct and indirect costs of implementation for that ISFSI or MRS are justified in view of this increased protection.

(d) The Commission may at any time require a holder of a license to submit such information concerning the backfitting or the proposed backfitting of an ISFSI or MRS as it deems appropriate.

Subpart D---Records, Reports, Inspections, and Enforcement10 CFR § 72.70

§ 72.70 Safety analysis report updating.

(a) The design, description of planned operations, and other information submitted in the Safety Analysis Report shall be updated by the licensee and *31670 submitted to the Commission at least once every six months after

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issuance of the license during final design and construction, until preoperational testing is completed, with final Safety Analysis Report completion and submittal to the Commission at least 90 days prior to the planned receipt of spent fuel or high-level radioactive waste. The final submittal must include a final analysis and evaluation of the design and performance of structures, systems, and components that are important to safety taking into account any pertinent information developed since the submittal of the license application.

(b) After the first receipt of spent fuel or high-level radioactive waste for storage, the Safety Analysis Report must be updated annually and submitted to the Commission by the licensee. This submittal must include the following:

(1) New or revised information relating to applicable site evaluation factors, including the results of environmental monitoring programs.

(2) A description and analysis of changes in the structures, systems, and components of the ISFSI or MRS, with emphasis upon:

(i) Performance requirements,

(ii) The bases, with technical justification therefor upon which such requirements have been established, and

(iii) Evaluations showing that safety functions will be accomplished.

(3) An analysis of the significance of any changes to codes, standards, regulations, or regulatory guides which the licensee has committed to meeting the requirements of which are applicable to the design, construction, or operation of the ISFSI or MRS.

10 CFR § 72.72

§ 72.72 Material balance, inventory, and records requirements for stored materials.

(a) Each licensee shall keep records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all spent fuel and high-level radioactive waste in storage. The records must include as a minimum the name of shipper of the material to the ISFSI or MRS, the estimated quantity of radioactive material per item (including special nuclear material in spent fuel), item identification and seal number, storage location, onsite movements of each fuel assembly or storage canister, and ultimate disposal. These records for spent fuel at an ISFSI or for spent fuel and high-level radioactive waste at an MRS must be retained for as long as the material is stored and for a period of five years after the material is disposed of or transferred out of the ISFSI or MRS.

(b) Each licensee shall conduct a physical inventory of all spent fuel and high-level radioactive waste in storage at intervals not to exceed 12 months unless otherwise directed by the Commission. The licensee shall retain a copy of the current inventory as a record until the Commission terminates the license.

(c) Each licensee shall establish, maintain, and follow written material control and accounting procedures that are sufficient to enable the licensee to account for material in storage. The licensee shall retain a copy of the current material control and accounting procedures until the Commission terminates the license.

(d) Records of spent fuel and high-level radioactive waste in storage must be kept in duplicate. The duplicate set of records must be kept at a separate location sufficiently remote from the original records that a single event

would not destroy both sets of records. Records of spent fuel transferred out of an ISFSI or of spent fuel or highlevel radioactive waste transferred out of an MRS must be preserved for a period of five years after the date of transfer.

10 CFR § 72.74

§ 72.74 Reports of accidental criticality or loss of special nuclear material.

(a) Each licensee shall notify the NRC Operations Center [FN1] within one hour of discovery of accidental criticality or any loss of special nuclear material.

FN1 Commercial telephone number of the NRC Operations Center is (301)951-0550.

(b) This notification must be made to the NRC Operations Center via the Emergency Notification System if the licensee is party to that system. If the Emergency Notification System is inoperative or unavailable, the licensee shall make the required notification via commercial telephonic service or any other dedicated telephonic system or any other method that will ensure that a report is received by the NRC Operations Center within one hour. The exemption of \$73.21(g)(3) of this chapter applies to all telephonic reports required by this section.

(c) Reports required under § 73.71 of this chapter need not be duplicated under the requirements of this section.

10 CFR § 72.76

§ 72.76 Material status reports.

(a) Except as provided in paragraph (b) of this section, each licensee shall complete and submit to the Commission (on DOE/NRC Form-742, Material Balance Report) material status reports in accordance with the printed instructions for completing the form. These reports must provide information concerning the special nuclear material contained in the spent fuel possessed, received, transferred, disposed of, or lost by the licensee. Material status reports must be made as of March 31 and September 30 of each year and filed within 30 days after the end of the period covered by the report. The Commission may, when good cause is shown, permit a licensee to submit material status reports at other times.

(b) Any licensee who is required to submit routine material status reports pursuant to § 75.35 of this chapter (pertaining to implementation of the US/IAEA Safeguards Agreement) shall prepare and submit such reports only as provided in that section instead of as provided in paragraph (a) of this section.

10 CFR § 72.78

§ 72.78 Nuclear material transfer reports.

(a) Except as provided in paragraph (b) of this section, whenever the licensee transfers or receives spent fuel, the licensee shall complete and distribute a Nuclear Material Transaction Report on DOE/NRC Form-741 in accordance with printed instructions for completing the form. Each ISFSI licensee who receives spent fuel from a foreign source shall complete both the supplier's and receiver's portion of DOE/NRC Form-741, verify the identity of the spent fuel, and indicate the results on the receiver's portion of the form.

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(b) Any licensee who is required to submit inventory change reports on DOE/NRC Form-741 pursuant to § 75.34 of this chapter (pertaining to implementation of the US/IAEA Safeguards Agreement) shall prepare and submit such reports only as provided in that section instead of as provided in paragraph (a) of this section.

10 CFR § 72.80

§ 72.80 Other records and reports.

(a) Each licensee shall maintain any records and make any reports that may be required by the conditions of the license or by the rules, regulations, and orders of the Commission in effectuating the purposes of the Act.

(b) Each licensee shall furnish a copy of its annual financial report, including the certified financial statements, to the Commission.

(c) Records that are required by the regulations in this part or by the license conditions must be maintained for the period specified by the appropriate regulation or license condition. If a retention period is not otherwise specified, the above records must be maintained until the Commission terminates the license.

(d) Any record that must be maintained pursuant to this part may be either the original or a reproduced copy by any state of the art method provided *31671 that any reproduced copy is duly authenticated by authorized personnel and is capable of producing a clear and legible copy after storage for the period specified by Commission regulations.

10 CFR § 72.82

§ 72.82 Inspections and tests.

(a) Each licensee under this part shall permit inspection by duly authorized representatives of the Commission of its records, premises, and activities and of spent fuel or high-level radioactive waste in its possession related to the specific license as may be necessary to effectuate the purposes of the Act, including section 105 of the Act.

(b) Each licensee under this part shall make available to the Commission for inspection, upon reasonable notice, records kept by the licensee pertaining to its receipt, possession, packaging, or transfer of spent fuel or high-level radioactive waste.

(c)(1) Each licensee under this part shall upon request by the Director, Office of Nuclear Material Safety and Safeguards or the appropriate NRC Regional Administrator provide rent-free office space for the exclusive use of the Commission inspection personnel. Heat, air conditioning, light, electrical outlets and janitorial services shall be furnished by each licensee. The office shall be convenient to and have full access to the installation and shall provide the inspector both visual and acoustic privacy.

(2) For a site with a single storage installation the space provided shall be adequate to accommodate a full-time inspector, a part-time secretary, and transient NRC personnel and will be generally commensurate with other office facilities at the site. A space of 250 sq. ft., either within the site's office complex or in an office trailer, or other onsite space, is suggested as a guide. For sites containing multiple facilities, additional space may be requested to accommodate additional full-time inspectors. The office space that is provided shall be subject to the approval of the Director, Office of Nuclear Material Safety and Safeguards or the appropriate NRC Regional Administrator. All furniture, supplies and Commission equipment will be furnished by the Commission.

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(3) Each licensee under this part shall afford any NRC resident inspector assigned to that site, or other NRC inspectors identified by the Regional Administrator as likely to inspect the installation, immediate unfettered access, equivalent to access provided regular plant employees, following proper identification and compliance with applicable access control measures for security, radiological protection, and personal safety.

(d) Each licensee shall perform, or permit the Commission to perform, such tests as the Commission deems appropriate or necessary for the administrator of the regulations in this part.

(e) A report of the preoperational test acceptance criteria and test results must be submitted to the appropriate Regional Office specified in Appendix A of Part 73 of this chapter with a copy to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, at least 30 days prior to the receipt of spent fuel or high-level radioactive waste.

10 CFR § 72.84

§ 72.84 Violations.

An injunction or other court order may be obtained prohibiting any violation of any provision of the Atomic Energy Act of 1954, as amended, or title II of the Energy Reorganization Act of 1974, as amended, or any regulation or order issued thereunder. A court order may be obtained for the payment of a civil penalty imposed pursuant to section 234 of the Atomic Energy Act for violation of sections 53, 57, 62, 63, 81, or 82 of the Atomic Energy Act, or section 206 of the Energy Reorganization Act of 1974, or any rule, regulation, or order issued thereunder, or any term, condition, or limitation of any license issued thereunder, or for any violation for which a license may be revoked under section 186 of the Atomic Energy Act. Any person who willfully violates any provision of the Atomic Energy Act, or any regulation or order issued thereunder, may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.

Subpart E-Siting Evaluation Factors10 CFR § 72.90

§ 72.90 General considerations.

(a) Site characteristics that may directly affect the safety or environmental impact of the ISFSI or MRS must be investigated and assessed.

(b) Proposed sites for the ISFSI or MRS must be examined with respect to the frequency and the severity of external natural and maninduced events that could affect the safe operation of the ISFSI or MRS.

(c) Design basis external events must be determined for each combination of proposed site and proposed ISFSI or MRS design.

(d) Proposed sites with design basis external events for which adequate protection cannot be provided through ISFSI or MRS design shall be deemed unsuitable for the location of the ISFSI or MRS.

(e) Pursuant to Subpart A of Part 51 of this chapter for each proposed site for an ISFSI and pursuant to sections 141 or 148 of NWPA, as appropriate (96 Stat. 2241, 101 Stat. 1330-235, 42 U.S.C. 10161, 10168) for each proposed site for an MRS, the potential for radiological and other environmental impacts on the region must be evaluated with due consideration of the characteristics of the population, including its distribution, and of the regional environs, including its historical and esthetic values.

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(f) The facility must be sited so as to avoid to the extent possible the long-term and short-term adverse impacts associated with the occupancy and modification of floodplains.

10 CFR § 72.92

§ 72.92 Design basis external natural events.

(a) Natural phenomena that may exist or that can occur in the region of a proposed site must be identified and assessed according to their potential effects on the safe operation of the ISFSI or MRS. The important natural phenomena that affect the ISFSI or MRS design must be identified.

(b) Records of the occurrence and severity of those important natural phenomena must be collected for the region and evaluated for reliability, accuracy, and completeness. The applicant shall retain these records until the license is issued.

(c) Appropriate methods must be adopted for evaluating the design basis external natural events based on the characteristics of the region and the current state of knowledge about such events.

10 CFR § 72.94

§ 72.94 Design basis external man-induced events.

(a) The region must be examined for both past and present man-made facilities and activities that might endanger the proposed ISFSI or MRS. The important potential man-induced events that affect the ISFSI or MRS design must be identified.

(b) Information concerning the potential occurrence and severity of such events must be collected and evaluated for reliability, accuracy, and completeness.

(c) Appropriate methods must be adopted for evaluating the design basis external man-induced events, based on the current state of knowledge about such events.

10 CFR § 72.96

§ 72.96 Siting limitations.

(a) An ISFSI which is owned and operated by DOE must not be located at any site within which there is a ***31672** candidate site for a HLW repository. This limitation shall apply until such² time as DOE decides that such candidate site is no longer a candidate site under consideration for development as a HLW repository.

(b) An MRS must not be sited in any State in which there is located any site approved for site characterization for a HLW repository. This limitation shall apply until such time as DOE decides that the candidate site is no longer a candidate site under consideration for development as a repository. This limitation shall continue to apply to any site selected for construction as a repository.

(c) If an MRS is located, or is planned to be located, within 50 miles of the first HLW repository, any Commission decision approving the first HLW repository application must limit the quantity of spent fuel or high-level radioactive waste that may be stored. This limitation shall prohibit the storage of a quantity of spent fuel containing in excess of 70,000 metric tons of heavy metal, or a quantity of solidified high-level radioactive waste

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resulting from the reprocessing of such a quantity of spent fuel, in both the repository and the MRS until such time as a second repository is in operation.

(d) An MRS authorized by section 142(b) of NWPA (101 Stat. 1330-232, 42 U.S.C. 10162(b)) may not be constructed in the State of Nevada. The quantity of spent nuclear fuel or high-level radioactive waste that may be stored at an MRS authorized by section 142(b) of NWPA shall be subject to the limitations in § 72.44(g) of this part instead of the limitations in paragraph (c) of this section.

10 CFR § 72.98

§ 72.98 Identifying regions around an ISFSI or MRS site.

(a) The regional extent of external phenomena, man-made or natural, that are used as a basis for the design of the ISFSI or MRS must be identified.

(b) The potential regional impact due to the construction, operation or decommissioning of the ISFSI or MRS must be identified. The extent of regional impacts must be determined on the basis of potential measurable effects on the population or the environment from ISFSI or MRS activities.

(c) Those regions identified pursuant to paragraphs (a) and (b) of this section must be investigated as appropriate with respect to:

(1) The present and future character and the distribution of population,

(2) Consideration of present and projected future uses of land and water within the region, and

(3) Any special characteristics that may influence the potential consequences of a release of radioactive material during the operational lifetime of the ISFSI or MRS.

10 CFR § 72.100

§ 72.100 Defining potential effects of the ISFSI or MRS on the region.

(a) The proposed site must be evaluated with respect to the effects on populations in the region resulting from the release of radioactive materials under normal and accident conditions during operation and decommissioning of the ISFSI or MRS; in this evaluation both usual and unusual regional and site characteristics shall be taken into account.

(b) Each site must be evaluated with respect to the effects on the regional environment resulting from construction, operation, and decommissioning for the ISFSI or MRS; in this evaluation both usual and unusual regional and site characteristics must be taken into account.

10 CFR § 72.102

§ 72.102 Geological and seismological characteristics.

(a)(1) East of the Rocky Mountain Front (east of approximately 104° west longitude), except in areas of known seismic activity including but not limited to the regions around New Madrid, MO, Charleston, SC, and Attica, NY, sites will be acceptable if the results from onsite foundation and geological investigation, literature review,

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and regional geological reconnaissance show no unstable geological characteristics, soil stability problems, or potential for vibratory ground motion at the site in excess of an appropriate response spectrum anchored at 0.2 g.

(2) For those sites that have been evaluated under paragraph (a)(1) of this section that are east of the Rocky Mountain Front, and that are not in areas of known seismic activity, a standardized design earthquake (DE) described by an appropriate response spectrum anchored at 0.25 g may be used. Alternatively, a site-specific DE may be determined by using the criteria and level of investigations required by Appendix A of Part 100 of this chapter.

(b) West of the Rocky Mountain Front (west of approximately 104° west longitude), and in other areas of known potential seismic activity, seismicity will be evaluated by the techniques of Appendix A of Part 100 of this chapter. Sites that lie within the range of strong near-field ground motion from historical earthquakes on large capable faults should be avoided.

(c) Sites other than bedrock sites must be evaluated for their liquefaction potential or other soil instability due to vibratory ground motion.

(d) Site-specific investigations and laboratory analyses must show that soil conditions are adequate for the proposed foundation loading.

(e) In an evaluation of alternative sites, those which require a minimum of engineered provisions to correct site deficiencies are preferred. Sites with unstable geologic characteristics should be avoided.

(f) The design earthquake (DE) for use in the design of structures must be determined as follows:

(1) For sites that have been evaluated under the criteria of Appendix A of 10 CFR Part 100, the DE must be equivalent to the safe shutdown earthquake (SSE) for a nuclear power plant.

(2) Regardless of the results of the investigations anywhere in the continental U.S., the DE must have a value for the horizontal ground motion of no less than 0.10 g with the appropriate response spectrum.

10 CFR § 72.104

§ 72.104 Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS.

(a) During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other organ as a result of exposure to:

(1) Planned discharges of radioactive materials, radon and its decay products excepted, to the general environ- ment,

(2) Direct radiation from ISFSI or MRS operations, and

(3) Any other radiation from uranium fuel cycle operations within the region.

(b) Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations.

(c) Operational limits must be established for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations to meet the limits given in paragraph (a) of this section.

10 CFR § 72.106

§ 72.106 Controlled area of an ISFSI or MRS.

(a) For each ISFSI or MRS site, a controlled area must be established.

(b) Any individual located on or beyond the nearest boundary of the controlled area shall not receive a dose greater than 5 rem to the whole body or any organ from any design basis accident. The minimum distance from ***31673** the spent fuel or high-level radioactive waste handling and storage facilities to the nearest boundary of the controlled area shall be at least 100 m eters.

(c) The controlled area may be traversed by a highway, railroad or waterway, so long as appropriate and effective arrangements are made to control traffic and to protect public health and safety.

10 CFR § 72.108

§ 72.108 Spent fuel or high-level radioactive waste transportation.

The proposed ISFSI or MRS must be evaluated with respect to the potential impact on the environment of the transportation of spent fuel or high-level radioactive waste within the region.

Subpart F-General Design Criteria10 CFR § 72.120

§ 72.120 General considerations.

(a) Pursuant to the provisions of § 72.24, an application to store spent fuel in an ISFSI or to store spent fuel or high-level radioactive waste in an MRS must include the design criteria for the proposed storage installation. These design criteria establish the design, fabrication, construction, testing, maintenance and performance requirements for structures, systems, and components important to safety as defined in § 72.3. The general design criteria identified in this subpart establish minimum requirements for the design criteria for an ISFSI or MRS. Any omissions in these general design criteria do not relieve the applicant from the requirement of providing the necessary safety features in the design of the ISFSI or MRS.

(b) The MRS must be designed to store either spent fuel or solid high-level radioactive wastes. Liquid high-level radioactive wastes may not be received or stored in an MRS. If the MRS is a water-pool type facility, the solidi-fied waste form shall be a durable solid with demonstrable leach resistance.

10 CFR § 72.122

§ 72.122 Overall requirements.

(a) Quality Standards. Structures, systems, and components important to safety must be designed, fabricated, erected, and tested to quality standards commensurate with the importance to safety of the function to be performed.

(b) Protection against environmental conditions and natural phenomena. (1) Structures, systems, and compon-

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ents important to safety must be designed to accommodate the effects of, and to be compatible with, site characteristics and environmental conditions associated with normal operation, maintenance, and testing of the ISFSI or MRS and to withstand postulated accidents.

(2) Structures, systems, and components important to safety must be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, lighting, hurricanes, floods, tsunami, and seiches, without impairing their capability to perform safety functions. The design bases for these structures, systems, and components must reflect:

(i) Appropriate consideration of the most severe of the natural phenomena reported for the site and surrounding area, with appropriate margins to take into account the limitations of the data and the period of time in which the data have accumulated, and

(ii) Appropriate combinations of the effects of normal and accident conditions and the effects of natural phenomena.

The ISFSI or MRS should also be designed to prevent massive collapse of building structures or the dropping of heavy objects as a result of building structural failure on the spent fuel or high-level radioactive waste or on to structures, systems, and components important to safety.

(3) Capability must be provided for determining the intensity of natural phenomena that may occur for comparison with design bases of structures, systems, and components important to safety.

(4) If the ISFSI or MRS is located over an aquifer which is a major water resource, measures must be taken to preclude the transport of radioactive materials to the environment through this potential pathway.

(c) Protection against fires and explosions. Structures, systems, and components important to safety must be designed and located so that they can continue to perform their safety functions effectively under credible fire and explosion exposure conditions. Noncombustible and heat-resistant materials must be used wherever practical throughout the ISFSI or MRS, particularly in locations vital to the control of radioactive materials and to the maintenance of safety control functions. Explosion and fire detection, alarm, and suppression systems shall be designed and provided with sufficient capacity and capability to minimize the adverse effects of fires and explosions on structures, systems, and components important to safety. The design of the ISFSI or MRS must include provisions to protect against adverse effects that might result from either the operation or the failure of the fire suppression system.

(d) Sharing of structures, systems, and components. Structures, systems, and components important to safety must not be shared between an ISFSI or MRS and other facilities unless it is shown that such sharing will not impair the capability of either facility to perform its safety functions, including the ability to return to a safe condition in the event of an accident.

(e) Proximity of sites. An ISFSI or MRS located near other nuclear facilities must be designed and operated to ensure that the cumulative effects of their combined operations will not constitute an unreasonable risk to the health and safety of the public.

(f) Testing and maintenance of systems and components. Systems and components that are important to safety must be designed to permit inspection, maintenance, and testing.

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(g) Emergency capability. Structures, systems, and components important to safety must be designed for emergencies. The design must provide for accessibility to the equipment of onsite and available offsite emergency facilities and services such as hospitals, fire and police departments, ambulance service, and other emergency agencies.

(h) Confinement barriers and systems. (1) The spent fuel cladding must be protected during storage against degradation that leads to gross ruptures or the fuel must be otherwise confined such that degradation of the fuel during storage will not pose operational safety problems with respect to its removal from storage. This may be accomplished by canning of consolidated fuel rods or unconsolidated assemblies or other means as appropriate.

(2) For underwater storage of spent fuel or high-level radioactive waste in which the pool water serves as a shield and a confinement medium for radioactive materials, systems for maintaining water purity and the pool water level must be designed so that any abnormal operations or failure in those systems from any cause will not cause the water level to fall below safe limits. The design must preclude installations of drains, permanently connected systems, and other features that could, by abnormal operations or failure, cause a significant loss of water. Pool water level equipment must be provided to alarm in a continuously manned location if the water level in the storage pools falls below a predetermined level.

(3) Ventilation systems and off-gas systems must be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions.

(4) Storage confinement systems must have the capability for continuous monitoring in a manner such that the ***31674** licensee will be able to determine when corrective action needs to be taken to maintain safe storage conditions.

(5) The high-level radioactive waste must be packaged in a manner that allows handling and retrievability without the release of radioactive materials to the environment or radiation exposures in excess of Part 20 limits. The package must be designed to confine the high-level radioactive waste for the duration of the license.

(i) Instrumentation and control systems. Instrumentation and control systems must be provided to monitor systems that are important to safety over anticipated ranges for normal operation and off-normal operation. Those instruments and control systems that must remain operational under accident conditions must be identified in the Safety Analysis Report.

(j) Control room or control area. A control room or control area, if appropriate for the ISFSI or MRS design, must be designed to permit occupancy and actions to be taken to monitor the ISFSI or MRS safely under normal conditions, and to provide safe control of the ISFSI or MRS under off-normal or accident conditions.

(k) Utility or other services. (1) Each utility service system must be designed to meet emergency conditions. The design of utility services and distribution systems that are important to safety must include redundant systems to the extent necessary to maintain, with adequate capacity, the ability to perform safety functions assuming a single failure.

(2) Emergency utility services must be designed to permit testing of the functional operability and capacity, including the full operational sequence, of each system for transfer between normal and emergency supply sources; and to permit the operation of associated safety systems.

(3) Provisions must be made so that, in the event of a loss of the primary electric power source or circuit, reliable and timely emergency power will be provided to instruments, utility service systems, the central security alarm station, and operating systems, in amounts sufficient to allow safe storage conditions to be maintained and to permit continued functioning of all systems essential to safe storage.

(4) An ISFSI or MRS which is located on the site of another facility may share common utilities and services with such a facility and be physically connected with the other facility; however, the sharing of utilities and services or the physical connection must not significantly:

(i) Increase the probability or consequences of an accident or malfunction of components, structures, or systems that are important to safety; or

(ii) Reduce the margin of safety as defined in the basis for any technical specifications of either facility.

(1) Retrievability. Storage systems must be designed to allow ready retrieval of spent fuel or high-level radioactive waste for further processing or disposal.

10 CFR § 72.124

§ 72.124 Criteria for nuclear criticality safety.

(a) Design for criticality safety. Spent fuel handling, packaging, transfer, and storage systems must be designed to be maintained subcritical and to ensure that, before a nuclear criticality accident is possible, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. The design of handling, packaging, transfer, and storage systems must include margins of safety for the nuclear criticality parameters that are commensurate with the uncertainties in the data and methods used in calculations and demonstrate safety for the handling, packaging, transfer and storage conditions and in the nature of the immediate environment under accident conditions.

(b) Methods of criticality control. When practicable the design of an ISFSI or MRS must be based on favorable geometry, permanently fixed neutron absorbing materials (poisons), or both. Where solid neutron absorbing materials are used, the design shall provide for positive means to verify their continued efficacy.

(c) Criticality Monitoring. A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under this subpart is not required.

10 CFR § 72.126

§ 72.126 Criteria for radiological protection.

(a) Exposure control. Radiation protection systems must be provided for all areas and operations where onsite personnel may be exposed to radiation or airborne radioactive materials. Structures, systems, and components for which operation, maintenance, and required inspections may involve occupational exposure must be designed, fabricated, located, shielded, controlled, and tested so as to control external and internal radiation exposures to personnel. The design must include means to:

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(1) Prevent the accumulation of radioactive material in those systems requiring access;

(2) Decontaminate those systems to which access is required;

(3) Control access to areas of potential contamination or high radiation within the ISFSI or MRS;

(4) Measure and control contamination of areas requiring access;

(5) Minimize the time required to perform work in the vicinity of radioactive components; for example, by providing sufficient space for ease of operation and designing equipment for ease of repair and replacement; and

(6) Shield personnel from radiation exposure.

(b) Radiological alarm systems. Radiological alarm systems must be provided in accessible work areas as appropriate to warn operating personnel of radiation and airborne radioactive material concentrations above a given setpoint and of concentrations of radioactive material in effluents above control limits. Radiation alarm systems must be designed with provisions for calibration and testing their operability.

(c) Effluent and direct radiation monitoring. (1) As appropriate for the handling and storage system, effluent systems must be provided. Means for measuring the amount of radionuclides in effluents during normal operations and under accident conditions must be provided for these systems. A means of measuring the flow of the diluting medium, either air or water, must also be provided.

(2) Areas containing radioactive materials must be provided with systems for measuring the direct radiation levels in and around these areas.

(d) Effluent control. The ISFSI or MRS must be designed to provide means to limit to levels as low as is reasonably achievable the release of radioactive materials in effluents during normal operations; and control the release of radioactive materials under accident conditions. Analyses must be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in § 72.104. Analyses of design basis accidents must be made to show that releases to the general environment will be within the exposure limits given in *31675 § 72.106. Systems designed to monitor the release of radioactive materials must have means for calibration and testing their operability.

10 CFR § 72.128

§ 72.128 Criteria for spent fuel, high-level radioactive waste, and other radioactive waste storage and handling.

(a) Spent fuel and high-level radioactive waste storage and handling systems. Spent fuel storage, high-level radioactive waste storage, and other systems that might contain or handle radioactive materials associated with spent fuel or high-level radioactive waste, must be designed to ensure adequate safety under normal and accident conditions. These systems must be designed with—

(1) A capability to test and monitor components important to safety,

(2) Suitable shielding for radioactive protection under normal and accident conditions,

(3) Confinement structures and systems,

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(4) A heat-removal capability having testability and reliability consistent with its importance to safety, and

(5) means to minimize the quantity of radioactive wastes generated.

(b) Waste treatment. Radioactive waste treatment facilities must be provided. Provisions must be made for the packing of site-generated low-level wastes in a form suitable for storage onsite awaiting transfer to disposal sites.

10 CFR § 72.130

§ 72.130 Criteria for decommissioning.

The ISFSI or MRS must be designed for decommissioning. Provisions must be made to facilitate decontamination of structures and equipment, minimize the quantity of radioactive wastes and contaminated equipment, and facilitate the removal of radioactive wastes and contaminated materials at the time the ISFSI or MRS is permanently decommissioned.

Subpart G-Quality Assurance10 CFR § 72.140

§ 72.140 Quality assurance requirements.

(a) Purpose. This subpart describes quality assurance requirements applying to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems, and components, and decommissioning that are important to safety. As used in this subpart, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of the material or component to predetermined requirements.

(b) Establishment of program. Each licensee [FN2] shall establish, maintain, and execute a quality assurance program satisfying each of the applicable criteria of this subpart, and satisfying any specific provisions which are applicable to the licensee's activities. The licensee shall execute the applicable criteria in a graded approach to an extent that is commensurate with the importance to safety. The quality assurance program must cover the activities identified in § 72.24(n) throughout the life of the licensed activity, from the site selection through decommissioning, prior to termination of the license.

FN2 While the term "licensee" is used in these criteria, the requirements are applicable to whatever design, construction, fabrication, assembly, and testing is accomplished with respect to structures, systems, and components prior to the time a license is issued.

(c) Approval of program. Prior to receipt of spent fuel at the ISFSI or spent fuel and high-level radioactive waste at the MRS, each licensee shall obtain Commission approval of its quality assurance program. Each licensee shall file a description of its quality assurance program, including a discussion of which requirements of this subpart are applicable and how they will be satisfied, with the Director, Office of Nuclear Material and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

(d) Previously approved programs. A Commission-approved quality assurance program which satisfies the ap-

plicable criteria of Appendix B to Part 50 of this chapter and which is established, maintained, and executed with regard to an ISFSI will be accepted as satisfying the requirements of paragraph (b) of this section. Prior to first use, the licensee shall notify the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, of its intent to apply its previously approved Appendix B program to ISFSI activities. The licensee shall identify the program by date of submittal to the Commission, docket number, and date of Commission approval.

10 CFR § 72.142

§ 72.142 Quality assurance organization.

The licensee shall be responsible for the establishment and execution of the quality assurance program. The licensee may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, but shall retain responsibility for the program. The licensee shall clearly establish and delineate in writing the authority and duties of persons and organizations performing activities affecting the functions of structures, systems and components which are important to safety. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions. The quality assurance functions are:

(a) Assuring that an appropriate quality assurance program is established and effectively executed and

(b) Verifying, by procedures such as checking, auditing, and inspection, that activities affecting the functions that are important to safety have been correctly performed. The persons and organizations performing quality assurance functions must have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.

The persons and organizations performing quality assurance functions shall report to a management level that ensures that the required authority and organizational freedom, including sufficient independence from cost and schedule considerations when these considerations are opposed to safety considerations, are provided. Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational freedom. Irrespective of the organizational structure, the individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program at any location where activities subject to this section are being performed must have direct access to the levels of management necessary to perform this function.

10 CFR § 72.144

§ 72.144 Quality assurance program.

(a) The licensee shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of this subpart. The licensee shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with these procedures *31676 throughout the period during which the ISFSI or MRS is licensed. The licensee shall identify the structures, systems, and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organ-

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izations.

(b) The licensee, through its quality assurance program, shall provide control over activities affecting the quality of the identified structures, systems, and components to an extent commensurate with the importance to safety, and as necessary to ensure conformance to the approved design of each ISFSI or MRS. The licensee shall ensure that activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied. The licensee shall take into account the need for special controls, processes, test equipment, tools and skills to attain the required quality and the need for verification of quality by inspection and test.

(c) The licensee shall base the requirements and procedures of its quality assurance program on the following considerations concerning the complexity and proposed use of the structures, systems, or components:

(1) The impact of malfunction or failure of the item on safety;

(2) The design and fabrication complexity or uniqueness of the item;

(3) The need for special controls and surveillance over processes and equipment;

(4) The degree to which functional compliance can be demonstrated by inspection or test; and

(5) The quality history and degree of standardization of the item.

(d) The licensee shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to ensure that suitable proficiency is achieved and maintained. The licensee shall review the status and adequacy of the quality assurance program at established intervals. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing.

10 CFR § 72.146

§ 72.146 Design control.

(a) The licensee shall establish measures to ensure that applicable regulatory requirements and the design basis, as specified in the license application for those structures, systems, and components to which this section applies, are correctly translated into specifications, drawings, procedures, and instructions. These measures must include provisions to ensure that appropriate quality standards are specified and included in design documents and that deviations from standards are controlled. Measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety.

(b) The licensee shall establish measures for the identification and control of design interfaces and for coordination among participating design organizations. These measures must include the establishment of written procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces. The design control measures must provide for verifying or checking the adequacy of design, by methods such as design reviews, alternate or simplified calculational methods, or by a suitable testing program. For the verifying or checking process, the licensee shall designate individuals or

groups other than those who were responsible for the original design, but who may be from the same organization. Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, the licensee shall include suitable qualification testing of a prototype or sample unit under the most adverse design conditions. The licensee shall apply design control measures to items such as the following: criticality physics, radiation, shielding, stress, thermal, hydraulic, and accident analyses; compatibility of materials; accessibility for inservice inspection, maintenance, and repair; features to facilitate deconstamination; and delineation of acceptance criteria for inspections and tests.

(c) The licensee shall subject design changes, including field changes, to design control measures commensurate with those applied to the original design. Changes in the conditions specified in the license require NRC approv- al.

10 CFR § 72.148

§ 72.148 Procurement document control.

The licensee shall establish measures to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are included or referenced in the documents for procurement of material, equipment, and services, whether purchased by the licensee or by its contractors or subcontractors. To the extent necessary, the licensee shall require contractors or subcontractors to provide a quality assurance program consistent with the applicable provisions of this subpart.

10 CFR § 72.150

§ 72.150 Instructions, procedures, and drawings.

The licensee shall prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall require that these instructions, procedures, and drawings be followed. The instructions, procedures, and drawings must include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

10 CFR § 72.152

§ 72.152 Document control.

The licensee shall establish measures to control the issuance of documents such as instructions, procedures, and drawings, including changes, which prescribe all activities affecting quality. These measures must assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed. These measures must ensure that changes to documents are reviewed and approved.

10 CFR § 72.154

§ 72.154 Control of purchased material, equipment, and services.

(a) The licensee shall establish measures to ensure that purchased material, equipment and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These mesaures must include provisions, as appropriate, for source evaluation and selection, objective evidence of

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quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery.

(b) The licensee shall have available documentary evidence that material and equipment conform to the procurement specifications prior to installation or use of the material and equipment. The licensee shall retain or have available this documentary evidence for the life of ISFSI or MRS. The licensee shall ensure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment.

*31677 (c) The licensee or designee shall assess the effectiveness of the control of quality by contractors and subcontractors at intervals consistent with the importance, complexity, and quantity of the product or services.

10 CFR § 72.156

§ 72.156 Identification and control of materials, parts, and components.

The licensee shall establish measures for the identification and control of materials, parts, and components. These measures must ensure that identification of the item is maintained by heat number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item as required, . throughout fabrication, installation, and use of the item. These identification and control measures must be designed to prevent the use of incorrect or defective materials, parts, and components.

10 CFR § 72.158

§ 72.158 Control of special processes.

The licensee shall establish measures to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applic able codes, standards, specifications, criteria, and other special requirements.

10 CFR § 72.160

§ 72.160 Licensee inspection.

The licensee shall establish and execute a program for inspection of activities affecting quality by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. The inspection must be performed by individuals other than those who performed the activity being inspected. Examinations, measurements, or tests of material or products processed must be performed for each work operation where necessary to assure quality. If direct inspection of processed material or products cannot be carried out, indirect control by monitoring processing methods, equipment, and personnel must be provided. Both inspection and process monitoring must be provided when quality control is inadequate without both. If mandatory inspection hold points, which require witnessing or inspecting by the licensee's designated representative and beyond which work should not proceed without the consent of its designated representative, are required, the specific hold points must be indicated in appropriate documents.

10 CFR § 72.162

§ 72.162 Test control.

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The licensee shall establish a test program to ensure that all testing required to demonstrate that the structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures that incorporate the requirements of this part and the requirements and acceptance limits contained in the ISFSI or MRS license. The test procedures must include provisions for assuring that all pre-requisites for the given test are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. The licensee shall document and evaluate the test results to ensure that test requirements have been satisfied.

10 CFR § 72.164 '

§ 72.164 Control of measuring and test equipment.

The licensee shall establish measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

10 CFR § 72.166

§ 72.166 Handling, storage, and shipping control.

The licensee shall establish measures to control, in accordance with work and inspection instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided.

10 CFR § 72.168

§ 72.168 Inspection, test, and operating status.

(a) The licensee shall establish measures to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the ISFSI or MRS. These measures must provide for the identification of items which have satisfactorily passed required inspections and tests where necessary to preclude inadvertent by passing of the inspections and tests.

(b) The licensee shall establish measures to identify the operating status of structures, systems, and components of the ISFSI or MRS, such as tagging valves and switches, to prevent inadvertent operation.

10 CFR § 72.170

§ 72.170 Nonconforming materials, parts, or components.

The licensee shall establish measures to control materials, parts, or components that do not conform to the licensee's requirements in order to prevent their inadvertent use or installation. These measures must include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.

10 CFR § 72.172

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§ 72.172 Corrective action.

The licensee shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of a significant condition adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action is taken to preclude repetition. The identification of the significant condition adverse to quality, the corrective action taken must be documented and reported to appropriate levels of management.

10 CFR § 72.174

§ 72.174 Quality assurance records.

The licensee shall maintain sufficient records to furnish evidence of activities affecting quality. The records must include the following: design records, records of use and the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. The records must include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records must, at a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any noted deficiencies. Records must be identifiable and retrievable. Records pertaining to the design, fabrication, erection, testing, maintenance, and use of structures, systems, and components important to safety shall be maintained by or under the control of the licensee until the Commission terminates the license.

10 CFR § 72.176

§ 72.176 Audits.

The licensee shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the quality assurance program and to determine the ***31678** effectiveness of the program. The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibilities in the areas being audited. Audited results must be documented and reviewed by management having responsibility in the area audited. Follow-up action, including re-audit of deficient areas, must be taken where indicated.

Subpart H-Physical Protection 10 CFR § 72.180

§ 72.180 Physical security plan.

The licensee shall establish a detailed plan for security measures for physical protection. The licensee shall retain a copy of the current plan as a record until the Commission terminates the license for which the procedures were developed and, if any portion of the plan is superseded, retain the superseded material for three years after each change. This plan must consist of two parts. Part I must demonstrate how the applicant plans to comply with the applicable requirements of Part 73 of this chapter and during transportation to and from the proposed ISFSI or MRS and must include the design for physical protection and the licensee's safeguards contingency plan and guard training plan. Part II must list tests, inspections, audits, and other means to be used to demonstrate compliance with such requirements.

10 CFR § 72.182

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§ 72.182 Design for physical protection.

The design for physical protection must show the site layout and the design features provided to protect the ISF-SI or MRS from sabotage. It must include:

(a) The design criteria for the physical protection of the proposed ISFSI or MRS;

(b) The design bases and the relation of the design bases to the design criteria submitted pursuant to paragraph (a) of this section; and

(c) Information relative to materials of construction, equipment, general arrangement, and proposed quality assurance program sufficient to provide reasonable assurance that the final security system will conform to the design bases for the principal design criteria submitted pursuant to paragraph (a) of this section.

10 CFR § 72.184

§ 72.184 Safeguards contingency plan.

(a) The requirements of the licensee's safeguards contingency plan for dealing with threats and radiological sabotage must be as defined in § 73.40(b) of this chapter. This plan must include Background, Generic Planning Base, Licensee Planning Base, and Responsibility Matrix, the first four categories of information relating to nuclear facilities licensed under Part 50 of this chapter. (The fifth category of information, Procedures, does not have to be submitted for approval.)

(b) The licensee shall prepare and maintain safeguards contingency plan procedures in accordance with Appendix C to 10 CFR Part 73 for effecting the actions and decisions contained in the Responsibility Matrix of the licensee's safeguards contingency plan. The licensee shall retain a copy of the current procedures as a record until the Commission terminates the license for which the procedures were developed and, if any portion of the procedures is superseded, retain the superseded material for three years after each change.

10 CFR § 72.186

§ 72.186 Change to physical security and safeguards contingency plans.

(a) The licensee shall make no change that would decrease the safeguards effectiveness of the physical security plan, guard training plan or the first four categories of information (Background, Generic Planning Base, Licensee Planning Base, and Responsibility Matrix) contained in the licensee safeguards contingency plan without prior approval of the Commission. A licensee desiring to make a change must submit an application for a license amendment pursuant to § 72.56.

(b) The licensee may, without prior Commission approval, make changes to the physical security plan, guard training plan, or the safeguards contingency plan, if the changes do not decrease the safeguards effectiveness of these plans. The licensee shall maintain records of changes to any such plan made without prior approval for a period of three years from the date of the change and shall furnish to the Regional Administrator of the appropriate NRC Regional Office specified in Appendix A of Part 73 of this chapter, with a copy to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, a report containing a description of each change within two months after the change is made.

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Subpart I-Training and Certification of Personnel10 CFR § 72.190

§ 72.190 Operator requirements.

Operation of equipment and controls that have been identified as important to safety in the Safety Analysis Report and in the license must be limited to trained and certified personnel or be under the direct visual supervision of an individual with training and certification in the operation. Supervisory personnel who personally direct the operation of equipment and controls that are important to safety must also be certified in such operations.

10 CFR § 72.192

§ 72.192 Operator training and certification program.

The applicant for a license under this part shall establish a program for training, proficiency testing, and certification of ISFSI or MRS personnel. This program must be submitted to the Commission for approval with the license application.

10 CFR § 72.194

§ 72.194 Physical requirements.

The physical condition and the general health of personnel certified for the operation of equipment and controls that are important to safety must not be such as might cause operational errors that could endanger other in-plant personnel or the public health and safety. Any condition that might cause impaired judgment or motor coordination must be considered in the selection of personnel for activities that are important to safety. These conditions need not categorically disqualify a person, if appropriate provisions are made to accommodate such defect.

Subpart J-Provision of MRS Information to State Governments and Indian Tribes10 CFR § 72.200

§ 72.200 Provision of MRS information.

(a) The Director, Office of Nuclear Material Safety and Safeguards, or the Director's designee shall provide to the Governor and legislature of any State in which an MRS authorized under the Nuclear Waste Policy Act of 1982, as amended, is or may be located, to the Governors of any contiguous States, to each affected unit of local government and to the governing body of any affected Indian tribe, timely and complete information regarding determinations or plans made by the Commission with respect to siting, development, design, licensing, construction, operation, regulation or decommissioning of such monitored retrievable storage facility.

(b) Notwithstanding paragraph (a) of this section, the Director or the Director's designee is not required to distribute any document to any entity if, with respect to such document, that entity or its counsel is included on a service list prepared pursuant to Part 2 of this chapter.

(c) Copies of all communications by the Director or the Director's designee under this section shall be placed in the *31679 Commission's Public Document Room and shall be furnished to DOE.

10 CFR § 72.202

§ 72.202 Participation in license reviews.

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State and local governments and affected Indian tribes may participate in license reviews as provided in Subpart G of Part 2 of this chapter.

10 CFR § 72.204

§ 72.204 Notice to States.

If the Governor and legislature of a State have jointly designated on their behalf a single person or entity to receive notice and information from the Commission under this part, the Commission will provide such notice and information to the jointly designated person or entity instead of the Governor and the legislature separately.

10 CFR § 72.206

§ 72.206 Representation.

Any person who acts under this subpart as a representative for a State (or for the Governor or legislature thereof) or for an affected Indian tribe shall include in the request or other submission, or at the request of the Commission, a statement of the basis of his or her authority to act in such representative capacity.

The following conforming amendments are also made to other parts of the Commission's regulations in Chapter 1, Title 10 of the Code of Federal Regulations.

PART 2—RULES OF PRACTICE FOR DOMESTIC LICENSING PROCEEDINGS2. The authority citation for Part 2 is revised to read as follows:

Authority: Secs. 161, 181, 68 Stat. 948, 953, as amended (42 U.S.C. 2201, 2231); sec. 191, as amended, Pub. L. 87-615, 76 Stat. 409 (42 U.S.C. 2241); sec. 201, 88 Stat. 1242, as amended (42 U.S.C. 5841); 5 U.S.C. 552.

Section 2.101 also issued under secs. 53, 62, 81, 103, 104, 105, 68 Stat. 930, 932, 933, 935, 936, 937, 938, as amended (42 U.S.C. 2073, 2092, 2093, 2111, 2133, 2134, 2135); sec. 102, Pub. L. 91-190, 83 Stat. 853, as amended (42 U.S.C. 4332); sec. 301, 88 Stat. 1248 (42 U.S.C. 5871). Sections 2.102, 2.103, 2.104, 2.105, 2.721 also issued under secs. 102, 103, 104, 105, 183; 189, 68 Stat. 936, 937, 938, 954, 955, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2233, 2239). Section 2.105 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239). Sections 2.200-2.206 also issued under secs. 186, 234, 68 Stat. 955, 83 Stat. 444, as amended (42 U.S.C. 2236, 2282); sec. 206, 88 Stat. 1246 (42 U.S.C. 5846). Sections 2.600-2.606 also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853 as amended (42 U.S.C. 4332). Sections 2.700a, 2.719 also issued under 5 U.S.C. 544. Sections 2.754, 2.760, 2.770 also issued under 5 U.S.C. 557. Section 2.764 and Table 1A of Appendix C also issued under sec. 103, 68 Stat. 936, as amended (42 U.S.C. 2133) and 5 U.S.C. 552. Sections 2.800 and 2.808 also issued under sec. 103, 68 Stat. 936, as amended (42 U.S.C. 2133) and 5 U.S.C. 553 and sec. 29, Pub. L. 85-256, 71 Stat. 579, as amended (42 U.S.C. 10154). Appendix A also issued under sec. 6, Pub. L. 91-560, 84 Stat. 1473 (42 U.S.C. 2135). Appendix B also issued under sec. 10, Pub. L. 99-240, 99 Stat. 1859 (42 U.S.C. 2021j).

10 CFR § 2.104

3. In § 2.104, paragraph (c) is revised to read as follows:

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10 CFR § 2.104

§ 2.104 Notice of hearing.

* * * * *

(e) The Secretary will give timely notice of the hearing to all parties and to other persons, if any, entitled by law to notice. The Secretary will transmit a notice of hearing on an application for a license for a production or utilization facility, for a license for receipt of waste radioactive material from other persons for the purpose of commercial disposal by the waste disposal licensee, for a license under Part 61 of this chapter, for a license to receive and possess high-level radioactive waste at a geologic repository operations area pursuant to Part 60 of this chapter, and for a license under Part 72 of this chapter to acquire, receive or possess spent fuel for the purpose of storage in an independent spent fuel storage installation (ISFSI) to the governor or other appropriate official of the State and to the chief executive of the municipality in which the facility is to be located or the activity is to be conducted or, if the facility is not to be located or the activity conducted within a municipality, to the chief executive of the county (or to the Tribal organization, if it is to be so located or conducted within an Indian reservation). The Secretary will transmit a notice of hearing on an application for a license under Part 72 of this chapter to acquire, receive or possess spent fuel, high-level radioactive waste or radioactive material associated with high-level radioactive waste for the purpose of storage in a monitored retrievable storage installation (MRS) to the same persons who received the notice of docketing under § 72.16(e) of this chapter.

10 CFR § 2.105

4. In § 2.105, paragraph (a) is amended by deleting the word "or" at the end of paragraph (6), by redesignating paragraphs (7), (8) and (9) as paragraphs (9), (10) and (11) and by adding new paragraphs (7) and (8) to read as follows:

10 CFR § 2.105

§ 2.105 Notice of proposed action.

(a) * * *

(7) A license under Part 72 of this chapter to acquire, receive or possess spent fuel for the purpose of storage in an independent spent fuel storage installation (ISFSI) or to acquire, receive or possess spent fuel, high-level radioactive waste or radioactive material associated with high-level radioactive waste for the purpose of storage in a monitored retrievable storage installation (MRS);

(8) An amendment to a license specified in paragraph (a)(7) of this section when such an amendment presents a genuine issue as to whether the health and safety of the public will be significantly affected; or

* * * * *

10 CFR § 2.764

5. In § 2.764, paragraph (c) is revised to read as follows:

10 CFR § 2.764

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이 집 사람은 것 같아요. 같은 것 같은 것 같은 것 같은 것 같은 것 같이 많이 있다.

§ 2.764 Immediate effectiveness of initial decision directing issuance or amendment of construction permit or operating license.

* * * * *

(c) An initial decision directing the issuance of an initial license for the construction and operation of an independent spent fuel storage installation (ISFSI) or monitored retrievable storage installation (MRS) under 10 CFR Part 72 shall become effective only upon order of the Commission. The Director of Nuclear Material Safety and Safeguards shall not issue an initial license for the construction and operation of an independent spent fuel storage installation (ISFSI) or a monitored retrievable storage installation (MRS) under 10 CFR Part 72 until expressly authorized to do so by the Commission.

* * * * *

6. In Appendix C, Table 1A, is revised to read as follows:

Appendix C-General Statement of Policy and Procedure for NRC Enforcement Actions

* * * * *

Table 1A -- Base Civil Penalties -----Plant Saféguards Transportation operations, construction, health physics and an EP Greater than Type A Type A quantity quantity or less [FN1] [FN2] a. Power reactors \$100,000 \$100,000 \$100,000 \$5,000 b. Test reactors 10,000 10,000 10,000 2,000 c. Research reactors and critical facilities 5,000 5,000 5,000 1,000 d. Fuel fabricators and industrial processors [FN3] 25,000 [FN4] 100,000 25,000 5,000 e. Mills and uranium conversion facilities 10,000 -- 5,000 2,000 f. Industrial users of material [FN5] 10,000 -- 5,000 2,000

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g. Waste disposal licensees 10,000 -- 5,000 2,000 h. Academic or medical institutions [FN6] 5,000 -- 2,500 1,000

i. Independent spent fuel and monitored

i. Other material

licensees 1,000 -- 2,500 1,000

1 Includes irradiated fuel, high level waste, unirradiated fissile material and any other quantities requiring Type B packaging.

2 Includes low specific activity waste (LSA), low level waste, Type A packages, and excepted quantities and articles.

3 Large firms engaged in manufacturing (or distribution of byproduct, source, or special nuclear material.

4 This amount refers to Category 1 licensees (or defined in 10 CFR 73.2(bb)). Licensed fuel fabricators not authorized to possess Category 1 material have a base penalty amount of \$50,000.

5 Includes industrial radiographers, nuclear pharmacies, and other industrial

users.

6 This applies to nonprofit institutions not otherwise categorized under sections "a" through "g" in this table.

*31680 PART 19—NOTICES, INSTRUCTIONS, AND REPORTS TO WORKERS; INSPECTIONS7. The authority citation for Part 19 is revised to read as follows:

Authority: Secs. 53, 63, 81, 103, 104, 161, 186, 68, Stat. 930, 933, 935, 936, 937, 948, 955, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2073, 2093, 2111, 2133, 2134, 2201, 2236, 2282); sec. 201, 88 Stat. 1242, as amended (42 U.S.C. 5841). Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851).

-10 CFR § 19.11

10 CFR § 19.12

10 CFR § 19.13

10 CFR § 19.14

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273); §§ 19.11(a), (c), (d), and (e) and 19.12 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); and §§ 19.13 and 19.14(a) are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

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10 CFR § 19.2

8. Section 19.2 is revised to read as follows:

10 CFR § 19.2

§ 19.2 Scope.

The regulations in this part apply to all persons who receive, possess, use, or transfer material licensed by the Nuclear Regulatory Commission pursuant to the regulations in Parts 30 through 35, 39, 40, 60, 61, 70, or 72 of this chapter, including persons licensed to operate a production or utilization facility pursuant to Part 50 of this chapter.

10 CFR § 19.3

9. In § 19.3, paragraph (d) is revised to read as follows:

10 CFR § 19.3

§ 19.3 Definitions.

* * * * *

(d) "License" means a license issued under the regulations in Parts 30 through 35, 39, 40, 60, 61, 70, or 72 of this chapter, including licenses to operate a production or utilization facility pursuant to Part 50 of this chapter. "Licensee" means the holder of such a license.

* * * * *

PART 20—STANDARDS FOR PROTECTION AGAINST RADIATION10. The authority citation for Part 20 is revised to read as follows:

Authority: Secs. 53, 63, 65, 81, 103, 104, 161, 68 Stat. 930, 933, 935, 936, 937, 948, as amended (42 U.S.C. 2073, 2093, 2095, 2111, 2133, 2134, 2201); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846).

Section 20.408 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161).

10 CFR § 20.101 10 CFR § 20.102 10 CFR § 20.103 10 CFR § 20.104 10 CFR § 20.105 10 CFR § 20.106

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10 CFR § 20.201 10 CFR § 20.202 10 CFR § 20.205 10 CFR § 20.207 10 CFR § 20.301 10 CFR § 20.303 10 CFR § 20.304 10 CFR § 20.305

10 CFR § 20.408

10 CFR § 20.409

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), §§ 20.101, 20.102, 20.103 (a), (b) and (f), 20.104 (a) and (b), 20.105(b), 20.106(a), 20.201, 20.202(a), 20.205, 20.207, 20.301, 20.303, 20.304, and 20.305 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); and §§ 20.102, 20.103(e), 20.401-20.407, 20.408(b) and 20.409 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

10 CFR § 20.2

11. Section 20.2 is revised to read as follows:

10 CFR § 20.2

§ 20.2 Scope.

The regulations in this part apply to all persons who receive, possess, use, or transfer material licensed pursuant to the regulations in Parts 30 through 35, 39, 40, 60, 61, 70, or 72 of this chapter, including persons licensed to operate a production or utilization facility pursuant to Part 50 of this chapter.

10 CFR § 20.408

12. In § 20.408, paragraph (a)(5) is revised to read as follows:

10 CFR § 20.408

§ 20.408 Reports of personnel monitoring on termination of employment or work.

(a) This section applies to each person licensed by the Commission to:

* * * * *

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(5) Possess spent fuel in an independent spent fuel storage installation (ISFSI) or possess spent fuel or high level radioactive waste in a monitored retrievable storage installation (MRS) pursuant to Part 72 of this chapter; or

* * * * *

PART 21—REPORTING OF DEFECTS AND NONCOMPLIANCE13. The authority citation for Part 21 is revised to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2201, 2282); secs. 201, as amended, 206, 88 Stat. 1242, as amended, 1246 (42 U.S.C. 5841, 5846).

Sec. 21.2 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161).

10 CFR § 21.6 10 CFR § 21.21 10 CFR § 21.31 10 CFR § 21.41 10 CFR § 21.51

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273); \S 21.6, 21.21(a) and 21.31 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); and \S 21.21, 21.41 and 21.51 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

10 CFR § 21.2

14. Section 21.2 is revised to read as follows:

10 CFR § 21.2

§ 21.2 Scope.

The regulations in this part apply, except as specifically provided otherwise in Parts 31, 34, 35, 39, 40, 60, 61, 70, or 72 of this chapter, to each individual, partnership, corporation, or other entity licensed pursuant to the ***31681** regulations in this chapter to possess, use, and/or transfer within the United States source material, byproduct material, special nuclear material, and/or spent fuel and high-level radioactive waste, or to construct, manufacture, possess, own, operate and/or transfer within the United States, any production or utilization facility, or independent spent fuel storage installation (ISFSI) or monitored retrievable storge installation (MRS), and to each director (see § 21.3(f)) and responsible officer (see § 21.3(j)) of such a licensee. The regulations in this part apply also to each individual, corporation, partnership or other entity doing business within the United States, and each director and responsible officer of such organization that constructs (see § 21.3(c)) a production or utilization facility licensed for manufacture, construction or operation (see § 21.3(h)) pursuant to Part 50 of this chapter, an independent spent fuel storage installation (ISFSI) for the storage of spent fuel licensed pursuant to Part 72 of this chapter or a monitored retrievable storage installation (MRS) for the storage of spent fuel or high-level radioactive waste licensed pursuant to Part 72 of this chapter or a facility or activity licensed, other than for export, under Parts 30, 39, 40, 50, 60, 61,

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70, 71, or 72 of this chapter. Nothing in these regulations should be deemed to preclude either an individual or a manufacturer/supplier of a commerical grade item (see § 21.3(a-1)) not subject to the regulations in this part from reporting to the Commission a known or suspected defect or failure to comply and, as authorized by law, the identity of anyone so reporting will be withheld from disclosure.[FN1]

FNI NRC Regional Officers will accept collect telephone calls from individuals who wish to speak to NRC representatives concerning nuclear safety-related problems. The location and telephone numbers (for nights and holidays as well as regular hours) are listed below:

Region:

Ι	(Philadelphia)	
II	(Atlanta)	
III	(Chicago)	
IV	(Dallas)	
IV	Uranium Recover	y Field Office (Denver) (303) 2

PART 51-ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RE-LATED REGULATORY FUNCTIONS15. The authority citation for Part 51 is revised to read as follows:

36-2805

Authority: Sec. 161, 68 Stat. 948, as amended (42 U.S.C. 2201); secs. 201, as amended, 202, 88 Stat. 1242, as amended, 1244 (42 U.S.C. 5841, 5842).

10 CFR § 51.20 10 CFR § 51.30 10 CFR § 51.60 10 CFR § 51.61 10 CFR § 51.80 10 CFR § 51.97 10 CFR § 51.22

Subpart A also issued under National Environmental Policy Act of 1969, secs. 102, 104, 105, 83 Stat. 853-854, as amended (42 U.S.C. 4332, 4334, 4335); and Pub. L. 95-604, Title II, 92 Stat. 3033-3041. Sections 51.20, 51.30, 51.60, 51.61, 51.80, and 51.97 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241, and sec. 148, Pub. L. 100-203, 101 Stat. 1330-235 (42 U.S.C. 10155, 10161, 10168). Section 51.22 also issued under sec. 274, 73 Stat. 688, as amended by 92 Stat. 3036-3038 (42 U.S.C. 2021).

10 CFR § 51.20

16. In § 51.20, paragraph (b)(9) is revised to read as follows:

10 CFR § 51.20

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§ 51.20 Criteria for an identification of licensing and regulatory actions requiring environmental impact state- ments.

* * * * *

* * * * * .

(b) The following types of actions require an environmental impact statement or a supplement to an environmental impact statement:

(9) Issuance of a license pursuant to Part 72 of this chapter for the storage of spent fuel in an independent spent fuel storage installation (ISFSI) at a site not occupied by a nuclear power reactor, or for the storage of spent fuel or high-level radioactive waste in a monitored retrievable storage installation (MRS).

* * * * *

10 CFR § 51.30

17. In § 51.30, a new paragraph (c) is added to read as follows:

10 CFR § 51.30

§ 51.30 Environmental assessment.

* * * * *

(c) An environmental assessment for a proposed action regarding a monitored retrievable storage installation (MRS) will not address the need for the MRS or any alternative to the design criteria for an MRS set forth in section 141(b)(1) of the Nuclear Waste Policy Act of 1982 (96 Stat. 2242, 42 U.S.C. 10161(b)(1)).

10 CFR § 51.60

18. In § 51.60, paragraphs (a), (b)(1)(iii) and (b)(4) are revised to read as follows:

10 CFR § 51.60

§ 51.60 Environmental report-materials licenses.

(a) Each applicant for a license or other form of permission, or an amendment to or renewal of a license or other form of permission issued pursuant to Parts 30, 32, 33, 34, 35, 39, 40, 61, 70 and/or 72 of this chapter, and covered by paragraphs (b)(1) through (b)(6) of this section, shall submit with its application to the Director of Nuclear Material Safety and Safeguards the number of copies, as specified in § 51.66, of a separate document, entitled "Applicant's Environmental Report" or "Supplement to Applicant's Environmental Report," as appropriate. The "Applicant's Environmental Report" shall contain the information specified in § 51.45. If the application is for an amendment to or a renewal of a license or other form of permission for which the applicant has previously submitted an environmental report, the supplement to applicant's environmental report may be limited to incorporating by reference, updating or supplementing the information previously submitted to reflect any significant environmental change, including any significant environmental change resulting from operation-al experience or a change in operations or proposed decommissioning activities. If the applicant is the U.S. De-

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partment of Energy, the environmental report may be in the form of either an environmental impact statement or an environmental assessment, as appropriate.

(b) * * *

(1) * * *

(iii) Storage of spent fuel in an independent spent fuel storage installation (ISFSI) or the storage of spent fuel or high-level radio-active waste in a monitored retrievable storage installation (MRS) pursuant to Part 72 of this chapter.

* * * * *

(4) Amendment of a license to authorize the decommissioning of an independent spent fuel storage installation (ISFSI) or a monitored retrievable storage installation (MRS) pursuant to Part 72 of this chapter.

* * * * *

10 CFR § 51:61

19. Section 51.61 is revised to read as follows:

10 CFR § 51.61

§ 51.61 Environmental report-independent spent fuel storage installation (ISFSI) or monitored retrievable storage installation (MRS) license.

Each applicant for issuance of a license for storage of spent fuel in an independent spent fuel storage installation (ISFSI) or for the storage of spent fuel and high-level radioactive waste in a monitored retrievable storage installation (MRS) pursuant to Part 72 of this chapter shall submit with its application to the Director of Nuclear Material Safety and Safeguards the number of copies, as specified in § 51.66 of a separate document entitled "Applicant's Environmental Report—ISFSI License" or "Applicant's *31682 Environmental Report—MRS License," as appropriate. If the applicant is the U.S. Department of Energy, the environmental report may be in the form of either an environmental impact statement or an environmental assessment, as appropriate. The environmental report shall contain the information specified in § 51.45 and shall address the siting evaluation factors contained in Subpart E of Part 72 of this chapter. Unless otherwise required by the Commission, in accordance with the generic determination in § 51.23(a) and the provisions in § 51.23(b), no discussion of the environmental impact of the storage of spent fuel at an ISFSI beyond the term of the license or amendment applied for is required in an environmental report submitted by an applicant for an initial license for storage of spent fuel in an ISFSI, or any amendment thereto.

10 CFR § 51.80

20. In § 51.80, paragraph (b) is revised to read as follows:

10 CFR § 51.80

§ 51.80 Draft environmental impact statement—materials license.

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* * * * *

(b)(1) Independent spent fuel storage installation (ISFSI). Unless otherwise determined by the Commission and in accordance with the generic determination in § 51.23(a) and the provisions of § 51.23(b), a draft environmental impact statement on the issuance of an initial license for storage of spent fuel at an independent spent fuel storage installation (ISFSI) or any amendment thereto, will address environmental impacts of spent fuel only for the term of the license or amendment applied for.

(2) Monitored retrievable storage installation (MRS). As provided in sections 141 (c). (d), and (e) and 148 (a) and (c) of the Nuclear Waste Policy Act of 1982, as amended (NWPA) (96 Stat. 2242, 2243, 42 U.S.C. 10161 (c), (d), (e); 101 Stat. 1330-235, 1330-236, 42 U.S.C. 10168 (a) and (c)), a draft environmental impact statement for the construction of a monitored retrievable storage installation (MRS) will not address the need for the MRS or any alternative to the design criteria for an MRS set forth in section 141(b)(1) of the NWPA (96 Stat. 2242, 42 U.S.C. 10161(b)(1)) but may consider alternative facility designs which are consistent with these design criteria.

10 CFR § 51.97

21. In § 51.97, a new paragraph (b) is added to read as follows:

10 CFR § 51.97

§ 51.97 Final environmental impact statement-materials license.

* * * * *

(b) Monitored retrievable storage facility (MRS). As provided in sections 141 (c), (d), and (e) and 148 (a) and (c) of the Nuclear Waste Policy Act of 1982, as amended (NWPA) (96 Stat. 2242, 2243, 42 U.S.C. 10161 (c), (d), (e); 101 Stat. 1330-235, 1330-236, 42 U.S.C. 10168 (a), (c)) a final environmental impact statement for the construction of a monitored retrievable storage installation (MRS) will not address the need for the MRS or any alternative to the design criteria for an MRS set forth in section 141(b)(1) of the NWPA (96 Stat. 2242, 42 U.S.C. 10161(b)(1)) but may consider alternative facility designs which are consistent with these design criteria.

10 CFR § 51.101

§ 51.101 [Amended]

10 CFR § 51.101 10 CFR § 72.11 10 CFR § 72.20 10 CFR § 72.31 10 CFR § 72.16 10 CFR § 72.34

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10 CFR § 72.40

22. The references to §§ 72.11, 72.20 and 72.31(b) in the second sentence of paragraph (a)(2) of § 51.101 are redesignated respectively as §§ 72.16, 72.34 and 72.40(b).

PART 70—DOMESTIC LICENSING OF SPECIAL NUCLEAR MATERIAL23. The authority citation for Part 70 is revised to read as follows:

Authority: Sections 51, 53, 161, 182, 183, 68 Stat. 929, 930, 948, 953, 954, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2071, 2073, 2201, 2232, 2233, 2282); secs. 201, as amended, 202, 204, 206, 88 Stat. 1242, as amended, 1244, 1245, 1246 (42 U.S.C. 5841, 5842, 5845, 5846).

10 CFR § 70.1 10 CFR § 70.20a 10 CFR § 70.7 10 CFR § 70.21 10 CFR § 70.31 10 CFR § 70.36 10 CFR § 70.44 10 CFR § 70.61 10 CFR § 70.61

Sections 70.1(c) and 70.20a(b) also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161). Section 70.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851). Section 70.21(g) also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Section 70.31 also issued under sec. 57d, Pub. L. 93-377, 88 Stat. 475 (42 U.S.C. 2077). Sections 70.36 and 70.44 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Section 70.61 also issued under secs. 186, 187, 68 Stat. 955 (42 U.S.C. 2236, 2237). Section 70.62 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138).

For the purposes of sec. 223, 68 Stat. 958, as amended ($42 \cup S.C. 2273$); §§ 70.3, 70.19(c), 70.21(c), 70.22 (a), (b)(d)-(k), 70.24 (a) and (b), 70.32 (a)(3), (5) and (6), (d) and (i), 70.36, 70.39 (b) and (c), 70.41(a), 70.42 (a) and (c), 70.56, 70.57 (b), (c), and (d), 70.58 (a)-(g)(3), and (h)-(j) are issued under sec. 161b, 68 Stat. 948 as amended ($42 \cup S.C. 2201(b)$); §§ 70.7, 70.20a (a) and (d), 70.20b (c) and (e), 70.21(c), 70.24(b), 70.32 (a)(6), (c), (d), (e), and (g), 70.36, 70.51(c)-(g), 70.56, 70.57 (b) and (d), 70.58 (a)-(g)(3) and (h)-(j) are issued under sec. 161i, 68 Stat. 949, as amended ($42 \cup S.C. 2201(i)$); and §§ 70.5, 70.9, 70.20b (d) and (e), 70.38, 70.51 (b) and (i), 70.52, 70.53, 70.54, 70.55, 70.58 (g)(4), (k) and (l), 70.59, and 70.60 (b) and (c) are issued under sec. 161o, 68 Stat 950, as amended ($42 \cup S.C. 2201(o)$).

10 CFR § 70.1

24. In § 70.1, paragraph (c) is revised to read as follows:
10 CFR § 70.1

§ 70.1 Purpose

(c) The regulations in Part 72 of this chapter establish requirements, procedures, and criteria for the issuance of licenses to possess:

(1) Spent fuel and other radioactive materials associated with spent fuel storage in an independent spent fuel storage installation (ISFSI), or

(2) Spent fuel, high-level radioactive waste, and other radioactive materials associated with the storage in a monitored retrievable storage installation (MRS), and the terms and conditions under which the Commission will issue such licenses.

10 CFR § 70.20a

25. In § 70.20a, paragraph (b) is revised to read as follows:

10 CFR § 70.20a

§ 70.20a General license to possess special nuclear material for transport.

(b) Notwithstanding any other provision of this chapter, the general license issued under this section does not authorize any person to conduct any activity that would be authorized by a license issued pursuant to Parts 30 through 35, 39, 40, 50, 72, 110, or other sections of this part.

PART 73-PHYSICAL PROTECTION OF PLANTS AND MATERIALS26. The authority citation for Part 73 is revised to read as follows:

Authority: Secs. 53, 161, 68 Stat. 930, 948, as amended, sec. 147, 94 Stat. 780 (42 U.S.C. 2073, 2167, 2201); secs. 201, as amended, 204, 88 Stat. 1242, as amended, 1245 (42 U.S.C. 5841, 5844).

Section 73.1 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161). Sec. 73.37(f) also issued under sec. 301, Pub. L. 96-295, 94 Stat. 789 (42 U.S.C. 5841 note). Section 73.57 is issued under sec. 606, Pub. L. 99-399, 100 Stat. 876 (42 U.S.C. 2169).

10 CFR § 73.21
10 CFR § 73.37
10 CFR § 73.55
10 CFR § 73.20

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10 CFR § 73.24 10 CFR § 73.25 10 CFR § 73.26 10 CFR § 73.27 10 CFR § 73.40 10 CFR § 73.45 10 CFR § 73.46 10 CFR § 73.50 10 CFR § 73.57 10 CFR § 73.67 10 CFR § 73.70 10 CFR § 73.71

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), §§ 73.21, 73.37(g) and 73.55 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); §§ 73.20, 73.24, 73.25, 73.26, 73.27, 73.37, 73.40, 73.45, 73.46, 73.50, 73.55, 73.57, and 73.67 are issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201(i)); and §§ 73.20(c)(1), 73.24(b)(1), 73.26 (b)(3), (h)(6), and (k)(4), 73.27 (a) and (b), 73.37(f), 73.40 (b) and (d), 73.46 (g)(6) and (h)(2), 73.50 (g)(2), (3)(iii)(B) and (h), 73.55 (h)(2), and (4)(iii)(B), 73.57, 73.70, 73.71 and 73.72 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

10 CFR § 73.1

27. In § 73.1. paragraph (b)(6) is revised to read as follows:

10 CFR § 73.1

§ 73.1 Purpose and scope.

* * * * *

(b) * * *

*31683 (6) This part prescribes requirements for the physical protection of spent fuel stored in either an independent spent fuel storage installation (ISFSI) or a monitored retrievable storage installation (MRS) licensed under Part 72 of this chapter.

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PART 75—SAFEGUARDS ON NUCLEAR MATERIAL—IMPLEMENTATION OF US/IAEA AGREE-MENT28. The authority citation for Part 75 is revised to read as follows:

Authority: Secs. 53, 63, 103, 104, 122, 161, 68 Stat. 930, 932, 936, 937, 939, 948, as amended (42 U.S.C. 2073, 2093, 2133, 2134, 2152, 2201); sec. 201, as amended, 88 Stat. 1242, as amended (42 U.S.C. 5841).

Section 75.4 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), the provisions of this part are issued under sec. 1610, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

10 CFR § 75.4

29. In § 75.4, paragraph (k)(4) is revised to read as follows:

10 CFR § 75.4

§ 75.4 Definitions.

As used in this part:

* * * * *

(k) "Installation" means:

* * * * *

(4) An independent spent fuel storage installation (ISFSI) or a monitored retrievable storage installation (MRS) as defined n \S 72.3 of this chapter; or

* * * * *

PART 150—EXEMPTIONS AND CONTINUED REGULATORY AUTHORITY IN AGREEMENT STATES AND IN OFFSHORE WATERS UNDER SECTION 27430. The authority citation for Part 150 is revised to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended, sec. 274, 73 Stat. 688, as amended (42 U.S.C. 2201, 2021); sec. 201, as amended, 88 Stat. 1242, as amended (42 U.S.C. 5841).

10 CFR § 150.3					
10 CFR § 150.15					
10 CFR § 150.15a					
10 CFR § 150.31					
10 CFR § 150.32					
10 CFR § 150.14					

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10 CFR § 150.17a

10 CFR § 150.30

Sections 150.3, 150.15, 150.15a, 150.31, 150.32 also issued under secs. 11e(2), 81, 68 Stat. 923, 935, as amended, secs. 83, 84, 92 Stat. 3033, 3039 (42 U.S.C. 2014e(2), 2111, 2113, 2114). Section 150.14 also issued under sec. 53, 68 Stat. 930, as amended (42 U.S.C. 2073). Section 150.15 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161). Section 150.17a also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Section 150.30 also issued under sec. 234, 83 Stat. 444 (42 U.S.C. 2282).

10 CFR § 150.20

10 CFR § 150.21

10 CFR § 150.14

10 CFR § 150.16-150.19

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273); §§ 150.20(b)(2)-(4) and 150.21 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); § 150.14 is issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201(i)); and §§ 150.16-150.19 and 150.20(b)(1) are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

10 CFR § 150.15

31. In § 150.15, paragraph (a)(7) is revised to read as follows:

10 CFR § 150.15

§ 150.15 Persons not exempt.

(a) * * *

(7) The storage of:

(i) Spent fuel in an independent spent fuel storage installation (ISFSI) or

(ii) Spent fuel and high level radioactive waste in a monitored retrievable storage installation (MRS) licensed pursuant to Part 72 of this chapter.

* * * * *

Dated at Rockville, Maryland, this 12th day of August, 1988.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

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[FR Doc. 88-18773 Filed 8-18-88; 8:45 am]

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53 FR 31651-01, 1988 WL 265640 (F.R.) END OF DOCUMENT

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Volume 55 of the Federal Register, including pages 38472-38474 (Sept. 18, 1990), Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation

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55 FR 38472-01	Page 1
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(Cite as: 55 FR 38472)	· · · · · · · · · · · · · · · · · · ·

RULES and REGULATIONS

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

RIN 3150-AD26

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation

Tuesday, September 18, 1990

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The Nuclear Regulatory Commission is revising its generic determinations on the timing of availability of a geologic repository for commercial high-level radioactive waste and spent fuel and the environmental impacts of storage of spent fuel at reactor sites after the expiration of reactor operating licenses. These revisions reflect findings of the Commission reached in a five-year update and supplement to its 1984 "Waste Confidence" rulemaking proceeding, which are published elsewhere in this issue of the Federal Register. The Commission now finds that spent fuel generated in any reactor can be stored safely and without significant environmental impacts in reactor facility storage pools or independent spent fuel storage installations located at reactor or away-from-reactor sites for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license). Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first 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.

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EFFECTIVE DATE: October 18, 1990.

FOR FURTHER INFORMATION CONTACT: John P. Roberts, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone: (301) 492-0608.

SUPPLEMENTARY INFORMATION:

Background

In 1984, the Commission concluded a generic rulemaking proceeding, the "Waste Confidence" proceeding, to reassess its degree of confidence that radioactive wastes produced by nuclear facilities will be safely disposed of, to determine when any such disposal would be available, and whether such wastes can be safely stored until they are safely disposed of. The Commission found that there was reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by 2007-2009. However, some reactor operating licenses might expire without being renewed or some reactors might be permanently shut down prior to this period. Since independent spent fuel storage installations had not yet been extensively developed, there was a probability that some onsite spent fuel storage after license expiration might be necessary or appropriate. In addition, the possibility existed that spent fuel might be stored in existing or new storage facilities for some period beyond 2007-2009. The Commission also found that the licensed storage of spent fuel for at least 30 years beyond the reactor operating license expiration either at or away from the reactor site was feasible, safe, and would not result in a significant impact on the environment.

Consequently, the Commission adopted a rule, codified in <u>10 CFR</u> <u>51.23</u>, providing that the environmental impacts of at-reactor storage after the termination of reactor operating licenses need not be considered in Commission proceedings related to issuance or amendment of a reactor operating license. The same safety and environmental considerations applied to fuel storage installations licensed under part 72 as for storage in reactor basins. Accordingly, the rule also provided that the environmental impacts of spent fuel storage at independent spent fuel storage installations for the period following expiration of the installation storage license or amendment need not be considered in proceedings related to issuance or amendment of a

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storage installation license.

Amendment to Part 51

At the time of issuance of its Waste Confidence decision and the adoption of 10 CFR 51.23, the Commission also announced that while it believed that it could, with reasonable assurance, reach favorable conclusions of confidence, it also recognized that significant unexpected events might affect its decision.

Consequently, the Commission stated that it would "review its conclusions on waste confidence should significant and pertinent unexpected events occur, or at least every 5 years until a repository for high-level radioactive waste and spent fuel is available." The Commission has now completed a five-year review of its earlier findings. A description of this review and the supplement and update to the earlier findings is announced elsewhere in this issue. As a result of this review, the Commission is modifying two of its earlier findings as follows:

The Commission finds reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time; and

The Commission finds 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 or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

In this proceeding, the Commission is revising <u>10 CFR 51.23(a)</u> to be consistent with these revisions to the Waste Confidence decision.

Summary of Comments

The Commission received 11 comments on its proposed revision to 10 CFR 51.23(a) from the following entities listed in the order of receipt of comments:

Duke Power Company

Public Citizen

Edison Electric Institute

Malachy Murphy (State of Nevada)

Yankee Atomic Electric Company

Department of Energy (DOE)

Philadelphia Electric Company

Commonwealth Edison

Virginia Electric and Power Company

Marvin I. Lewis, Registered Professional Engineer

Florida Power & Light

The revision to this rule was supported by Duke Power Company, Edison Electric Institute, Yankee Atomic Electric Company, Department of Energy, Philadelphia Electric Company, and Virginia Electric and Power Company and generally supported by Commonwealth Edison.

Malachy Murphy, for the State of Nevada, suggests that 10 CFR 51.23(a) be amended to reflect reasonable assurance that spent fuel can be stored safely and without significant environmental risk in dry casks at reactor sites for up to one hundred years. The Commission, in the notice of proposed rulemaking, discussed its conclusion that even if storage of spent fuel were necessary for at least thirty ***38473** years beyond the licensed life for operation of reactors, which for a reactor whose license is renewed for thirty years would mean a period of at least 100 years, such storage is feasible, safe and would not result in a significant impact on the The Commission's conclusion on this issue considers environment. both wet and dry storage. Although the Commission does not dispute the statement that dry spent fuel storage is safe and environmentally acceptable for a period of 100 years, the Commission does not find it

necessary to make that specific finding in this proceeding.

Marvin I. Lewis avers that 100 years is an excessive amount of time to predict that at-reactor storage will be available and safe. The commenter suggests that our institutions may not survive in a form that will provide safe onsite storage 100 years in the future. The commenter requests that the Commission reverse its finding that storage will be available and safe for 100 years. The Commission does not agree with the commenter that this finding should be reversed. The Commission believes that adequate regulatory authority exists and will remain available to require any measures necessary to assure safe storage of spent fuel.

Conclusions

The Commission is adopting the proposed revision with one small clarifying change. The proposed revision to <u>10 CFR 51.23(a)</u> (and the proposed revision to the Waste Confidence decision) stated that spent fuel can be stored safely for at least 30 years beyond the licensed life for operation of any reactor which may include the term of a "revised license." As the discussion in the notice made explicit, the term "revised" license was intended to embrace a "renewed" license. To reflect more accurately the inclusion of the term of a renewed license, the parenthetical phrase which refers to this subject is being revised to read: "which may include the term of a revised or renewed license."

The necessity for the proposed revisions to the Waste Confidence decision and to 10 CFR 51.23(a) is based on the timing of repository availability, and premised on the following factors: The potential for delays in DOE's program; the mandate of the Nuclear Waste Policy Act Amendments of 1987 to characterize only the Yucca Mountain site which means that if that site is found unsuitable, characterization will have to begin at another site or suite of sites with consequent delay in repository availability; the regulatory need to avoid premature commitment to the Yucca Mountain site; and the questionable value of making predictions about completion of a project as complex and unique as the repository in terms of years when decades would be more realistic. But even with this change the Commission has concluded that it has reasonable assurance that on such a schedule for repository availability, sufficient repository capacity will be available within 30 years beyond the licensed life for operation of reactors. Adequate regulatory authority is

available to require any measures necessary to assure safe storage of the spent fuel until a repository is available. In addition, the Commission has concluded that even if storage of spent fuel were necessary for at least 30 years beyond the licensed life of reactors, which in the case of a reactor whose operating license is renewed for 30 years would mean for a period of at least 100 years, such storage is feasible, safe and would not result in a significant impact on the environment.

The Commission's conclusions with respect to safety and environmental impacts of extended storage are supported by NRC's Environmental Assessment (EA) for the 10 CFR part 72 rulemaking "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste" (53 FR 31651, August 19, Ongoing licensing and operational experience as well as 1988). studies of extended pool storage continue to demonstrate that such storage is a benign environment for spent fuel which does not lead to significant degradation of spent fuel integrity. Significant advances in the processes of dry storage of spent fuel continue to demonstrate that dry storage systems are simple, passive and easily NRC staff safety reviews of topical reports on dry maintained. storage system designs and dry storage installations at two reactor sites, as well as the EA for part 72, support the finding that storage of spent fuel in such installations for a period of 70 years does not significantly impact the environment. No significant additional non-radiological consequences which could adversely effect the environment for extended storage at reactors and independent spent fuel storage installations have been identified. In sum, the long-term material and system degradation effects are well understood and known to be minor, the ability to maintain a spent fuel storage system is assured, and the Commission maintains regulatory authority over any spent fuel storage installation.

Environmental Impact

This final rule amends 10 CFR part 51 of the Commission's regulations to modify the generic determination currently codified in part 51 which was made by the Commission in the Waste Confidence rulemaking proceeding. That generic determination was that for at least 30 years beyond the expiration of a reactor's operating license no significant environmental impacts will result from the storage of spent fuel in reactor facility storage pool or independent spent fuel storage installations located at reactor or away-from-reactor sites.

The modification provides that, if necessary, spent fuel generated in a reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation of any reactor. The licensed life for operation of a reactor may include the term of a revised or renewed license. The environmental analysis on which the revised generic determination is based can be found in the revision and supplement to the Waste Confidence findings published elsewhere in this issue. This final rulemaking action formally incorporating the revised generic determination in the Commission's regulations does not have separate independent environmental impact. The supplemental assessment and revisions to the Waste Confidence findings are available for inspection at the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC

Paperwork Reduction Act Statement

This final rule does not contain a new or amended information collection requirement subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). Existing requirements were approved by the Office of Management and Budget approval number 3150-0021.

Regulatory Flexibility Certification

As required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule will not have a significant economic impact on a substantial number of small entities. The rule describes a revised basis for continuing in effect the current provisions of 10 CFR 51.23(b) which provides that no discussion of any environmental impact of spent fuel storage in reactor facility storage pools or independent spent fuel storage installations [ISFSI] for the period following the term of the reactor operating license or amendment or *38474 initial ISFSI license or amendment for which application is made is required in any environmental report, environmental impact statement, environmental assessment or other analysis prepared in connection with certain This rule affects only the licensing and operation of actions. nuclear power plants. Entities seeking or holding Commission licenses for such facilities do not fall within the scope of the definition of small businesses found in section 34 of the Small Business Act, 15 U.S.C. 632, in the Small Business Size Standards set out in regulations issued by the Small Business Administration at 13 CFR part 121, or in the NRC's size standards published December 9,

1985 (50 FR 50241).

Backfit Analysis

This final rule does not modify or add to systems, structures, components or design of a facility; the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility. Accordingly, no backfit analysis pursuant to <u>10 CFR 50.109(c)</u> is required for this final rule.

List of Subjects in 10 CFR Part 51

Administration practice and procedure, Environmental impact statement, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C. 552 and 553, the NRC is adopting the following amendment to 10 CFR part 51.

PART 51--ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS

1. The authority citation for part 51 continues to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended ($\underline{42}$ U.S.C. 2201); secs. 201, as amended, 202, 88 Stat. 1242, as amended, 1244 ($\underline{42}$ U.S.C. 5841, 5842).

Subpart A also issued under National Environmental Policy Act of 1969, secs. 102, 104, 105, 83 Stat. 853-854, as amended ($\underline{42}$ U.S.C. $\underline{4332}$, $\underline{4334}$, $\underline{4335}$); and Pub. L. 95-604, Title II, 92 Stat. 3033-3041. Sections 51.20, 51.30, 51.60, 51.61, 51.80, and 51.97 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241, and sec. 148, Pub. L. 100-203, 101 Stat. 1330-223 ($\underline{42}$ U.S.C. 10155, 10161, 10168). Section 51.22 also issued under sec. 274, 73 Stat. 688, as amended by 92 Stat. 3036-3038 ($\underline{42}$ U.S.C. 2021) and under Nuclear Waste Policy Act of 1982, sec. 121, 96 Stat. 2228 ($\underline{42}$ U.S.C. 10141). Sections 51.43, 51.67, and 51.109 also issued under Nuclear Waste Policy Act of 1982, sec. 114(f), 96 Stat. 2216, as amended ($\underline{42}$ U.S.C. 10134(f)).

2. Section 51.23, paragraph (a) is revised to read as follows:

 \underline{S} 51.23 Temporary storage of spent fuel after cessation of reactor operation-- generic determination of no significant environmental impact.

(a) The Commission has made a generic determination 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 or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first 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.

* * * *

Dated at Rockville, Maryland this 11th day of September, 1990.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

[FR Doc. 90-21889 Filed 9-17-90; 8:45 a.m.]

55 FR 38472-01, 1990 WL 350816 (F.R.)

END OF DOCUMENT

Attachment 7

excerpt from the United States Department of Energy Final 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, Volume I – Impact Analysis, DOE/EIS-0250, February 2002, including pages 2-2 and 2-47

Final

Environmental Impact Statement

Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada

> Volume I - Impact Analyses Chapters 1 through 15



U.S. Department of Energy Office of Civilian Radioactive Waste Management

DOE/EIS-0250

February 2002

2.1 Proposed Action

DOE proposes to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain for the disposal of spent nuclear fuel and high-level radioactive waste. In its simplest terms, the proposed repository would be a large underground excavation with a network of *drifts* (tunnels) that DOE would use for spent nuclear fuel and high-level radioactive waste emplacement. About 600 square kilometers (230 square miles or 150,000 acres) of land in Nye County, Nevada, could be permanently withdrawn from public access for repository use. The proposed location of the repository is shown in Figure 2-2. DOE would dispose of spent nuclear fuel and high-level radioactive waste in the repository using the inherent, natural geologic features of the mountain and engineered (manmade) barriers to help ensure the long-term isolation of the spent nuclear fuel and high-level radioactive waste from the human environment. DOE would build the repository emplacement drifts inside Yucca Mountain at least 200 meters (660 feet) below the surface and at least 160 meters (530 feet) above the present-day *water table* (DIRS 154554-BSC 2001, pp. 28 and 29).

Under the Proposed Action, DOE would permanently place approximately 11,000 (DIRS 152010-CRWMS M&O 2000, p. 14) to 17,000 waste packages containing no more than 70,000 metric tons of heavy metal (MTHM) of spent nuclear fuel and high-level radioactive waste in a repository at Yucca Mountain. Of the 70,000 MTHM to be emplaced in the repository, 63,000 MTHM would be spent nuclear

fuel assemblies from boiling-water and *pressurized-water reactors* (Figure 2-3) that DOE would ship from commercial nuclear sites to the repository. The remaining 7,000 MTHM would consist of about 2,333 MTHM of DOE spent nuclear fuel and 8,315 canisters (4,667 MTHM) containing solidified high-level radioactive waste (see Figure 2-3) that the Department would ship to the repository from its facilities. The 70,000-MTHM inventory would

include surplus weapons-usable plutonium as spent mixed-oxide fuel or immobilized plutonium. Appendix A contains additional information on the inventory and characteristics of spent nuclear fuel, high-level radioactive waste, and other materials that DOE could emplace in the proposed repository. For this EIS, a connected action includes the offsite manufacturing of the containers that DOE would use for the transport and disposal of spent nuclear fuel and high-level radioactive waste and the specialized titanium drip shields and corrosion-resistant emplacement pallets that DOE could install over and under, respectively, the waste packages to improve performance and to reduce uncertainty about the long-term performance of the repository.

2-2

Proposed Action and No-Action Alternative

2.1.3.2.2 Mostly Legal-Weight Truck Shipping Scenario

Under this scenario, DOE would ship all high-level radioactive waste and most spent nuclear fuel from commercial and DOE sites to the Yucca Mountain site by legal-weight truck. About 53,000 shipments of these materials would travel on the Nation's Interstate Highway System during a 24-year period. There would be about 41,000 commercial spent nuclear fuel shipments and about 12,000 shipments of DOE spent nuclear fuel and high-level radioactive waste. The exception would be about 300 shipments of naval spent nuclear fuel that would travel from the Idaho National Engineering and Environmental Laboratory to Nevada by rail. The Department of the Navy prepared an EIS (DIRS 101941-USN 1996, all) and issued two Records of Decision (62 FR 1095, January 8, 1997; 62 FR 23770, May 1, 1997) on its spent nuclear fuel.

Truck shipments would use Nuclear Regulatory Commission-certified, reusable shipping casks secured on legal-weight trucks (Figure 2-20). With proper labels and vehicle placards (hazard identification) and vehicle and cask inspections, a truck carrying a shipping cask of spent nuclear fuel or high-level radioactive waste would travel to the repository on highway routes selected in accordance with U.S. Department of Transportation regulations (49 CFR 397.101), which require the use of *preferred routes*. These routes include the Interstate Highway System, including beltways and bypasses. Alternative preferred routes could be designated by states and tribes following Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and with any other affected states. Shipments of naval spent nuclear fuel would travel by rail in reusable rail shipping casks certified by the Nuclear Regulatory Commission. These shipments would use applicable and appropriate placards and inspection procedures.

2.1.3.2.3 Mostly Rail Shipping Scenario

Under this scenario, DOE would ship most spent nuclear fuel and high-level radioactive waste to Nevada by rail, with the exception of material from commercial nuclear sites that do not have the capability to load large-capacity rail shipping casks. Those sites would ship spent nuclear fuel to the repository by legal-weight truck. Commercial sites that have the capability to load large-capacity rail shipping casks but do not have immediate rail access could use heavy-haul trucks or barges to transport their spent nuclear fuel to a nearby rail line. Under this scenario, about 9,000 to 10,000 railcars of spent nuclear fuel and high-level radioactive waste would travel on the nationwide rail network over a period of 24 years. Rail shipments would consist of Nuclear Regulatory Commission-certified, reusable shipping casks secured on railcars (see Figure 2-21). In addition, there would be about 1,000 legal-weight truck shipments. All shipments would be marked with the appropriate labels and placards and would be inspected in accordance with applicable regulations.

Some of the logistics of rail transportation to the repository would depend on whether DOE used general or *dedicated freight service*. General freight shipments of spent nuclear fuel and high-level radioactive waste would be part of larger trains carrying other commodities. A number of transfers between trains could occur as a railcar traveled to the repository. The basic infrastructure and activities would be similar between general freight and dedicated trains. However, dedicated train service would contain only railcars destined for the repository. In addition to railcars carrying spent nuclear fuel or high-level radioactive waste, there would be buffer and *escort cars*, in accordance with Federal regulations. DOE would use a satellite-based system to monitor all spent nuclear fuel shipments (see Section 2.1.3.2).

2-47

Attachment 8

excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 2, (Enclosure 2 to NL-08-144), prepared by TLG Services, Inc. for Entergy Nuclear, October 2008, ML092260723, including pages 2-4, 9-11, 16-18, 25-27

Enclosure 2 to NL-08-144

Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 2

ENTERGY NUCLEAR OPERATIONS, INC INDIAN POINT NUCLEAR GENERATING UNIT 2 DOCKET NO. 50-247

Document E11-1589-003 PRELIMINARY DECOMMISSIONING COST ANALYSIS for the INDIAN POINT ENERGY CENTER, UNIT 2 prepared for **Entergy Nuclear** prepared by TLG Services, Inc. Bridgewater, Connecticut October 2008

Document E11-1583-003 Page il of v

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1.1 DECOMMISSIONING ALTERNATIVES

The Nuclear Regulatory Commission (NRC) provided general decommissioning guidance in a rule adopted on June 27, 1988.^[2] In this rule, the NRC set forth technical and financial criteria for decommissioning licensed nuclear facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

<u>DECON</u> is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."^[3]

<u>SAFSTOR</u> is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."^[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

<u>ENTOMB</u> is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."^[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

1.2 REGULATORY GUIDANCE

In 1996, the NRC published revisions to its general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in

U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988

Ibid. Page FR24022, Column 3

[•] Tbid.

Ibid. Page FR24023, Column 2

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the decommissioning process.^[6] The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures that are acceptable to the NRC staff for implementing the requirements of the 1996 revised rule that relate to the initial activities and the major phases of the decommissioning process. The cost estimate for IP-2 follows the general guidance and sequence presented in the amended regulations.

1.3 BASIS OF COST ESTIMATE

For the purpose of the analysis, IP-2 was assumed to cease operations in September 2013, after 40 years of operations. The unit would then be placed in safe-storage (SAFSTOR), with the spent fuel relocated to an Independent Spent Fuel Storage Installation (ISFSI) to await transfer to a DOE facility. Based upon a 2017 start date for the pickup of spent fuel from the commercial nuclear power generators, Entergy anticipates that the removal of spent fuel from the site could be completed by the year 2043. However, for purposes of this analysis, the plant will remain in storage until 2064, at which time it will be decommissioned and the site released for alternative use without restriction. This sequence of events is delineated in Figure 1 along with major milestone dates.

The decommissioning estimate was developed using the site-specific, technical information relied upon in the decommissioning assessments prepared in 2000 and 2002.^{[7][8]} This-information was reviewed for the current analysis and updated to reflect any significant changes in the plant configuration over the past five years. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from recent decommissioning projects provided viable alternatives or improved processes. On site interviews were conducted between August and November 2007 to assist in obtaining current site specific conditions as well as collect financial data.

1.4 METHODOLOGY

The methodology used to develop the estimate followed the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for

U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61, (p 39278 et seq.), July 29, 1996

⁷ Decommissioning Cost Evaluation Due Diligence Estimate for the Indian Point 1 & 2 Nuclear Generating Stations Document No. E11-1395-002, September 2000.

TLG Document No. E11-1449-002, December 19, 2002

Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"^[9] and the DOE "Decommissioning Handbook."^[10] These documents present a unit cost factor method for estimating decommissioning activity costs that simplifies the calculations. Unit factors for concrete removal (\$/cubic yard), steel removal (\$/ton), and cutting costs (\$/inch) were developed using local labor rates. The activity-dependent costs were then estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.^[11]

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, ensures that essential elements have not been omitted.

This analysis reflected lessons learned from TLG's involvement in the Shippingport Station decommissioning, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

Work Difficulty Factors

TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in a power plant environment. WDFs are assigned to each unique set of unit factors, commensurate with the working conditions. The ranges used for the WDFs were as follows:

•	Access Factor	0% to 30%
٠	Respiratory Protection Factor	0% to 50%

⁹ T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

¹¹ "Building Construction Cost Data 2007," Robert Snow Means Company, Inc., Kingston, Massachusetts

W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980

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review, DOE expects that receipt of fuel could begin as early as 2017,^[14] depending upon the level of funding appropriated by Congress.

It is generally necessary that spent fuel be actively cooled and stored for a minimum period at the generating site prior to transfer. The NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).^[15] This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimate, for example, costs associated with the isolation and continued operation of the spent fuel pool and ISFSI.

At shutdown, the spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the next eight years, the assemblies are packaged into multipurpose canisters for transfer directly to the DOE or for interim storage at the ISFSI. It is assumed that this period provides the necessary cooling for the final core to meet the design requirements for decay heat for either the transport or storage systems (the eight-year period also considers the use of the IP-2 pool by IP-3).

DOE's contracts with utilities generally order the acceptance of spent fuel from utilities based upon the oldest fuel receiving the highest priority. For purposes of this analysis, acceptance of commercial spent fuel by the DOE was expected to begin in 2017. The first assemblies removed from the IPEC site was assumed to be in 2018. With an estimated rate of transfer of 3,000 metric tons of uranium (MTU)/year for the commercial industry, completion of the removal of all fuel from the site was projected to be in the year 2045 assuming shutdown of IP-2 in 2013 and IP-3 in 2015. Entergy Nuclear's analysis assumes, for purposes only of this report, that Entergy Nuclear does not employ DOE spent fuel disposal contract allowances for up to 20% additional fuel designation for shipment to DOE each year.

Entergy Nuclear's position is that the DOE has a contractual obligation to accept IPEC fuel earlier than the projections set out above. No assumption made in the study should be interpreted to be inconsistent with this claim. However, at this time, including the cost of storing spent fuel in this study

^{* &}quot;DOE Announces Yucca Mountain License Application Schedule", U.S. Department of Energy's Office of Public Affairs, Press Release July 19, 2006

U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses"

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is the most reasonable approach because it insures the availability of sufficient decommissioning funds at the end of the station's life if, contrary to its contractual obligation, the DOE has not performed earlier.

ISFSI

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This analysis assumes that an ISFSI has been constructed within the protected area (PA) to support continued plant operations. The estimate further assumes that this facility is expanded (to a total capacity of 96 casks) to support decommissioning and accommodate the additional dry storage casks needed to off-load the IP-2 wet storage pool (the facility may need to be further expanded for IP-3 spent fuel storage). Once the IP-2 pool is emptied, the spent fuel storage and handling facilities are available for decommissioning or readied for long-term storage.

Operation and maintenance costs for the ISFSI are included within the estimate and address the costs for staffing the facility, as well as security, insurance, and licensing fees. The estimate includes the costs to purchase, load, and transfer the multi-purpose spent fuel storage canisters (MPCs) directly from the pool to the DOE or to the ISFSI for interim storage. Costs are also provided for the final disposition of the facilities once the transfer is complete.

In the absence of identifiable DOE transport cask requirements, the design and capacity of the ISFSI is based upon a commercial dry cask storage system. It should be noted that Entergy's contract with the DOE requires DOE to provide transport canisters to Entergy, but for present purposes, this estimate includes this cost.

Storage Canister Design

The design and capacity of the ISFSI is based upon the Holtec HI-STORM dry cask storage system. The Holtec multi-purpose canister or MPC has a capacity of 32 fuel assemblies.

Canister Loading and Transfer

The estimate includes the costs to purchase, load, and transfer the MPCs from the pool into a DOE-provided transport cask or to the ISFSI. Costs are also included for the transfer of the fuel at the ISFSI to the DOE.

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For fuel transferred directly from the pool to the DOE, the DOE is assumed to provide the canister at no additional cost to the owner. It should be noted that, in this analysis, DOE is assumed to use its own Transport, Aging and Disposal (TAD) canister with a capacity of 21 assemblies for wet pool pickup.

Operations and Maintenance

The estimate includes costs for the operation of the spent fuel pool until it is emptied and the operation of the ISFSI until the spent fuel is transferred to the DOE.

The ISFSI operating duration is based upon the previously stated assumptions on fuel transfer schedule expectations.

ISFSI Design Considerations

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage silo is used as a basis for this cost analysis. Approximately 50% of the silos are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding free-release limits). Approximately 10% of the concrete and steel is assumed to be removed from the overpacks for controlled disposal. The cost of the disposition of this material, as well as the demolition of the ISFSI facilities, is reflected within the estimate.

GTCC

The dismantling of the reactor internals generates radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the Federal Government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. However, to date, the Federal Government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the estimate to decommission IP-2 includes an allowance for the disposition of GTCC material.

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The federal law encouraged the formation of regional groups or compacts to implement this objective safely, efficiently, and economically, and set a target date of 1986 for implementation. After little progress, the "Low-Level Radioactive Waste Policy Amendments Act of 1985,^[19] extended the implementation schedule, with specific milestones and stiff sanctions for non-compliance. Subsequent court rulings have substantially diluted those sanctions and, to date, no new compact facilities have been successfully sited, licensed and constructed.

At the time this analysis was prepared, IP-2 was able to dispose of Class A, B or C low-level radioactive waste^[20] at the licensed commercial lowlevel radioactive waste disposal facility in Barnwell, South Carolina. In June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. South Carolina legislation requires South Carolina to gradually limit disposal capacity at the Barnwell facility through mid-2008. As of June 30, 2008, access to the Barnwell Low-Level Radioactive Waste Disposal Facility is available only to generators located in states affiliated with the Atlantic Compact. However, IP-2 is still able to dispose of Class A material at EnergySolutions' facility in Clive, Utah.

The costs reported for direct disposal (burial) in the estimate are based upon Entergy Nuclear Operations, Inc. current Life of Plant Disposal Agreement with EnergySolutions^[21]. This facility was used as the destination for the majority of the waste volume generated by decommissioning (99.3%). EnergySolutions does not have a license to dispose of the more highly radioactive waste (Class B and C) generated in the dismantling of the reactor. As such, the disposal costs for this material (representing approximately 0.6% of the waste volume) were based upon Barnwell disposal rates, as a proxy.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising approximately 0.1% of the total waste volume) is generally not suitable for shallow-land disposal. This material is packaged in the same multipurpose canisters used for spent fuel storage/transport and designated for geologic disposal.

[&]quot;Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, January 15, 1986

U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

General Services Agreement 10160239 between Entergy Nuclear Operations and EnergySolutions, June 2007

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A significant portion of the waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be analyzed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/ recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to eliminate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimate reflects the savings from waste recovery/volume reduction. Costs for waste processing/reduction were also based upon existing agreements.

Disposition of the low-level radioactive waste generated from decommissioning operations (and cost basis) is summarized in Table 1.

1.7.8 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license when it determines that site remediation has been performed in accordance with the license termination plan, and that the final status survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process ends at this point. Building codes and state environmental regulations dictate the next step in-the-decommissioning process, as-well-as-the owner's own future plans and commitments for the site.^[22]

Only existing site structures are considered in the dismantling cost. The current analysis includes all structures as defined in the site plot plan.^[23] The electrical switchyard remains after Indian Point is decommissioned in support of the regional transmission and distribution system. The Generation Support Building and IPEC Training Center remain in place for future use. Clean non-contaminated structures are removed to a nominal depth of three feet below grade. The voids are backfilled with clean debris and capped with soil. The site is then regraded to conform to the adjacent landscape. Vegetation is established to inhibit erosion. These "non-radiological costs" are included in the total cost of decommissioning.

²² "Entergy is committed to returning the Indian Point Unit 1, 2 and 3 facilities and the surrounding site to a "Greenfield" condition." Letter from Michael R. Kansler to Westchester County Attorney Alan D. Scheinkman, March 16, 2001

Entergy Nuclear Northeast "Buildings and Structures Identification Plan" ER-04-2-012, Rev. 01

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Site utility and service piping are abandoned in place. Electrical manholes are backfilled with suitable earthen material. Asphalt surfaces in the immediate vicinity of site buildings are broken up and the material used for fill, as required. The site access road remains in place.

1.7.9 Site Contamination

As indicated by the IPEC Groundwater Investigation Project,^[24] it is likely that radionuclides in the soil has contaminated portions of the subsurface power block structures. As such, sub-grade surfaces of the following IP-2 structures are designated for removal:

- Discharge Canal
- Fuel Storage Building, and
- Turbine Building (approximately 50%).

All other structures or buildings expect to be impacted in the decontamination process are removed to a nominal depth of three feet below grade.

Site remediation costs include the removal and disposition of 379,000 cubic feet of potentially contaminated soil on the IP-2 site. This volume includes soil_contaminated_by IP-1 located_within the boundaries of the IP-2 site.

1.8 ASSUMPTIONS

The following assumptions were made in the development of the estimate for decommissioning IP-2.

1.8.1 Estimating Basis

Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in 2007 dollars. Costs are not inflated, escalated, or discounted over the periods of performance.

The estimates rely upon the physical plant inventory that was the basis for the 2002 analysis (updated to reflect any significant changes to the plant over the past five years).

²⁴ "Hydrogeologic Site Investigation Report," GZA GeoEnvironmental, Inc., January 2008

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For purposes of this study, GTCC is packaged in the same canisters used for spent fuel. The GTCC material is assumed to be shipped directly to a DOE facility as it is generated (since the fuel has been removed from the site prior to the start of decommissioning and the ISFSI deactivated). While designated for disposal at the geologic repository along with the spent fuel, GTCC waste is still classified herein as low-level radioactive waste and, as such, included as a "License Termination" expense.

2.1 Decommissioning Trust Fund

The decommissioning trust fund, as reported in Entergy's latest status report (dated May 8, 2008) was \$347.20 million, as of December 31, 2007.^[30] This includes the money available from the Provisional Trust.

2.2 Financial Assurance

It is the current plan, based on the growth of the funds in the IP-2 decommissioning trust, to fund the expenditures for license termination from the currently existing decommissioning trust fund.

Table 4 identifies the cost projected for license termination (in accordance with 10 CFR 50.75). Table 7 provides the details of the proposed funding plan for decommissioning IP-2 based on a 2% real rate of return on the decommissioning trust fund. As shown in Table 7, the current trust fund (as of December 31, 2007) is sufficient to accomplish the intended tasks and terminate the operating license for IP-2. The analysis also shows a surplus in the fund at the completion of decommissioning. This surplus could be made available to fund other activities at the site (e.g., spent fuel management and/or restoration activities), recognizing that the licensee would need to make the appropriate submittals for an exemption in accordance with 10 CFR 50.12 from the requirements of 10 CFR 50.82(a)(8)(i)(A) in order to use the decommissioning trust funds for non-decommissioning related expenses, as defined by 10 CFR 50.2.

 Entergy Nuclear Operations' submittal of its "Decommissioning Fund Status Report" to the Nuclear Regulatory Commission, Letter No. ENOC-08-00028, dated May 8; 2008

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FIGURE 1 SAFSTOR DECOMMISSIONING TIMELINE (not to scale)

Shutdown: September 28, 2012



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TABLE 1Indian Point Energy Center, Unit 2Low-Level Radioactive Waste Disposition

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
			:	
Low-Level Radioactive Waste		· .		
(near-surface disposal)	EnergySolutions	<u>A</u> .	620,166	53,686,179
	Barnwell	В	3,330	352,433
	Barnwell	С	501	45,688
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	496	104,146
Processed/Conditioned	Recycling			
(off-site recycling center)	Vendors	<u> </u>	381,062	15,069,040
Total ^[2]	-	······	1,005,554	69,257,486

14 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

[2] Columns may not add due to rounding.

Attachment 9

Volume 75 of the Federal Register, pages 81032-81076, published December 23, 2010, Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation & Waste Confidence Decision Update


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Thursday, December 23, 2010

Part VI

Nuclear Regulatory Commission

10 CFR Part 51

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation; Waste Confidence Decision Update; Final Rules

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

[NRC-2008-0404]

RIN 3150-AI47

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation

AGENCY: Nuclear Regulatory Commission. ACTION: Final rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC or Commission) is revising its generic determination on the environmental impacts of storage of spent fuel at, or away from, reactor sites after the expiration of reactor operating licenses. The revisions reflect findings that the Commission has reached in an update and supplement to the 1990 Waste Confidence rulemaking proceeding published elsewhere in this issue of the Federal Register. The Commission now finds that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations (ISFSIs). It also finds reasonable assurance that sufficient mined geologic repository capacity will be available for disposal of spent fuel when necessary. DATES: The rule is effective on January

24, 2011. ADDRESSES: You can access publicly available documents related to this

document using the following methods: *NRC's Public Document Room (PDR):* The public may examine and have copied for a fee publicly available

documents at the NRC's PDR, Room O– 1F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland.

NRC's Agencywide Documents Access and Management System (ADAMS): Publicly available documents created or received at the NRC are available electronically at the NRC's electronic Reading Room at http://www.nrc.gov/ reading-rm/adams.html. From this page, the public can gain entry into ADAMS, which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents' located in ADAMS, contact the NRC's PDR reference staff at 1-800-397-4209, 301–415–4737, or by e-mail to pdr.resource@nrc.gov.

Federal Rulemaking Web site: Public comments and supporting materials related to this final rule can be found at http://www.regulations.gov by searching. on Docket ID: NRC-2008-0404.

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SUPPLEMENTARY INFORMATION:

Background

In 1990, the Commission concluded a generic rulemaking proceeding to reassess its degree of confidence that radioactive wastes produced by nuclear power plants can be safely disposed of, to determine when this disposal or offsite storage will be available, and to determine whether radioactive wastes can be safely stored onsite past the expiration of existing facility licenses until offsite disposal or storage is available. This proceeding reviewed the Commission's 1984 findings on these issues, which were developed through a generic rulemaking proceeding that became known as the "Waste Confidence Proceeding." The 1990 proceeding resulted in the following five reaffirmed or revised Waste Confidence findings:

1. The Commission finds reasonable assurance that safe disposal of highlevel radioactive waste (HLW) and spent nuclear fuel (SNF) in a mined geologic repository is technically feasible;

2. The Commission finds reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twentyfirst century, and that sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the commercial HLW and SNF originating in such reactor and generated up to that time;

3. The Commission finds reasonable assurance that HLW and SNF will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all HLW and SNF;

4. The Commission finds 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 or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite ISFSIs: and

5. The Commission finds reasonable assurance that safe independent onsite spent fuel storage or offsite spent fuel storage will be made available if such storage capacity is needed. (55 FR 38474; September 18, 1990).

These five findings formed the basis of the Commission's revised generic determination of no significant environmental impact from temporary storage of SNF after cessation of reactor operation, which was codified at 10 CFR 51.23(a):

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 a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first 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 [HLW] and [SNF] originating in such reactor and generated up to that time. (55 FR 38474; September 18, 1990)

Thus, the environmental impacts of spent fuel storage for the period following the term of a reactor operating license or amendment or reactor combined license or amendment or initial independent spent fuel storage installation license or amendment do not need to be considered in proceedings on applications for these licenses or amendments. See 10 CFR 51.23(b).

In 1999, the Commission reviewed its Waste Confidence findings and concluded that experience and developments after 1990 had confirmed the findings and made a comprehensive reevaluation of the findings unnecessary. It also stated that it would consider undertaking a reevaluation when the pending repository development and regulatory activities had run their course or if significant and pertinent unexpected events occurred that raise substantial doubt about the continuing validity of the Waste Confidence findings (See 64 FR 68005; December 6, 1999).

The Proposed Rule

In 2008, the Commission decided that the generic resolution of appropriate

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issues that might be raised in licensing proceedings on anticipated combined operating license (COL) applications for new reactors would enhance the efficiency of the COL proceedings; waste confidence was one of these issues. Prior to NRC's original Waste Confidence proceeding, the Commission stated that, as a matter of policy, it "would not continue to license reactors if it did not have reasonable confidence that the wastes can and will in due course be disposed of safely" (42 FR 34391, 34393; July 5, 1977). It has been 20 years since the last formal review of the Waste Confidence findings, so the Commission is revisiting the findings to address their continuing validity, given the passage of time since the last update to the Waste Confidence Decision, and given the upcoming COL proceedings. The Commission is now updating and revising the 1990 Waste Confidence Decision and Rule.

On October 9, 2008 (73 FR 59551), the Commission published the proposed update and revision of two of the Waste Confidence findings, along with a request for public comment, in the Federal Register. In the same issue of the Federal Register, the Commission proposed a conforming amendment of its generic determination of no significant environmental impact from the temporary storage of spent fuel after cessation of reactor operations codified at 10 CFR 51.23(a) (73 FR 59547; October 9, 2008). The Commission proposed to modify its generic determination to state that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite ISFSIs until a disposal facility can reasonably be expected to be available.

The Final Rule

After evaluating the public comments on the proposed rule and update to the Waste Confidence Decision, the Commission is now publishing its final rule amending 10 CFR 51.23(a), along with the final update and revision to the Waste Confidence Decision (published separately in this issue of the Federal Register). The Commission is revising two of its findings:

Finding 2: The Commission finds reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary. Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite independent spent fuel storage installations.

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The Commission, in response to public comments, and to achieve greater consistency with Finding 4, is also modifying the rule to include a time frame for the safe storage of SNF:

The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.

Public Comments

The NRC received 158 comment letters, including a late-supplemental comment from the Attorney General of New York, as well as two form letters sent by 1,990 and 941 commenters, respectively. Many of the comment letters contained multiple comments on the proposed rule, the proposed revisions to the Waste Confidence findings, or both. All comments received on both notices have been considered together and are addressed in the final update to the Waste Confidence Decision. The main issues raised by the comments are briefly discussed below.

Many commenters argued that NRC has not complied with the National Environmental Policy Act (NEPA) because they believe that the revisions to the findings and amended rule constitute "generic licensing decisions" and need to be supported by a Generic Environmental Impact Statement (GEIS) that addresses all aspects of the nuclear fuel cycle. But as the Commission discusses in its comment responses, neither the Waste Confidence Rule nor the Decision allow for the issuance of a license; applicants for an NRC license must comply with the relevant NRC regulations before they can receive a license. And the Waste Confidence Decision and Rule satisfy a portion of the NRC's NEPA obligations—those associated with the environmental impacts after the end of license life. In this rulemaking, the Waste Confidence Decision is the Environmental Assessment—the NRC's NEPA analysis—that provides the basis for the generic determination of no significant environmental impacts reflected in the rule (10 CFR 51.23).

The Commission is amending its generic determination of no significant environmental impact from the temporary storage of spent fuel after cessation of reactor operation contained in 10 CFR 51.23(a) to conform it to the Commission's revised Finding 4 of the Waste Confidence Decision. Finding 4 is revised to provide reasonable assurance that spent fuel can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation of a reactor, rather than for at least 30 years as in the present Finding 4. The Commission is also revising the final rule to remove the time frame from the second sentence of 10 CFR 51.23(a); instead the Commission has incorporated the language adopted in Finding 2: That sufficient repository capacity will be available to dispose of spent nuclear fuel and high-level waste when necessary.

The revised generic determination is not a generic licensing decision. It does not authorize the operation of a nuclear power plant (NPP), the renewal of a NPP license, or the production or storage of spent fuel by a NPP. Licensing proceedings for any of these actions are supported by both specific and generic environmental impact statements (EISs) or environmental assessments (EAs) that consider the potential environmental impacts of storage of spent fuel during the term of the license. Because of the generic determination in § 51.23(a) the potential environmental impact of storage of spent fuel for a 60-year period (rather than a 30-year period) after the end of licensed operations or whether ultimate disposal will be available, is not considered in individual NPP licensing reviews. The EA supporting this 30-year extension of the generic determination and the finding of reasonable assurance of a safe, timely disposal facility is the Waste Confidence Decision Update, which supports the Commission's Finding of No Significant Impact (FONSI) and concurrent decision to not conduct an EIS.

A number of commenters asserted that NRC, in preparing an EA and FONSI, has not complied with the

procedural requirements for a FONSI, which include the preparation of an EA and the identification of all the documents that the FONSI is based on. As stated above, the update and revision of the Waste Confidence Decision is the EA supporting the amendment of the generic determination in 10 CFR 51.23(a). All of the documents relied upon in preparing the Update and Final Rule are referenced. Two of the referenced documents are not publicly available; these are reports concerning the safety and security of spent fuel pool storage issued by Sandia National Laboratories (SNL) and the National Academy of Sciences (NAS), which are either Classified, Safeguards Information (SGI), or Official Use Only-Security Related Information. Although these documents cannot be released to the public, redacted or publicly available summaries are available. A redacted version of the SNL study can be found in ADAMS (ADAMS Accession Number ML062290362) and the unclassified summary of the NAS report can be purchased or downloaded for free by accessing the NAS Web site at: http://www.nap.edu/ catalog.php?record_id=11263. No other non-public documents are referenced in the Waste Confidence Update.

A number of commenters argued that NRC's revisions of its Waste Confidence findings and temporary storage rule do not comply with the holding of the U.S. Court of Appeals for the Ninth Circuit in San Luis Obispo Mothers for Peace v. NRC, 449 F. 3d 1016 (2006), cert. denied, 127 S. Ct. 1124 (2007), that NEPA requires an examination of the environmental impacts that would result from an act of terrorism against an ISFSI. These commenters believe that an attack is reasonably foreseeable and therefore subject to a NEPA review. Despite the outcome of Mothers for Peace, the Commission has adhered to its traditional position (outside of the Ninth Circuit) that the environmental effects of a terrorist attack do not need to be considered in its NEPA analyses. See Amergen Energy Co., LLC (Oyster Creek Nuclear Generating Station), CLI-07-08, 65 NRC 124 (2007). And in 2009, the U.S. Court of Appeals for the Third Circuit upheld the Commission's position that terrorist attacks are too far removed from the natural or expected consequences of agency action to require an environmental impact analysis. New Jersey Dept. of Environmental Protection v. U.S. Nuclear Regulatory Com'n, 561 F.3d 132 (2009). Even so, the EA for this update and rulemaking includes a discussion of terrorism that NRC believes satisfies the

Ninth Circuit's holding in *Mothers for Peace*.

Some commenters believe that this revision of the Waste Confidence findings violates the Atomic Energy Act of 1954 (AEA) because the AEA precludes NRC from licensing any new NPP or renewing the license of any existing NPP if it would be "inimical * * to the health and safety of the public." 42 U.S.C. 2133(d). As explained above, NRC's revised Waste Confidence findings and revised generic

determination are not licensing decisions, but merely generically resolve certain discrete issues in licensing proceedings. They are not determinations made as part of the licensing proceedings for NPPs or ISFSIs or the renewal of those licenses. They do not authorize the storage of SNF in spent fuel pools or ISFSIs. The revised findings and generic determination include conclusions of the Commission's environmental analyses, under NEPA, of the foreseeable environmental impacts stemming from the storage of spent fuel after the end of reactor operation.

Other comments questioned NRC's basis for reaffirming Finding 1 and Finding 3 and for the revisions made in Findings 2 and 4. Those comments are fully addressed in the final update as well as other, more minor, comments. The Commission, below, restates its reasons for revising Findings 2 and 4.

Specific Question for Public Comment

The Waste Confidence Decision Update considers the many comments received on the specific question for public comment in the Commission's proposals-whether Finding 2 should contain a target date, as proposed, or take a more general approach that a repository will be available when needed (the alternative approach). The State of Nevada, Clark and Eureka Counties in Nevada, and the Nuclear Energy Institute favor the alternative approach. They generally believe that a time frame involves too much speculation about future events and that licensed storage of SNF will be safe no matter what the time needed. Several states; State organizations; Nye County, Nevada; environmental groups; and other commenters want the Commission to retain a time frame. In general, they believe that, in the absence of a time frame, the Commission's confidence in the eventual disposal of spent fuel would rest on pure speculation; that it would ignore intergenerational ethical concerns of this generation reaping the benefits of nuclear energy while passing off the problem of waste disposal to future generations; and that a time frame is necessary to provide an incentive for the Federal Government to meet its responsibilities for the disposal of spent fuel and HLW.

The Commission has confidence that spent fuel can be safely stored without significant environmental impact for long periods of time for all the reasons described in its discussion of Findings 3, 4, and 5 in the update to the Waste Confidence Decision. Further, as discussed in Finding 2, the Commission has confidence that sufficient mined geologic disposal capacity will be available when necessary. However, there are issues beyond the Commission's control, including the political and societal challenges of siting a HLW repository, that make it premature to predict a date when a repository will become available. The Commission has therefore decided not to adopt a specific time frame in Finding 2 or its final rule. Instead, the Commission is expressing its reasonable assurance that a repository will be available "when necessary."

The Commission believes that this standard accurately reflects its position, as discussed in the analysis supporting Finding 2, that a repository can be constructed within 25–35 years of a Federal decision to do so. Further, the Commission continues to have confidence, as expressed in Findings 3 and 5, that safe and sufficient onsite or offsite storage capacity is available and will be available until a repository becomes available for disposal. In addition, revised Finding 4 supports at least 60 years of safe and environmentally sound onsite or offsite storage beyond the end of the licensed life for operation of any nuclear power reactor. It necessarily follows from these findings that the Commission has reasonable assurance that sufficient repository capacity will be available before there are safety or environmental issues associated with the SNF and HLW that would require the material to be removed from storage and placed in a disposal facility.

In short, the Commission can express its reasonable assurance that disposal capacity will become available when necessary and that there will be sufficient safe and environmentally sound storage available for all of the SNF until this disposal capacity becomes available.

Safe Storage of Spent Fuel

This update reflects the Commission's increased confidence in the safety and security of SNF storage, both in spent fuel pools and in ISFSIS. In 1990, the Commission determined that experience with spent fuel pools continued to

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confirm that pool storage is a benign environment that does not lead to significant degradation of spent fuel integrity; that the pools in which the assemblies are stored will remain safe for extended periods; and that degradation mechanisms are well understood and allow time for appropriate remedial action. Similarly, by 1990, the Commission had gained experience with dry storage systems that confirmed the Commission's 1984 conclusions that material degradation processes in dry storage are well understood and that dry storage systems are simple, passive, and easily maintained. In fact, one of the bases for the Commission's confidence in the safety of dry storage was its August 19, 1988 (53 FR 31651) amendment to 10 CFR part 72 that addressed spent fuel storage in a monitored retrievable storage installation (MRS) for a license term of 40 years, with the possibility of renewal. In the EA for the MRS rule, the Commission found confidence in the safety and environmental insignificance of dry storage for 70 years following a period of 70 years of storage in a storage pool, for a total of 140 years of storage. See NUREG-1092: Environmental Assessment for 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste," August 1984. Nothing has occurred in the intervening years to call into question the Commission's confidence in the long-term safety of both wet and dry storage of SNF. Subsequently, the NRC has approved a 20-year license renewal for a wet ISFSI and 40-year license renewals for three dry ISFSIs.

Since 1990, the Commission's primary focus has been on potential accidents. And since September 11, 2001, this focus has expanded to include security events that might lead to a radioactive release from stored SNF. Multiple studies of the safety and security of spent fuel storage, including the potential for the draining of a spent fuel pool leading to a zirconium fire and for an airplane crashing into an ISFSI, have been undertaken by NRC and by other entities, such as the NAS. These studies and the Commission's regulatory actions have reinforced NRC's view that spent fuel storage systems are safe, secure, and without significant environmental impacts. See, e.g., Letter to Senator Pete V. Domenici from Nils J. Diaz, March 14, 2005, enclosing NRC Report to Congress on the [NAS] Study on the Safety and Security of Commercial (SNF) Storage, March 2005; (73 FR 46204; August 8, 2008); In the

Matter of Private Fuel Storage, L.L.C., CLI-05-19; 62 NRC 403 (2005).

In sum, the characteristics of spent fuel storage facilities, the studies of the safety and security of spent fuel storage (conducted both before and after the 1990 update to the Decision and Rule), NRC's extensive experience in regulating spent fuel storage and ISFSIs and in certifying dry cask storage systems, NRC's actions in approving 40year license renewals for three ISFSIs (meaning that the safety of dry storage after licensed operation at these ISFSIs has been approved for at least a 60-year period), and an additional 20 years of experience with safely storing spent fuel support the Commission's confidence in the long-term safety and security of spent fuel storage.

The Availability of a Repository

On June 3, 2008, the Department of Energy (DOE) submitted the Yucca Mountain (YM) application to NRC and on September 8, 2008, NRC staff notified DOE that it found the application acceptable for docketing (73 FR 53284; September 15, 2008). Although the licensing proceeding for the YM repository is still pending, the current Administration and DOE leadership have made it clear that they oppose the construction of the YM repository. The President's 2010 budget proposal stated that the "Administration proposes to eliminate the Yucca Mountain repository program. Terminations, Reductions, and Savings: Budget of the U.S. Government, Fiscal Year 2010, Page 68 available at http:// www.gpoaccess.gov/usbudget/fy10/pdf/ trs.pdf (last visited on November 9, 2010).

On March 3, 2010, DOE filed a Notice of Withdrawal with the Atomic Safety and Licensing Board (Board) that is presiding over the YM licensing proceeding (ADAMS Accession Number ML100621397). On June 29, 2010, the Board denied DOE's motion; and on June 30, 2010, the Secretary of the Commission invited the parties to file briefs regarding whether the Commission should review, reverse, or uphold the Board's decision (ADAMS Accession Numbers ML101800299 and ML101810432). The Commission has not yet issued its decision.

Recent events, coupled with its ongoing analysis of the target date approach used in Finding 2, have caused the Commission to reconsider its position regarding the use of a target date in Finding 2. As discussed above, the Commission continues to have confidence that a repository can be constructed in 25–35 years, but it is uncertain whether the social and political consensus necessary for a successful repository program will be reached in the near future. Therefore, the Commission has adopted the approach proposed in the Additional Question for Public Comment, and has removed the target date from Finding 2 (73 FR 59561; October 9, 2008).

This modification to Finding 2 does not mean that the Commission is endorsing indefinite storage of HLW and SNF; Finding 4 has not been changed, and only considers "at least 60 years" of storage beyond the licensed life for operation. If the expiration of this time nears without the availability of a repository, the Commission will revisit the Waste Confidence Decision and Rule. The Commission's current Waste **Confidence Decision and Rule reflect** the NRC's best information and judgment. But the longer-term rulemaking and study of storage for more than 120 years that the Commission directed the staff to start in its Staff Requirements Memorandum (SRM) (SRM-SECY-09-0090, M100915; September 15, 2010) will result in the Commission having more information in a timely fashion should additional adjustments to the Waste Confidence Decision and Rule prove necessary.

The Commission remains confident that disposal of SNF and HLW in a geologic repository is technically feasible and that DOE should be able to locate a suitable site for repository development in no more time than was needed for the YM repository program (about 20 years). Both domestic and international developments have made it clear that confidence in the technical feasibility of a repository alone is not sufficient to bring about the broader societal and political acceptance of a repository. Achieving this broader support for construction of a repository at a particular site requires a broad public outreach program. In some countries community acceptance has taken 25–35 years.

For example, if a new repository program starts in 2025, it could be reasonable to expect that a repository would become available by 2050-2060. But the Commission cannot express reasonable assurance in 2025 as the start date for a new program because it is not possible to predict when a political and social consensus will be reached. The Commission believes that there is no specific date by which a repository must be available for safety or environmental reasons; the Commission did not define a period when a repository will be needed for safety or environmental reasons in 1990 and it is not doing so now—it is only explaining its view of when a repository could reasonably be

expected to be available after a Federal decision to construct a repository.

Availability of Repository Capacity for Disposal of Spent Fuel From All Reactors

The Commission's generic determination of no significant environmental impact from the temporary storage of spent fuel after cessation of reactor operation has included a prediction that sufficient repository capacity for a reactor's fuel will be available within 30 years beyond the licensed life for operation of that reactor. This prediction was not based on safety or environmental considerations; it was based on finding that 30 years beyond the licensed life for operation of even the earliest reactors would not occur until after 2025. Thus, the Commission's confidence that a repository would be available by 2025 still meant that no reactor would need to store its SNF for more than 30 years beyond its licensed life for operation. If it is assumed that a repository will not be available until well after 2025, then this prediction can no longer be maintained (the analysis supporting Finding 2 indicates that if the political and societal roadblocks were resolved today, a repository would not be available until at least 2035-2045). According to NRC's "High-Value Datasets," there are 14 reactor operating licenses that will expire between 2012 and 2020 and an additional 36 licenses that will expire between 2021 and 2030. NRC High-Value Datasets, http:// www.nrc.gov/public-involve/ open.html#datasets (last visited November 9, 2010).

For licenses that are not renewed, some spent fuel will need to be stored for more than 30 years beyond the licensed life for operation. There are 23 reactors that were formerly licensed to operate by the NRC or the Atomic Energy Commission (the NRC's predecessor agency) and have been permanently shut down. Id. For most of these plants, 30 years beyond the licensed life for operation will fall in the 2030s and 2040s. Thus, for virtually all of these plants, spent fuel will have to be stored beyond 30 years from the expiration of the license if a repository is not available until well after 2025. Further, the Commission has concerns about the use of the target date approach used in proposed Finding 2 and the proposed rule and has decided not to adopt this approach. A target date requires the Commission to have reasonable assurance of when a repository will become available; but, because the Commission cannot predict when this societal and political

acceptance will occur, it is unable to express reasonable assurance in a specific target date for the availability of a repository. The Commission does, however, believe that a repository can be constructed within 25–35 years of a Federal decision to construct a repository.

Given the ongoing activities of the Blue-Ribbon Commission on America's Nuclear Future, events in other countries, the viability of safe long-term storage for at least 60 years (and perhaps longer) after reactor licenses expire, and the Federal Government's statutory obligation to develop a HLW repository, the Commission has confidence that a repository will be made available well before any safety or environmental concerns arise from the extended storage of spent nuclear fuel and highlevel waste. In other words, a repository will be available when necessary. For these reasons, the Commission is amending its generic determination that sufficient repository capacity will be available "within 30 years of the expiration of the licensed life for operation of all reactors" to reflect its reasonable assurance that sufficient repository capacity will be available when necessary.

As stated above, this is not a safety finding, and the amendment is made solely to be consistent with an assumption that a repository will not be available until 25–35 years after the resolution of the political and societal issues associated with a repository. As explained in the update to the Waste Confidence Decision, the Commission's confidence that a repository will be available when necessary rests on a number of factors, including (for example) the options being considered by the Blue-Ribbon Commission, the time it likely will take to site, license. and build a repository, the Federal Government's commitment, by law (the Nuclear Waste Policy Act) to dispose of spent fuel, and developments in other countries.

Summary of Amendments by Section

The Commission is adopting the proposed revision, with some changes. The rule is being revised to more closely track the language in final Findings 2 and 4; the basis for the rule is identical to the basis for the findings, no matter how the rule itself is phrased. But to avoid confusion and respond to the issues raised in the comments, the Commission has reconsidered the phrasing of the proposed rule, and the generic determination in the final rule now is made identical to Finding 4.

Section 51.23(a) is also revised to reinsert a version of the second sentence

in the present rule that was excluded from the proposed rule. This statement was added to make clear that Finding 4 does not contemplate indefinite storage and to underscore that the 60-year storage period is related to the Commission's expectation that sufficient repository capacity will be available when necessary. Accordingly, the added sentence provides that there is "reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.'

Section 51.23(a) is also revised to provide the Commission's generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin or at either onsite or offsite ISFSIs. The time period of "at least 30 years" beyond the licensed life for operation is deleted. This amendment also deletes the predictions that at least one mined geologic repository will be available within the first quarter of the twentyfirst century and that sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial HLW and SNF originating in such reactor and generated up to that time. The amendment adds the expectation that sufficient mined geologic repository capacity will be available to dispose of the commercial HLW and spent fuel originating in any reactor when necessary.

Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995 (Pub. L. 104-113) requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this final rule, NRC is modifying its generic determination on the consideration of environmental impacts of temporary storage of spent fuel after cessation of reactor operations to provide that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that

reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite ISFSIs. This action does not constitute the establishment of a standard that establishes generallyapplicable requirements.

Finding of No Significant Environmental Impact: Availability

This final rule amends the generic determination in 10 CFR 51.23 to state that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite ISFSIs. The environmental assessment on which the revised generic determination is based is the revision and update to the Waste Confidence findings published elsewhere in this Federal **Register**. Based on this analysis, the Commission finds that this final rulemaking has no significant environmental impacts. The final revisions and update to the Waste Confidence findings are available as specified in the ADDRESSES section of this document.

Paperwork Reduction Act Statement

This final rule does not contain a new or amended information collection requirement subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). Existing requirements were approved by the Office of Management and Budget (OMB) approval number 3150–0021.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

Regulatory Analysis

A regulatory analysis has not been prepared for this regulation because this regulation does not establish any requirements that would place a burden on licensees.

Regulatory Flexibility Certification

Under the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule does not have a significant economic impact on a substantial number of small entities. This final rule describes a revised basis for continuing in effect the current provisions of 10 CFR 51.23(b), which provides that no discussion of any environmental impact of spent fuel storage in reactor facility storage pools or ISFSIs for the period following the term of the reactor operating license or amendment or initial ISFSI license or amendment for which application is made is required in any environmental report, environmental impact statement, environmental assessment, or other analysis prepared in connection with certain actions. This rule affects only the licensing and operation of nuclear power plants or ISFSIs. Entities seeking or holding Commission licenses for these facilities do not fall within the scope of the definition of "small entities" set forth in the Regulatory Flexibility Act or the size standards established by the NRC at 10 CFR 2.810.

Backfit Analysis

The NRC has determined that the backfit rule (§§ 50.109, 70.76, 72.62, or 76.76) does not apply to this final rule because this amendment does not involve any provisions that would impose backfits as defined in the backfit rule. Therefore, a backfit analysis is not required.

Congressional Review Act

In accordance with the Congressional Review Act of 1996, the NRC has determined that this action is not a major rule and has verified this determination with the Office of Information and Regulatory Affairs of OMB.

List of Subjects in 10 CFR Part 51

Administrative practice and procedure, Environmental impact statement, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

■ For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 552 and 553, the NRC is adopting the following amendment to 10 CFR part 51.

PART 51—ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS

■ 1. The authority citation for part 51 continues to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended, sec. 1701, 106 Stat. 2951, 2952, 2953 (42 U.S.C. 2201, 2297(f)); secs. 201. as amended, 202, 88 Stat. 1242, as amended, 1244 (42 U.S.C. 5841, 5842); sec. 1704, 112 Stat. 2750 (44 U.S.C. 3504 note). Subpart A also issued under National Environmental Policy Act of 1969, secs. 102, 104, 105, 83 Stat. 853–854, as amended (42 U.S.C. 4332, 4334, 4335), and Pub. L. 95-604, Title II, 92 Stat. 3033-3041; and sec. 193, Pub. L. 101-575, 104 Stat. 2835 (42 U.S.C. 2243). Sections 51.20, 51.30, 51.60, 41.80, and 51.97 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241, and sec. 148, Pub. L. 100-203, 101 Stat. 1330-223 (42 U.S.C. 10155, 10161, 10168). Section 51.22 also issued under sec. 274, 73 Stat. 688, as amended by 92 Stat. 3036-3038 (42 U.S.C. 2021) and under Nuclear Waste Policy Act of 1982, sec. 121, 96 Stat. 2228 (42 U.S.C. 10141). Sections 51.43, 51.67, and 51.109 also under Nuclear Waste Policy Act of 1982, sec. 114(f), 96 Stat. 2216, as amended (42 U.S.C. 10134 (f)).

■ 2. In § 51.23, paragraph (a) is revised to read as follows:

§ 51.23 Temporary storage of spent fuel after cessation of reactor operation generic determination of no significant environmental Impact.

(a) The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.

* * * * *

Dated at Rockville, Maryland, this 9th day of December, 2010.

For the Nuclear Regulatory Commission. Annette L. Vietti-Cook,

Secretary of the Commission.

[FR Doc. 2010-31624 Filed 12-22-10; 8:45 am] BILLING CODE 7590-01-P

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

[NRC-2008-0482]

Waste Confidence Decision Update

AGENCY: Nuclear Regulatory Commission.

ACTION: Update and final revision of Waste Confidence Decision.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC or Commission) is updating its Waste Confidence Decision of 1984 and, in a parallel rulemaking proceeding, revising its generic determinations in the NRC's regulations. ADDRESSES: You can access publicly available documents related to this document using the following methods:

NRC's Public Document Room (PDR): The public may examine and have copied for a fee publicly available documents at the NRC's PDR, Room O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland.

NRC's Agencywide Documents Access and Management System (ADAMS): Publicly available documents created or received at the NRC are available electronically at the NRC's electronic Reading Room at http://www.nrc.gov/ reading-rm/adams.html. From this page, the public can gain entry into ADAMS, which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's PDR reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov.

Federal Rulemaking Web site: Public comments and supporting materials related to this final rule can be found at *http://www.regulations.gov* by searching on Docket ID: NRC-2008-0482.

FOR FURTHER INFORMATION CONTACT: Tison Campbell, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555– 0001, telephone: 301–415–8579, e-mail: tison.campbell@nrc.gov; Lisa London, Office of the General Counsel, U.S. Nuclear Regulatory Commission. Washington, DC 20555–0001, telephone: 301–415–3233, e-mail: lisa.london@nrc.gov.

SUPPLEMENTARY INFORMATION:

Background

On September 18, 1990 (55 FR 38474), the NRC issued a decision reaffirming and revising, in part, the five Waste Confidence Findings reached in its 1984 Waste Confidence Decision. The 1984 Decision and the 1990 update to the Decision were products of rulemaking proceedings designed to assess the degree of assurance that radioactive wastes generated by nuclear power plants can be safely disposed of, to determine when disposal or offsite storage would be available, and to determine whether radioactive wastes can be safely stored onsite past the expiration of existing facility licenses until offsite disposal or storage is available. In 2008, the Commission decided to undertake a review of its Waste Confidence Decision and Rule as part of an effort to enhance the efficiency of combined license

proceedings for applications for nuclear power plant (NPP) licensees anticipated in the near future by ensuring that the findings are up to date.

The Commission has considered developments since 1990 and has reviewed its five prior findings and supporting environmental analysis. As a result of this review, the Commission is revising the second and fourth findings in the Waste Confidence Decision as follows:

Finding 2: The Commission finds reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.

Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite independent spent fuel storage installations.

The Commission reaffirms the three remaining findings. Each finding and the reasons for revising or reaffirming the finding are discussed below. In keeping with revised Findings 2 and 4, the Commission is concurrently publishing in this issue of the Federal Register conforming amendments to 10 CFR 51.23(a), which provides a generic determination of the environmental impacts of storage of spent fuel at, or away from, reactor sites after the expiration of reactor operating licenses, and expresses reasonable assurance that sufficient geologic disposal capacity will be available when necessary

In October 1979, the NRC initiated a rulemaking proceeding, known as the Waste Confidence proceeding, to assess its degree of assurance that radioactive wastes produced by NPPs "can be safely disposed of, to determine when such disposal or offsite storage will be available, and to determine whether radioactive wastes can be safely stored onsite past the expiration of existing facility licenses until offsite disposal or storage is available" (44 FR 61372, 61373; October 25, 1979). The Commission's action responded to a remand from the U.S. Court of Appeals for the District of Columbia Circuit in State of Minnesota v. NRC, 602 F.2d 412 (DC Cir.1979). That case questioned whether an offsite storage or disposal solution would be available for the spent nuclear fuel (SNF) produced at the Vermont Yankee and Prairie Island NPPs at the expiration of the licenses for those facilities in 2007-2009 or, if not, whether the SNF could be stored at

those reactor sites until an offsite solution was available.

The Waste Confidence proceeding also stemmed from the Commission's statement, in denying a petition for rulemaking filed by the Natural Resources Defense Council (NRDC), that it intended to periodically reassess its finding of reasonable assurance that methods of safe permanent disposal of high-level radioactive waste (HLW) would be available when they were needed. Further, the Commission stated that, as a matter of policy, it "would not continue to license reactors if it did not have reasonable confidence that the wastes can and will in due course be disposed of safely" (42 FR 34391, 34393; July 5, 1977), pet. for rev. dismissed sub nom., NRDC v. NRC, 582 F.2d 166 (2d Cir. 1978)).1

The Waste Confidence proceeding resulted in the following five Waste Confidence Findings, which the Commission issued on August 31, 1984:

(1) The Commission finds reasonable assurance that safe disposal of HLW and SNF in a mined geologic repository is technically feasible;

(2) The Commission finds reasonable assurance that one or more mined geologic repositories for commercial HLW and SNF will be available by the years 2007–2009 and that sufficient repository capacity will be available within 30 years beyond the expiration of any reactor operating license to dispose of existing commercial HLW and SNF originating in such reactor and generated up to that time;

(3) The Commission finds reasonable assurance that HLW and SNF will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all HLW and SNF;

(4) The Commission finds 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 expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations (ISFSIs);

(5) The Commission finds reasonable assurance that safe independent onsite or offsite spent fuel storage will be made available if such storage capacity is needed (49 FR 34658).

Based on these findings, the Commission promulgated 10 CFR 51.23(a) to provide a generic determination that for at least 30 years

¹ The NRDC petition asserted that the Atomic Energy Act of 1954 (AEA). Public Law 83-703, 68 Stat. 919 (1954), required NRC to make a finding, before issuing an operating license for a reactor, that permanent disposal of HLW generated by that reactor can be accomplished safely. The Commission found that the AEA did not require this safety finding to be made in the context of reactor licensing, but rather in the context of the licensing of a geologic disposal facility.

beyond the expiration of reactor operating licenses, no significant environmental impacts will result from the storage of spent fuel in reactor facility storage pools or ISFSIs located at reactor or away-from-reactor sites and that the Commission had reasonable assurance that a permanent disposal facility would be available by 2007– 2009.

The Commission conducted a review of its findings in 1989–1990, which resulted in the revision of Findings 2 and 4 to reflect revised expectations for the date of availability of the first repository, and to clarify that the expiration of a reactor's operating license referred to the full 40-year initial license for operation, as well as any additional term of a revised or renewed license:

(2) The Commission finds reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the commercial HLW and SNF originating in such reactor and generated up to that time;

(4) The Commission finds 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 or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite ISFSIs.

(55 FR 38474; September 18, 1990)

The Commission similarly amended the generic determination in 10 CFR 51.23(a):

The Commission has made a generic determination 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 or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite [ISFSIs]. Further; the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first 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 [HLW and SNF] originating in such reactor and generated up to that time. (55 FR 38472; September 18, 1990)

This generic determination is applied in licensing proceedings conducted under 10 CFR parts 50, 52, 54, and 72. See 10 CFR 51.23(b) (2010).

In 1999, the Commission reviewed its Waste Confidence Findings and

concluded that experience and developments since 1990 had confirmed the findings and made a comprehensive reevaluation of the findings unnecessary. It also stated that it would consider undertaking a reevaluation when the pending repository development and regulatory activities had run their course or if significant and pertinent unexpected events occurred that raise substantial doubt about the continuing validity of the Waste Confidence Findings (64 FR 68005; December 6, 1999). The Commission has not found that the criteria put forth in 1999 for reevaluating its findings have been met. But because the Commission is now preparing to conduct a significant number of proceedings on combined license (COL) applications for new reactors, and the issue of waste confidence has been raised in some of those proceedings and may be raised in others, it is prudent to take a fresh look at the NRC's Waste Confidence Findings now, before completing the agency's review of new reactor license applications.

On February 14, 2002, the Secretary of Energy recommended the Yucca Mountain (YM) site for the development of a repository to the President thereby setting in motion the approval process set forth in sections 114 and 115 of the Nuclear Waste Policy Act, as amended (NWPA). See 42 U.S.C. 10134(a)(1); 10134(a)(2); 10135(b), 10136(b)(2) (2006). On February 15, 2002, the President recommended the site to Congress. On April 8, 2002, the State of Nevada submitted a notice of disapproval of the site recommendation. Congress responded on July 9, 2002, by passing a joint resolution approving the development of a repository at YM, which the President signed on July 23, 2002. See Public Law 107–200, 116 Stat. 735 (2002) (codified at 42 U.S.C. 10135 note (Supp. IV 2004)).

On June 3, 2008, the Department of Energy (DOE) submitted the "Yucca Mountain Repository License Application," seeking NRC's authorization to begin construction of a permanent HLW repository at YM. U.S. Department of Energy, License Application for a High-Level Waste Geologic Repository at Yucca Mountain (2008), available at http://www.nrc.gov/ waste/hlw-disposal/yucca-lic-app.html. On September 8, 2008, the NRC staff found that the application contained sufficient information for the staff to begin its detailed technical review, and docketed the application (73 FR 53284; September 15, 2008). On October 17, 2008, the Commission issued a "Notice of Hearing and Opportunity to Petition for Leave to Intervene" (73 FR 63029;

October 22, 2008). Requests for hearing were received from 12 parties and 2 interested governmental entities; these requests included 318 contentions to the application.² The Construction Authorization Boards granted 10 of these petitions to intervene and admitted all but 17 of the 318 contentions (ADAMS Accession Number ML091310479).

On January 29, 2010, President Obama directed the Secretary of Energy to create a "Blue Ribbon Commission on America's Nuclear Future" to evaluate options for the back-end of the nuclear fuel cycle. See Presidential Memorandum—Blue Ribbon Commission on America's Nuclear Future (January 29, 2009), available at http://www.whitehouse.gov/the-pressoffice/presidential-memorandum-blueribbon-commission-americas-nuclearfuture.

In the YM proceeding, DOE filed a "Motion to Stay the Proceeding," on February 1, 2010, which stated that the President, in the proposed budget for fiscal year 2011, "directed that the Department of Energy 'discontinue its application to the U.S. Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain in 2010

repository at Yucca Mountain in 2010 * * *'" (ADAMS Accession Number ML100321641 at 1). The Motion also stated that the proposed budget indicated that all DOE funding for YM would be eliminated in 2011. *Id*. Therefore, DOE stated its intent to withdraw the license application by March 3, 2010, and requested a stay of the proceeding to avoid unnecessary expenditure of resources by the Board and parties. *See Id*. at 2. Construction Authorization Board 4 granted a stay of the proceeding on February 16, 2010 (ADAMS Accession Number ML100470423).

On February 19, 2010, Aiken County, South Carolina filed an action in the U.S. Court of Appeals for the District of Columbia Circuit, challenging DOE's decision to seek withdrawal of the license application. Similar lawsuits filed by three individuals living near Hanford. Washington (the Ferguson Petitioners), the State of South Carolina, and the State of Washington were consolidated into one proceeding now before the District of Columbia Circuit. See In re Aiken County, No. 10–1050 (and consolidated cases) (DC Cir.).

² ADAMS Accession Numbers ML083540096, ML083540230, ML083550015, ML083570102, ML083570371, ML083570416, ML083570731, ML083570732, ML083570741, ML083570761, ML083570773, ML083570775, ML083570779, ML083570788, ML083570789, ML083590091, ML090050465, ML083540836.

On March 3, 2010, DOE filed with the NRC a Motion to withdraw its license application with prejudice (ADAMS Accession Number ML100621397) On June 29, 2010, Construction Authorization Board 4 issued a Memorandum and Order (Granting Intervention to Petitioners and Denying Withdrawal Motion), LBP-10-11, ____, denying DOE's motion to NRC withdraw as outside its authority under the NWPA (ADAMS Accession Number ML101800299). The Secretary of the Commission invited briefs from all the parties in the YM proceeding on whether to review and whether to uphold or reverse the Board's decision. The Commission has not yet acted on these questions.

Although the proposed updates to the Waste Confidence Decision and Rule did not consider some of these recent developments, the Commission has assumed, for the purposes of these updates, that YM would not be built Even so, the new YM developments are pertinent. The Commission believes that the updates to the Waste Confidence Decision and Rule reflect the uncertainty regarding the timing of the availability of a geologic repository for SNF and HLW. The Commission, as a separate action, has directed the staff to develop a plan for a longer-term rulemaking and Environmental Impact Statement (EIS) to assess the environmental impacts and safety of long-term SNF and HLW storage beyond 120 years (SRM-SECY-09-0090; ADAMS Accession Number ML102580229). This analysis will go well beyond the current analysis that supports at least 60 years of postlicensed life storage with eventual disposal in a deep geologic repository. The Commission believes that a more expansive analysis is appropriate because it will provide additional information (beyond the reasonable assurance the Commission is recognizing in the current rulemaking) on whether spent fuel can be safely stored for a longer time, if necessary. This analysis could reduce the frequency with which the Commission must, as a practical matter, consider waste storage capabilities. The staff's new review will require an analysis and, to some extent, a forecast of the safety and environmental impacts of storage for extended periods of time beyond that currently recognized in 10 CFR 51.23 and the Waste Confidence Decision. While storage of spent fuel for 60 years beyond licensed life has been shown through experience or analyses to be safe and not to have a significant environmental impact, the proposed

technical analysis will go well beyond the time frame of existing requirements.

Even though the Commission has not determined whether this particular analysis will result in a different conclusion concerning the environmental impacts of extended spent fuel storage, the Commission believes that this unprecedented longterm review should be accompanied by an EIS. Preparing an EIS will ensure that the agency considers these longer-term storage issues from an appropriate perspective. The Commission has therefore decided to exercise its discretionary authority under 10 CFR 51.20(a)(2) and is directing the staff to prepare a draft EIS to accompany the proposed rule developed as a result of this longer-term analysis. The updates to the Waste Confidence Decision in this document and the final rule published in this issue of the Federal Register rely on the best information currently available to the Commission and therefore are separate from this longterm initiative. The updates to the Waste Confidence Decision and Rule are not dependent upon the staff completing any action outside the scope of these revisions to the Waste Confidence Decision and Rule.

Based upon the technical and environmental analysis contained in this document, and discussed at length below, the Commission has prepared this update of the Waste Confidence Decision and now makes the following revisions to Findings 2 and 4:

(2) The Commission finds reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent nuclear fuel generated by any reactor when necessary.

(4) The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite ISFSIs.

The update to the Waste Confidence Decision restates and supplements the bases for the earlier findings and addresses the public comments received on the proposed revisions to the findings.

The Commission is also concurrently publishing in this issue of the Federal Register a final rule revising 10 CFR 51.23(a) to conform to the revisions of Findings 2 and 4.

Responses to Public Comments

The NRC received comments from environmental and other public interest organizations; the nuclear industry; States, local governments, an Indian Tribe, and inter-governmental organizations; and individuals. Comments from the 158 letters, including a late supplemental letter from the Attorney General of New York, have been categorized and grouped under 8 issues for purposes of this discussion. The issues include comments made in two form letters received from 1,990 and 941 commenters, respectively.

Issue 1: Compliance of the Waste Confidence Decision With the National Environmental Policy Act (NEPA)

Comment 1: A large number of commenters stated that the NRC has not complied with NEPA in issuing its proposed revisions to the Waste Confidence Decision and to its generic determination in 10 CFR 51.23(a) because they believe that the revisions need to be supported by a Generic Environmental Impact Statement (GEIS). The National Resources Defense Council (NRDC) argues that these two agency actions "are, in effect, generic licensing decisions that allow for the production of additional spent reactor fuel and other radioactive wastes associated with the uranium fuel cycle—essentially in perpetuity." Thus, these "generic licensing decisions," in NRDC's view, must "be accompanied by a [GEIS] that fully assesses the environmental impacts of the entire uranium fuel cycle, including health and environmental impacts and costs, and that examines a reasonable array of alternatives, including the alternative of not producing any additional radioactive waste."

Texans for a Sound Energy Policy (TSEP) stated that "the NRC has relied on the Waste Confidence Decision to license and re-license many nuclear power plants, and therefore it constitutes a major federal action significantly affecting the environment," requiring preparation of an EIS.

The Attorney General of New York argued that the NRC should "require and perform a site-specific evaluation of environmental impacts of spent fuel storage at each reactor location, taking into account environmental factors including surrounding population density, water resources, seismicity, subsurface geology, and topography along with the design, construction, and operating experience of the spent fuel pool in question and the layout of the fuel assemblies in that pool." The Attorney General believes that these "new factual conclusions also provide compelling evidence to support * [consideration] in relicensing

proceedings, such as the ongoing proceeding for the Indian Point power reactors, of any properly presented environmental and safety contention focused on the adequacy of mitigation measures taken or to be taken at that site to address the safety and environmental impacts flowing from the 20 additional years of spent fuel storage at the reactor site, the increased volume of spent fuel created during those 20 years, and the indefinite storage at that reactor site of all the waste generated by that reactor." Finally a form letter, used by many commenters, asserts "it is appropriate that any major Federal action on radioactive waste (such as changing the Waste Confidence Decision) be considered in a generic (programmatic) NEPA proceeding" that includes all aspects of the nuclear fuel chain.

NRC Response: In considering the NRC's compliance with NEPA in revising its Waste Confidence Decision and Rule, it is important to keep in mind the limited scope of these revisions. The NRC is amending its generic determination of no significant environmental impact from the temporary storage of spent fuel after cessation of reactor operation contained in 10 CFR 51.23(a) to conform it to the Commission's revised Findings 2 and 4 of the Waste Confidence Decision.

In revised Finding 4, the Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years (rather than 30 years, as in the present finding) beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite ISFSIs. The revised generic determination in 10 CFR 51.23(a) is dependent upon the environmental analysis supporting revised Finding 4.

The revision also incorporates the Commission's supporting analysis for revised Finding 2, which looks at the time necessary to develop a repository (about 25-35 years) and concludes that reasonable assurance exists that sufficient mined geologic repository capacity will be available when necessary to dispose of the commercial HLW and SNF originating in such reactor and generated up to that time. As the Commission indicated in its Staff Requirements Memorandum (SRM) approving publication of this Decision and the final rule, the changes to Finding 2 do not mean that the Commission has endorsed indefinite

storage of SNF and HLW.³ See SRM– SECY-09-0090; ADAMS Accession Number ML102580229.

The revised generic determination is not a generic licensing decision-it generically deals with one aspect of licensing decisions that have yet to be made. It does not authorize the operation of a NPP, the renewal of a license of a NPP, or the production of spent fuel by a NPP. NPPs and renewals of operating licenses are licensed in individual licensing proceedings. The NRC must prepare a site-specific EIS in connection with any type of application to construct and operate a NPP. See 10 CFR 51.20(b). For operating license renewals, the NRC may rely on NRC's GEIS for License Renewal of Nuclear Plants, NUREG-1437, May 1996, for issues that are common to all plants and must also prepare a Supplemental EIS that evaluates site-specific issues not discussed in the GEIS or "new and significant information" regarding issues that are discussed in the GEIS.⁴ See 10 CFR part 51, subpart A, appendix B.

Both types of licensing proceedings are supported by both generic and specific EISs. The generic determination in § 51.23(a) does play a role in the environmental analyses of the licensing and license renewal of individual NPPs; it excuses applicants for those licenses and the NRC from conducting an additional site-specific environmental analysis only within the scope of the generic determination in 10 CFR 51.23(a). Thus, 10 CFR 51.23(b) provides:

Accordingly, * * * within the scope of the generic determination in paragraph (a) of this section, no discussion of any environmental impact of spent fuel storage in reactor facility storage pools or [ISFSIs] for the period following the term of the reactor operating license or amendment, reactor combined license or amendment, or initial ISFSI license or amendment for which application is made, is required in any environmental report. [EIS], [EA], or other analysis prepared in connection with the issuance or amendment of an operating license for a [NPP] under parts 50 and 54 of this chapter, or issuance or amendment of a combined license for a [NPP] under parts 52 and 54 of this chapter,

or the issuance of an initial license for storage of spent fuel at an ISFSI, or any amendment thereto (emphasis added).

In short, the environmental analysis, which is done as part of the licensing or license renewals of individual NPPs, as well as the initial licensing of an ISFSI, does consider the potential environmental impacts of storage of spent fuel during the term of the license. What is not considered in those proceedings-due to the generic determination in 10 CFR 51.23(a)—is the potential environmental impact of storage of spent fuel for a 60-year period after the end of licensed operations or the potential environmental impacts of ultimate disposal. Environmental analysis for this period is covered by the environmental analysis the NRC has done in this update to the Waste Confidence Decision, particularly under Findings 3, 4, and 5. This analysis enables the Commission to generically resolve this issue because it demonstrates that spent fuel can be safely stored and managed under a 10 CFR part 50 or 10 CFR part 72 license after the cessation of reactor operations for at least a 60-year period. Further, if it becomes clear that a repository will not be available by the expiration of the 60-year post licensed life period, the Commission will revisit the Waste Confidence Decision and Rule early enough to ensure that it continues to have reasonable assurance of the safe storage without significant environmental impacts of the SNF and HLW.

In addition, the NRC's Waste Confidence Decision and Rule do not pre-approve any particular waste storage or disposal site technology-although the Decision does evaluate the technical feasibility of deep geologic disposalnor do they require that a specific cask design be used for storage. Individual licensees and applicants, or in the case of a HLW repository, DOE, will have to apply for and meet all of the NRC's safety and environmental requirements before the NRC will issue a license for storage or disposal.

The NRC must prepare an EIS when the proposed action is a major Federal action significantly affecting the quality of the human environment or when the proposed action involves a matter that the Commission, in the exercise of its discretion, has determined should be covered by an EIS. 10 CFR 51.20(a). The NRC's rulemaking action here is to incorporate a revised generic determination into 10 CFR 51.23(a), which expands from at least 30 years to at least 60 years after licensed life the period during which the Commission has confidence that spent fuel can be

³ This reflects the Commission's confidence that a repository will be made available before the storage of the SNF and HLW becomes unsafe or would result in significant environmental impacts. Finding 2 also reflects the Commission's belief that it cannot have confidence in a target date because it cannot predict when the societal and political obstacles to a successful repository program will be overcome. Once those obstacles are overcome, the Commission has confidence that a repository can be sited, licensed, and constructed within 25-35 years.

⁺ The Commission issued a proposed rule updating the 1996 GEIS on July 31, 2009 (74 FR 38117) for a 75-day public comment period; the staff is currently preparing responses to the public comments.

safely stored without significant environmental impacts and to state its confidence that a permanent repository will be available when necessary. As the Commission explained in 1984 and 1990, this final rulemaking action formally incorporating the revised generic determination in the Commission's regulations does not have separate independent environmental impacts (49 FR 34693; August 31, 1984, 55 FR 38473; September 18, 1990). The environmental analysis that the revised generic determination is based on is found in this update to the Waste Confidence Decision, which serves as the Environmental Assessment (EA) for the rule.

The updates to the Waste Confidence Decision and Rule, as explained above, do not authorize any licensing or other Federal action. The rule does have the effect of removing from a reactor operating license proceeding, license renewal proceeding, or initial ISFSI licensing proceeding the issue of whether safe storage of SNF can be accomplished without any significant environmental impact for an additional 30 years beyond the 30 years provided by the current generic determination. The update to the Waste Confidence Decision explains and documents the Commission's continued reasonable assurance that this extended storage period will have no significant environmental impacts. Given this conclusion, a finding of no significant environmental impact (FONSI) may be made and preparation of an EIS is not required.

Comment 2: A number of commenters asserted that the NRC, in making its FONSI, has not complied with its procedural requirements for a FONSI: 10 CFR 51.32, or with the requirements of the Council on Environmental Quality: 40 CFR 1508.13. In particular, some commenters claim that the NRC has not published an EA, as required by 10 CFR 51.32, and has not identified all the documents that the FONSI is based on. TSEP asserts that the NRC's alleged failure to comply with its procedural requirements for a FONSI also results in a violation of the Administrative Procedure Act because it means the public has not had an opportunity to comment on the basis for the FONSI.

NRC Response: As explained in response to Comment 1, the only Federal action involved in this rulemaking is the amendment of 10 CFR 51.23(a). This amendment adopts the expansion, by 30 years, of the Commission's Finding 4 in its 1990 Waste Confidence Decision that spent fuel generated in any reactor can be stored safely and without significant environmental impacts after the licensed life for operation of the reactor; the amendment also captures the revisions to Finding 2 in the Waste Confidence Decision that deep geologic dispoşal capacity will be available when necessary. This is the action described in the NRC's proposed FONSI (See 73 FR 59550; October 9, 2008).

The formal incorporation of revised Findings 2 and 4 into 10 CFR 51.23(a) has no separate independent environmental impact from the revisions of Findings 2 and 4. The update and revision of the Waste Confidence Decision is the EA supporting the action and the basis for the FONSI and, as evidenced by the breadth of comments received, the findings of the Waste Confidence Decision have been made available for public review and comment. The update was undertaken, as a matter of discretion, to ensure the currency of the Waste Confidence Findings, which have not been changed in nearly 20 years.

The NRC's procedural requirements for an EA call for a brief discussion of the need for the proposed action, alternatives to that action, and the environmental impacts of the proposed action and alternatives as well as a list of agencies and persons consulted and identification of the sources used. See 10 CFR 51.30(a). The Commission's proposal explained that the need for an update of the 1990 Waste Confidence Decision was prompted by a desire to make anticipated licensing proceedings for new reactors more efficient by resolving any concerns that the generic determination was out of date and could not be relied upon in these licensing proceedings (See 73 FR 59553, 59558; October 9, 2008). The Commission's proposed rule also explicitly raised the question, in the context of revising Finding 2, whether it should remove a target date from Finding 2 and make a general finding of reasonable assurance that SNF generated in any reactor can be stored safely and without significant environmental impacts until a disposal facility can reasonably be expected to be available (See 73 FR 59561-59562; October 9, 2008).

The Commission explained what the basis of this alternative finding would be:

In other words, in response to the court's concerns that precipitated the original Waste Confidence proceeding, the Commission could now say that there is no need to be concerned about the possibility that spent fuel may need to be stored at onsite or offsite storage facilities at the expiration of the license (including a renewed license) until such time as a repository is available because we have reasonable assurance that spent fuel can be so stored for long periods of time, safely and without significant environmental impact. Such a finding would be made on the basis of the Commission's accumulated experience of the safety of long-term spent fuel storage with no significant environmental impact (see Finding 4) and its. accumulated experience of the safe management of spent fuel storage during and after the expiration of the reactor operating license (see Finding 3). Id.

The Commission explicitly sought public comment on whether any additional information would be needed to make this change. The update to the Waste Confidence Decision shows that there would be no difference between the environmental impacts of the proposed action of extending the time period for safe storage of SNF by 30 years and the no-action alternative of leaving it as it is. The Commission also stated in its proposed update and rule that the environmental impacts of the alternative of indefinite storage may be the same, but found no need to make this prediction due to its expectation that a repository will be available within 50-60 years of the end of any reactor's license for the disposal of its spent fuel.

The Commission has, however, now reconsidered its position regarding the use of the 50-60 year target date: The Commission has confidence that spent fuel can be safely stored without significant environmental impact for long periods of time as described in its discussion of Findings 3, 4, and 5. But there are issues beyond the Commission's control, including the political and societal challenges of siting a HLW repository, that make it premature to predict a precise date or time frame when a repository will become available.⁵ The Commission has therefore decided not to adopt a specific time frame in Finding 2 or its final rule. Instead, the Commission is expressing its reasonable assurance that a repository will be available "when necessary.'

The Commission believes that this standard accurately reflects its position, as discussed in the analysis supporting Finding 2, that a repository can be constructed within 25-35 years of a Federal decision (e.g., congressional action or executive order) to start a new repository program. The Commission continues to have confidence, as expressed in Findings 3 and 5, that safe and sufficient onsite or offsite storage capacity is and will be available until the waste is sent to a repository for disposal. In addition, revised Finding 4 supports safe onsite or offsite storage without significant environmental

⁵ These political and societal issues are discussed in the analysis of Finding 2 in this document.

impacts for at least 60 years beyond the end of the licensed life for operation of any nuclear power reactor. Given that long period of time, the current "Blue-Ribbon Commission" studying options for handling SNF, the Commission's direction to the NRC staff to consider whether it is feasible to expand the 60year period for safe storage, and a continued Federal obligation to site and build a repository under the Nuclear Waste Policy Act, the Commission has reasonable assurance that disposal capacity will become available when necessary and that there will be sufficient safe and environmentally sound storage for all of the spent nuclear fuel until disposal capacity becomes available.

Further, the Commission has decided not to endorse the concept of indefinite storage that was discussed with the alternative Finding 2 in the proposed rule (73 FR 59561-59562; October 9, 2008). The Commission has determined that it is not necessary to endorse indefinite storage if there is no target date for a repository because the Commission has confidence that either a repository will be available before the expiration of the 60 years post-licensed life discussed in Finding 4 or that the Waste Confidence Decision and Rule will be updated and revised if the expiration of the 60-year period approaches without an ultimate disposal solution for the HLW and SNF.

With respect to the claim that the NRC must make the documents on which its FONSI relies available to the public, the commenters are correct that the NRC must disclose all portions of the documents that informed its NEPA analysis and that are not exempt from public disclosure under the Freedom of Information Act (FOIA). The Commission acknowledged this fact when, in Pacific Gas and Electric Co. (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NKC 1 (2008), it directed the NRC staff to prepare a complete list of the documents on which it relied in preparing its EA

In the case of the update to the Waste Confidence Decision, the NRC has complied with this standard—all of the documents relied upon in preparing the update to the Waste Confidence Decision and Rule are referenced. Two of the referenced documents are not publicly available: reports concerning the safety and security of spent fuel pool storage issued by Sandia National Laboratories and the National Academy of Sciences (NAS), which are Classified. Safeguards Information, or Official Use Only—Security Related Information. Although these documents cannot be released to the public, redacted or publicly available summaries are available: A redacted version of the Sandia study can be found in ADAMS at (ADAMS Accession Number ML062290362) and the unclassified summary of the NAS report can be purchased or downloaded for free by accessing the NAS Web site at: http:// www.nap.edu/catalog.php?record_id= 11263. No other non-public documents are referenced in the Waste Confidence Decision.

In sum, the NRC's FONSI identifies the proposed action and relies upon an EA that explains at considerable length the reasons why this action will not have a significant effect on the quality of the human environment and describes the documents relied upon and how these documents may be accessed by the public.

Comment 3: A number of commenters asserted that the NRC has failed to comply with NEPA because the NRC has not prepared a GEIS to review and update Table S-3 of 10 CFR 51.51(b). Table S–3 lists environmental data to be used by applicants and the NRC staff as the basis for evaluating the environmental effects of the portions of the fuel cycle that occur before new fuel is delivered to the plant and after spent fuel is removed from the plant site for light-water reactors. Table S-3 was incorporated into the NRC's regulations in 1979 and includes an assumption, based on NRC staff's analysis of disposal in a bedded-salt geologic repository, that after a repository is sealed there would be no further release of radioactive materials to the environment (the "zero release assumption"). The 1979 rulemaking also included an expectation that "a suitable bedded-salt repository site or its equivalent will be found" (44 FR 45362 and 45368; August 2, 1979).

The commenters stated that the NRC's proposed revisions to the Waste Confidence Decision acknowledge that salt formations are now only being considered as hosts for reprocessed nuclear materials because heatgenerating waste. like SNF, exacerbates a process by which salt can rapidly deform (See 73 FR 59555; October 9, 2008). For this and other reasons, the commenters believe that Table S-3 has been undermined and is out of date and needs to be reviewed in a GEIS. NRDC also believes that the Table S-3 Rule's "finding of no significant health impacts fundamentally supports the Waste Confidence Decision because its estimate of zero radioactive releases from a repository is based on the Commission's then-current Waste

Confidence finding, that 'a suitable bedded-salt repository site or its equivalent will be found.'" The commenters also note that the Commission, in 1990, indicated that it would find it necessary to review the Table S–3 Rule if it found, in a future review of the Waste Confidence Decision, that its confidence in the technical feasibility of disposal in a mined geologic repository had been lost (55 FR 38491; September 18, 1990). The commenters believe that the Commission lacks a basis for continued confidence in the technical feasibility of safe geologic disposal and that the relationship of the Table S–3 rule to the Waste Confidence Decision is such that a GEIS to review the Table S-3 Rule is a necessary prerequisite to a revision of the Waste Confidence Findings.

NRC Response: The Waste Confidence Decision does not rely on findings made in the context of the Table S-3 Rule. Even in 1984, the Commission's confidence that a suitable geologic site for a repository would be found was not premised on the expectation that a bedded-salt site would be located, but rather on the fact that DOE's site exploration efforts were "providing information on site characteristics at a sufficiently large number and variety of sites and geologic media to support the expectation that one or more technically acceptable sites will be identified." (49 FR 34668; August 31, 1984). Similarly, the issue of concern to the NRC in considering waste confidence has not been whether a zero-release assumption will be met, but rather when Environmental Protection Agency (EPA) would issue standards ensuring that any releases of radioactive materials to the environment would not be inimical to public health and safety (See 55 FR 38500; September 18, 1990).

In 1990, the Commission discussed the relationship of the Table S-3 rulemaking with the Waste Confidence proceeding (See 55 FR 38490-38491; September 18, 1990). The Commission noted that the Table S-3 proceeding was the outgrowth of efforts to generically address the NEPA requirement for an evaluation of the environmental impacts of operation of a light water reactor (LWR), that Table S-3 assigned numerical values for environmental costs resulting from uranium fuel cycle activities to support one year of LWR operation, and that the Waste Confidence proceeding was not intended to make quantitative judgments about the environmental costs of waste disposal. The Commission stated that unless, "in a future review of the Waste Confidence decision, [it] finds that it no longer has

confidence in the technical feasibility of disposal in a mined geologic repository, the Commission will not consider it necessary to review the S-3 rule when it reexamines its Waste Confidence Findings in the future" (55 FR 38491; September 18, 1990). The Commission continues to have confidence in the technical feasibility of disposal in a mined geologic repository (see NRC Response to Comment 8 and the discussion of Finding 1 later in this document) so there is no need to review the S-3 rule to support its Waste Confidence Findings.⁶ This does not preclude the NRC from taking future regulatory action to amend Table S–3 if doing so appears to be necessary or desirable. In 2008, the Commission stated that "[t]he NRC will continue to evaluate, as part of its annual review of potential rulemaking activity, the need to amend Table S-3." New England Coalition on Nuclear Pollution; Denial of Petition for Rulemaking (73 FR 14946, 14949; March 20, 2008).

Comment 4: The Attorney General of California believes that the Waste Confidence Decision violates core principles of NEPA and the NRC's regulations because it does not allow for supplementation of an EIS for an ISFSI even when there is significant change in the circumstances under which a project is carried out or when there is significant new information regarding the environmental impacts of the project. See 10 CFR 51.92(a). He asserts that "NRC has not shown a clearly articulated justification, based on substantial evidence in the record, for the proposed extension of this presumption that no change in circumstance, and no new information, can ever trigger the NEPA duty to supplement the environmental analysis of the long-term onsite storage of nuclear waste." The Attorney General also believes that the proposed update to the Waste Confidence Decision allows NPPs "to be substantially repurposed and transformed into longterm storage facilities * * * without environmental review" and that therefore supplementation of the initial EIS for the NPP may be warranted. Similarly, the Attorney General of New York, in a supplemental comment, argues that the Commission's proposed revision to Finding 2 (originally discussed in the Commissioners' September 2009 votes) endorses a policy of indefinite storage and that the

Commission "has not made a generic determination regarding environmental and safety issues presented by indefinite storage of spent fuel at the site of nuclear reactors following shutdown."

NRC Response: Under 10 CFR 51.23(b), the NRC does not need to prepare a site-specific EA or EIS during individual NPP licensing that discusses the environmental impacts of spent fuel storage for the period following the term of the reactor license or initial ISFSI license because of the generic determination the Commission has made in 10 CFR 51.23(a) that spent fuel can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life of the reactor. The generic determination is based on the environmental analysis conducted in the Waste Confidence Decision. However, the commenter is not correct that this means that an EA or EIS for a reactor or an ISFSI may never need to be supplemented even if there is a significant change in circumstances or significant new information that demonstrates that the application of the generic determination would not serve the purposes for which it was adopted. Under 10 CFR 51.20(a)(2), the Commission, in its discretion, may determine that a proposed action involves a matter that should be covered by an EIS. Further, 10 CFR 2.335(b) provides that a party to an adjudicatory proceeding may petition for the waiver of the application of the rule or for an exception for that particular proceeding. The sole grounds for a petition for waiver or exception is that special circumstances with respect to the subject matter of the particular proceeding exist so that the application of the rule would not serve the purposes for which it was adopted.

More fundamentally, as the Commission clarified in its SRM authorizing publication of this decision and final rule in the Federal Register, the changes to the Waste Confidence Decision and Rule are not intended to support indefinite storage. If the time frame for safe and environmentally sound storage included in Finding 4 approaches without the availability of sufficient repository capacity, the Commission will revisit the Waste Confidence Decision and Rule.

Comment 5: Riverkeeper asserts that the NRC made its finding of no significant impact in its initial 1984 decision "without performing an environmental review pursuant to NEPA, explicitly stating that an [EIS] was not necessary," and then has continued to make this finding without appropriate environmental review.

NRC Response: Riverkeeper is correct that the NRC concluded in 1984 that Finding 4-that SNF could be safely stored without significant environmental impacts for at least 30 years beyond the expiration of the reactor's operating license-did not require the support of an EIS (See 49 FR 34666; August 31, 1984). This does not mean that this finding was made without performing the required environmental review under NEPA. The Commission explained that the Waste Confidence Decision itself considered the environmental aspects of spent fuel storage and did comply with NEPA. Id. No EIS was conducted because the fourth finding concluded that the environmental impacts from extended storage of SNF are so insignificant as not to require consideration in an EIS. The NRC has explained in its response to Comment 1 why an EIS is unnecessary to support the expansion of its generic determination.

Issue 2: Compliance of the Waste Confidence Decision With the Atomic Energy Act (AEA)

Comment 6: Several commenters asserted that the updates to the Waste Confidence Decision and Rule do not comply with the AEA. They stated that that the AEA precludes NRC from licensing any new NPP or renewing the license of any existing NPP if it would be "inimical * * * to the health and safety of the public." 42 U.S.C. 2133(d) (2006). They note that the Commission continues to state that it would not continue to license reactors if it did not have reasonable confidence that the wastes can and will in due course be disposed of safely. These commenters assert that Finding 1 effectively constitutes a licensing determination that spent fuel disposal risks are not inimical to public health and safety, and that Findings 3, 4, and 5 effectively constitute a licensing determination that spent fuel storage risks are not inimical to public health and safety. Because the commenters believe that the NRC has presented no well-documented safety findings supporting its findings, they contend that the NRC's revisions of its findings are in violation of the AEA.

NRC Response: As explained in the response to Comment 1, the NRC's update to the Waste Confidence Decision and Rule are not licensing decisions. They are not determinations made as part of the licensing proceedings for NPPs or ISFSIs or the renewal of those licenses. They do not authorize the storage of SNF in spent fuel pools or ISFSIs. The revised findings and generic determination are conclusions of the Commission's

[•] As discussed below. Finding 1 deals with the general technical feasibility of a repository and is not dependent upon a specific site. Further, the Commission makes it clear in its discussion of Finding 2 that the Findings assume that YM will not be used as a geologic repository.

environmental analyses, under NEPA, of the foreseeable environmental impacts stemming from the storage of SNF after the end of reactor operation.

As long ago as 1978, the U.S. Court of Appeals for the Second Circuit considered the question "whether NRC, prior to granting nuclear power reactor operating licenses, is required by the public health and safety requirement of the AEA to make a determination * * * that high-level radioactive wastes can be permanently disposed of safely." Natural Resources Defense Council v. NRC, 582 F. 2d 166, 170 (1978) (emphasis in original). The court found that the NRC was not required to make a finding under the AEA that SNF could be disposed of safely at the time a reactor license was issued, but that it was appropriate for the Commission to make this finding in considering a license application for a geologic repository. Similarly, the U.S. Court of Appeals for the District of Columbia Circuit did not vacate amendments to NPP operating licenses permitting the reracking of spent fuel storage pools because it was concerned about the availability of storage or disposal facilities at the end of licensed operation. State of Minnesota v. NRC, 602 F. 2d 412 (DC Cir. 1979). Rather, that court was concerned that the Commission's confidence in these matters had not been subjected to public scrutiny, so it directed the Commission to conduct a rulemaking proceeding to assess its degree of confidence on these issues, leading to the original Waste Confidence proceeding

The Commission will make the safety finding with respect to SNF disposal envisioned by the commenters in the context of a licensing proceeding for a geologic repository. The Commission does make the safety findings with respect to storage of SNF envisioned by the commenters in the context of licensing proceedings for NPPs and ISFSIs for the terms of those licenses.

Issue 3: What is the meaning of "reasonable assurance" in the waste confidence Findings?

Comment 7: One commenter expressed the view that the NRC should continue to take a position of suspending the licensing of reactors if it does not have confidence beyond a reasonable doubt that wastes can and will be disposed of safely. Another commenter criticized the NRC for "fail[ing] to define the standard for reasonable assurance—what level of assurance that they found in making their determination—90%, 51%, 5%."

NRC Response: The "reasonable assurance" standard is not equivalent to the "beyond a reasonable doubt" standard used in the criminal law. North Anna Environmental Coalition v. NRC, 533 F.2d 655, 667 (DC Cir. 1976) (North Anna).7 It is more akin to a "clear preponderance of the evidence" standard, and what constitutes "reasonable assurance" depends on the particular circumstances of the issue being examined. In a 2009 decision affirming the license renewal of the Oyster Creek NPP, the Commission explained: "Reasonable assurance is not quantified as equivalent to a 95% (or any other percent) confidence level, but is based on sound technical judgment of the particulars of a case and on compliance with our regulations * * ." In re Amergen Energy Co. (License Renewal for Oyster Creek

(License Renewal for Oyster Creek Nuclear Generating Station), *CLI-09-07*, 69 NRC 235 (April 1, 2009).

Thus, the Commission's reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely without significant environmental impacts for at least 60 years beyond the licensed life for operation of that reactor is based on a clear preponderance of the technical and scientific evidence described in the discussion of Finding 4. The Commission's reasonable assurance in Finding 2, that sufficient repository capacity will be available when necessary, is somewhat different; it does not include a specific date for when a repository will be available and is supported by an analysis that considers how long it may take to successfully complete the process to select a site, license, and build a repository. This analysis is not purely scientific, and thus the evidence has more qualitative content than evidence considered for strictly scientific or technical issues.

Issue 4: Whether the Commission Has an Adequate Basis for Reaffirming Finding 1

Comment 8: TSEP believes that the Commission lacks a sound basis for reaffirming Finding 1: that there is reasonable assurance that safe disposal

of HLW and SNF in a mined geologic repository is technically feasible. In support of its view, TSEP provides the comments of the Institute for Energy and Environmental Research (IEER) by Dr. Arjun Makhijani. IEER stated that "the Waste Confidence Decision presents a safety finding, under the Atomic Energy Act, that the NRC has reasonable assurance that disposal of spent fuel will not pose an undue risk to public health and safety. It does so via the finding that disposal is technically feasible and can be done in conformity with the assumption of zero releases in Table S-3 * * *." IEER believes that the NRC has failed to address available information, which shows that the NRC currently does not have an adequate technical basis for a reasonable level of confidence that spent fuel can be isolated in a geologic repository.

IEER defines "safe disposal" as involving "(i) the safety of building the repository, putting the waste in it, and backfilling and sealing it, and (ii) the performance relative to health and environmental protection standards for a long period after the repository is sealed * * *. [I]t is essential to show a reasonable basis for confidence that the public and the environment far into the future will be adequately protected from the effects of disposal at a specific site and a specific engineered system built there." Further, IEER believes that "reasonable assurance" requires "a statistically valid argument based on real-world data that would show (i) that all the elements for a repository exist and (ii) that they would work together as designed; as estimated by validated models. The evidence must be sufficient to provide a reasonable basis to conclude that the durability of the isolation arrangements would be sufficient to meet health and environmental standards for long periods of time * * * with a high probability." IEER believes that the NRC does not have the requisite reasonable assurance because the NRC "has not taken into account a mountain of data and analysis" derived from the YM repository program and from the French program at the Bure site, which illustrate the problems these programs have encountered and thus show, in IEER's view, "that it is far from assured that safe disposal of spent fuel in a geologic repository is technically feasible." IEER also cites to the historical difficulty the EPA has had in formulating radiation protection standards and notes that "[w]ithout a final standard that is clear of court challenges, performance assessment

⁷ In North Anna, the court considered whether the Commission's "reasonable assurance" standard required an applicant for a NPP license to prove beyond a reasonable doubt that an earthquake fault under the proposed site was not capable. The court found that neither the AEA nor the pertinent regulations required the Commission to find, under its reasonable assurance standard, that the site was totally risk-free. See also Power Reactor Development Co. v. International Union of Electrical, Radio and Machine Workers, 367 U.S. 396, 414 (1961), where the Supreme Court rejected a claim that the Commission's finding of reasonable assurance needed to be based on "compelling reasons" when a construction permit for a reactor sited near a large population center was being considered.

must necessarily rest on guesses about what it might be; this is not a basis on which 'reasonable assurance' of the technical feasibility of 'safe disposal' can be given, for the simple reason that there is no accepted definition of safe in relation to Yucca Mountain as yet,"

NRC Response: IEER confuses the safety finding that the NRC must make under the AEA when considering an application for a license to construct and operate a repository at an actual site with the Waste Confidence Findings made under NEPA, including the finding that there is reasonable assurance that safe disposal of HLW and SNF is technically feasible. See response to Comment 6. The NRC currently has before it DOE's application for a construction authorization at the YM site and, if the proceeding moves forward, will consider information submitted with admitted contentions that may call into question DOE's ability to safely dispose of HLW and SNF at that site. However, it is very important that the Commission preserve its adjudicatory impartiality and not consider ex parte communications of the type proffered by IEER outside of the YM licensing proceeding, and it has been careful not to do so in the context of reviewing its Waste Confidence Decision: See 10 CFR 2.347.

Webster's Third New International Dictionary (1993) defines "feasible" as "capable of being done, executed, or effected: possible of realization." The Commission began its discussion of Finding 1 in its original 1984 decision by stating that "[t]he Commission finds that safe disposal of [HLW and SNF] is technically possible and that it is achievable using existing technology" (49 FR 34667; August 31, 1984) (emphasis added). The Commission then went on to say: "Although a repository has not yet been constructed and its safety and environmental acceptability demonstrated, no fundamental breakthrough in science or technology is needed to implement a successful waste disposal program." Id. This focus on whether a fundamental breakthrough in science or technology is needed has guided the Commission's consideration of the feasibility of the disposal of HLW and SNF

The Commission identified three key technical problems that would need to be solved: the selection of a suitable geologic setting, the development of waste packages that can contain the waste until the fission product hazard is greatly reduced, and engineered barriers that can effectively retard migration of radionuclides out of the repository. *Id.* In 1984, the Commission reviewed

evidence indicating that there are geologic media in the United States in many locations potentially suitable for a waste repository; that the chemical and physical properties of HLW and SNF can be sufficiently understood to permit the design of a suitable waste package; and that DOE's development work on backfill materials and sealants provided a reasonable basis to expect that backfill materials and long-term seals can be developed. In 1990, the Commission noted that the NRC staff had not identified any fundamental technical flaw or disqualifying factor for any of the nine sites DOE had identified as potentially acceptable for a repository, even though the HLW program was then focused exclusively on the YM site (55 FR 38486; September 18, 1990). Similarly, the Commission found no reason to abandon its confidence in the technical feasibility of developing a suitable waste package and engineered barriers, even though DOE's scientific programs were focused on Yucca Mountain (See 55 FR 38488-38490; September 18, 1990). Both the EPA and the NRC have standards in place that would have to be met by either the proposed repository at YM or a repository at any other site. See 40 CFR parts 190 and 197 and 10 CFR parts 60 and 63.

IEER does not assert that the need for a scientific or technical breakthrough stands in the way of establishing any possible repository; IEER believes that the evidence it has offered shows that a repository at YM will not be capable of meeting the EPA's standards and the NRC's performance objectives. This could turn out to be the case, but this does not mean that safe disposal of HLW and SNF in some repository is not possible.

Issue 5: Whether the Commission Has an Adequate Basis To Revise Finding 2

Comment 9: Many commenters responded to the Commission's request for comments on whether the Commission should revise Finding 2 to predict that repository capacity will be available within 50–60 years beyond the licensed life for operation of all reactors or whether the Commission should adopt a more general finding of reasonable assurance that SNF generated in any reactor can be stored safely and without significant environmental impacts until a disposal facility can reasonably be expected to be available.

Specific Question for Public Comment: In its proposed rule and its proposed revisions to the Waste Confidence Decision, the Commission explicitly requested public comment on an alternative approach to Finding 2 (73 FR 59550 and 73 FR 59561; March 20, 2008). The Commission recognized that its proposed revision of Finding 2, to include a time frame for availability of repository capacity within 50–60 years beyond the licensed life for operation of all reactors, is based on its assessment not only of its understanding of the technical issues involved, but also predictions of the time needed to bring about the necessary societal and political acceptance for a repository site.

Recognizing the inherent difficulties in making this prediction, the Commission outlined an alternative approach wherein it would adopt a more general finding of reasonable assurance that SNF generated in any reactor can be stored safely and without significant environmental impacts until a disposal facility can reasonably be expected to be available. This finding would be made on the basis of the Commission's accumulated experience of the safety of long-term spent fuel storage with no significant environmental impact (see Finding 4) and its accumulated experience of the safe management and storage of spent fuel during and after the expiration of the reactor operating license (see Finding 3). The Commission also asked whether additional information is needed for this approach or whether accompanying changes should be made to its other findings on the long-term storage of spent fuel if this approach is adopted.

The State of Nevada (NV), Clark and Eureka Counties in NV, and the Nuclear Energy Institute (NEI) provided comments supporting the alternative approach to Finding 2. NV supports the approach because it believes that specifying a time frame involves too much speculation about public acceptance, future technology, a possible redirection of the waste disposal program, adequate funding, and the outcome of the NRC licensing proceedings. NV believes that "whatever the NRC's period of safe storage might be, it is long enough for the Commission to generally conclude that, even if Yucca Mountain fails, one or more other repository sites (or some other form of disposition) would be available before dry storage of reactor spent fuel * * could pose any significant safety or environmental problem." Further, NV suggested that if the Commission followed this approach, it could dispense with Finding 2 altogether since Finding 3 provides reasonable assurance that HLW and SNF will be managed in a safe manner until sufficient repository capacity is available. Clark and Eureka Counties believe that focusing waste

confidence on management of SNF allows for consideration of a more systemic approach to waste management that considers an array of options and takes into account evolving energy policy at the national and international level, technology enhancements, and scientific research that could lead to new approaches and alternatives. NEI stated that "identifying the exact number of years involved is not necessary because, for whatever length of time is needed, the NRC's regulations will continue to provide a high standard of safety in the storage of spent nuclear fuel, and industry is compelled to comply with these regulations."

Many comments from States, State organizations, one NV county environmental groups and individuals opposed the alternative approach and want the Commission to retain a time frame. These commenters believe that a time frame is necessary to provide an incentive to the Federal Government to meet its responsibilities for the disposal of HLW. One commenter favored only a slight extension of the repository availability date to 2035 in the belief that a further extension or removal of a time frame would remove virtually all societal incentives for the United States to develop a geologic repository. Some commenters feared that removal of a time frame, which would remove any pressure on the Federal Government to resolve the SNF disposal issue, would lead to added costs to taxpayers due to the accumulating damages incurred by DOE because of its failure to honor its contracts for accepting SNF. Nye County, NV believes that removal of the time frame implies that there is no urgency in implementing the NWPA. Nye County believes that waste confidence would better be achieved if Finding 2 included a reaffirmation of the need for a repository for ultimate waste confidénce and for its role in the nation's commitment to support the environmental cleanup of weapons program sites because a repository will be needed even if other options for spent fuel management, such as recycling, are adopted.

Some commenters believe that removal of a time frame does not acknowledge the intergenerational ethical concerns of this generation reaping the benefits of nuclear energy, and passing off the nuclear waste products to future generations without providing them with any ultimate disposal solution. Nye County believes that intergenerational equity is still the primary international basis for the policy of geologic disposal. The Western interstate Energy Board, in urging retention of a time frame, states that the NRC should be concerned about the possibility of indefinite storage of SNF because it undermines support for a plan for disposal of nuclear waste, noting that approval of a new generation of NPPs should be contingent on a credible plan by which the Federal Government meets its responsibilities.

The Attorneys General of New York, Vermont, and Massachusetts believe that "NRC has admitted that its original thirty-year time estimation was based on no scientific or technical facts, but instead on the period of time in which it expected a repository to be available.

* The NRC's reasoning—that because no problems significant in NRC's eyes have [yet] occurred * * no problems will occur no matter how long spent fuel remains on reactor sites—is antithetical to science, the laws of time, and common sense. For example, over an indefinite period of storage, the probability of a severe earthquake increases." They believe that the NRC's alternative approach is arbitrary because there is no basis for unconditional confidence in the indefinite onsite or offsite storage of waste. Further, the Attorney General of New York argues (in supplemental comments) that the Commission's September 2009 votes on the draft final rule, which would remove a target date from Finding 2 (and which the Commission decided to do in September 2010), support the idea that fuel will have to be stored indefinitely.8 Similarly, another commenter asserted that it is questionable whether the storage of SNF at current sites for 150 years or more "is safe and feasible merely on the basis of the much more limited experience involving SNF storage to date, particularly at ISFSIs, and at fewer locations with lower quantities of SNF, compared to what would exist over such a long time span."

In addition, the Attorneys General believe that in proposing to revise the generic determination in 10 CFR 51.23(a) without reference to any time frame, the NRC has prematurely and inappropriately adopted the alternative approach without waiting for public comments. Similarly, the Prairie Island Indian Community believes that, in the absence of a time frame, "the Waste Confidence Rule would be premised on the pure speculation that a disposal facility will be available at some unknown point in the future." NRDC believes that the NRC's alternative approach "is contrary to the NRC's longstanding policy of (having) at least some minimal time limitation on the actions of its licensees with respect to active institutional controls at nuclear facilities," e.g., 10 CFR 61.59(b), which prohibits reliance on institutional controls for more than 100 years by the land owner or custodial agency of a lowlevel waste disposal site.

NRC Response: In 1990, the Commission explained that it had not identified a date by which health and safety reasons require that a repository must be available (55 FR 38504; September 18, 1990). The Commission noted that in 1984 it had found under Finding 3 that SNF would be safely managed until sufficient repository capacity is available, but that safe management would not need to continue for more than 30 years beyond the expiration of any reactor's operating license because sufficient repository capacity was expected to become available within those 30 years. The Commission also reached the conclusion under Finding 4 that SNF could be safely stored for at least 30 years beyond the expiration of the operating license. Id.

In 1990, the Commission considered a license renewal term of 30 years in its analysis supporting Findings 2 and 4 9 and explained its reasons for believing that "there is ample technical basis for confidence that spent fuel can be stored safely and without significant environmental impact at these reactors for at least 100 years" (55 FR 38506; September 18, 1990). Thus, it is not correct to say that "NRC has admitted that its original thirty-year time estimation was based on no scientific or technical facts." Rather, the NRC's estimate was based on both when it expected a repository to be available and all the scientific and technical facts it discussed under Findings 3 and 4 that support a conclusion that SNF can be safely managed and stored for at least that period of time. In fact, the Commission considered a comment urging it to find that SNF can be stored safely in dry storage casks for 100 vears (55 FR 38482; September 18, 1990). The Commission did not "dispute a conclusion that dry spent fuel storage is safe and environmentally acceptable for a period of 100 years," but rejected this suggestion because it found that safe storage without significant environmental impact could take place for "at least" 30 years beyond the licensed life for operation of the reactor, and because it supported "timely

⁶ The Commission's September 2009 votes, along with the September 2010 votes, are available at http://www.nrc.gov/reading-rm/doc-collections/ commission/cvr/2009/2009-0090vtr.pdf.

⁹ The license renewal period for operating reactors in 10 CFR part 54 is 20 years.

disposal of [SNF and HLW] in a geologic repository, and by this Decision does not intend to support storage of spent fuel for an indefinitely long period." *Id.*

The fact that the Commission, in 1990 and now, has confidence that SNF can be safely stored for long periods of time does not mean, however, that the Commission has examined scientific and technological evidence supporting indefinite storage. The commenters supporting alternative Finding 2 did not provide evidence supporting indefinite storage, nor has the Commission adopted findings that support indefinite storage. The State of Nevada, in its 2005 petition for rulemaking, requested, inter alia, that the NRC define "availability" by presuming that some acceptable disposal site would be available at some undefined time in the future. In denying the petition, the Commission said "[w]e find this approach inconsistent with that taken in the 1984 [WCD] because it provides neither the basis for assessing the degree of assurance that radioactive waste can be disposed of safely nor the basis for determining when such disposal will be available" (70 FR 48333; August 17, 2005).

As explained in response to Comment 1, the Commission's action in this update of the 1990 Waste Confidence Decision is to expand its generic determination in 10 CFR 51.23(a) by 30 years, an action that results in no significant environmental impacts and therefore does not require an EIS. The Commission's approach in Findings 2 and 4 acknowledges the need for permanent disposal, and for the generations that benefit from nuclear energy to bear the responsibility for providing an ultimate disposal for the resulting waste. The Commission's removal of a target date from Finding 2 does not mean that the Commission has approved indefinite storage; Finding 4 still contains a time frame for the length of post-licensed life storage. But a time frame in Finding 4 does not mean that the Commission has to include a target date in Finding 2; instead, the Commission has adopted a revised Finding 2 that expresses the Commission's reasonable assurance that repository capacity will be available when necessary. This Finding does not contemplate indefinite storage of SNF and HLW; Finding 4 has not been changed, and only considers "at least 60 vears" of storage beyond the licensed life for operation, including a license renewal period, and the analysis supporting Finding 2 considers the time needed to construct a repository.

The Commission has removed the target date from Finding 2 because recent events have demonstrated that

the Commission is unable to predict with confidence when a successful program to construct a repository will start. Instead, the Commission has reasonable assurance that sufficient repository capacity will be available when necessary, which means that repository capacity will be available before there are safety or environmental issues associated with the SNF and HLW that would require the material to be removed from storage and placed in a disposal facility. As made clear in the analysis that supports Finding 2, the Commission continues to have confidence that a repository can be constructed within 25-35 years of a Federal decision to do so, which is much shorter than the time frame considered in revised Finding 4. Further, if it becomes clear that a repository or some other disposal solution will not be available by the end of 60 years after licensed life for operation, the Commission will revisit and reassess its Waste Confidence Decision and Rule if a revision has not already occurred for other reasons.

As the Attorneys General, as well as other commenters, noted, the proposed rule was phrased differently from the proposed revision of Finding 2; the proposed rule made a generic determination of safe storage of SNF "until a disposal facility can reasonably be expected to be available" whereas proposed Finding 2 predicted repository availability "within 50–60 years beyond the licensed life for operation," and proposed Finding 4 made a finding of reasonable assurance of safe storage of SNF "for at least 60 years beyond the licensed life for operation."

The Commission did not intend to cause confusion by adopting different language in the Findings and the rule. The basis for the rule is identical to the basis for the findings, no matter how the rule itself is phrased; the Commission has therefore decided to adopt similar language for Findings 2 and 4 and the rule. As discussed above, the Commission has reconsidered Finding 2 and, in recognition of recent developments, has concluded that it would be inappropriate to include a target date in the Finding. The Commission has therefore made a conforming change to the rule to incorporate the revised language from Finding 2.

Further, as discussed in the proposed rule, the Commission has updated the rule language to include the time frame for safe and environmentally sound storage from Finding 4. The final rule now limits the generic determination regarding safe and environmentally sound storage to "at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license)." Section 51.23(a) is also revised to reinsert a version of the second sentence in the present rule that was excluded from the proposed rule. This statement was added to make it clear that Finding 4 does not contemplate indefinite storage and to underscore the fact that the Commission has confidence that mined geologic repository capacity will be available when necessary.

Comment 10: TSEP claims that the survey of various international HLW disposal programs that the NRC provided to review the issue of social and political acceptability of a repository shows that there can be no confidence that the necessary social and political conditions exist in the United States to provide any assurance that a repository can be developed in any foreseeable time frame. TSEP also believes that the NRC's survey is inaccurate and essentially incomplete because it omits the country that is often held up as being exemplary for nuclear power-France.

NRC Response: The NRC rejects the commenter's assertion that the NRC's examination of international experience shows that there can be no confidence that a repository will be developed in the United States in any foreseeable time frame. The NRC's discussion of the HLW programs of other countries was included to show that those countries have programmed into their plans various methodologies for securing social and political acceptance of a repository. This has been a trial-anderror process that has led to both failures and successes. The processes, especially in Finland and Sweden, show that this focus on deliberate attempts to gain public support can lead to success given a sufficiently inclusive process and enough time.

The commenter believes that the NRC's survey is partly inaccurate because the NRC incorrectly implies that the United Kingdom (UK) ended a program for developing a repository for HLW and SNF in 1997 when, in fact, the program was for disposal of intermediate-level waste (ILW). The NRC agrees with the commenter that one sentence describing the UK program is misleading. This is because of a typographical error where "HLW" was inserted instead of "ILW". This error is corrected in this update.

With respect to the omission of France, the NRC did not seek to provide an exhaustive survey or complete history of all foreign repository programs. The NRC examined a number of international examples for the

purpose of reasonably estimating the minimum time needed to "develop * * * societal and political acceptance in concert with essential technical, safety and security assurances." The NRC noted that France was among ten nations that have established target dates (France expects that its repository will commence operation in 2025.), and among seven nations, of those ten, that plan disposal of reprocessed SNF and HLW (73 FR 59558; October 9, 2008). A brief examination of the progress of France's waste disposal program suggests a time frame that is consistent with a range of 25–35 years for achieving societal and political acceptability of a repository. Initial efforts in France in the 1980s failed to identify potential repository sites using solely technical criteria. Failure of these attempts led to the passage of nuclear waste legislation that prescribed a period of 15 years of research. Reports on generic disposal options in clay and granite media were prepared and reviewed by the safety authorities in 2005. In 2006, conclusions from the public debate on disposal options, held in 2005, were published. Later that year, the French Parliament passed new legislation designating a single site for deep geologic disposal of intermediate and HLW. This facility, to be located in the Bure region of northeastern France, is scheduled to open in 2025, some 34 years after passage of the original Nuclear Waste Law of 1991.

Comment 11: Several commenters believe that the history of the U.S. repository program demonstrates that there should be no assurance that the political and social acceptance needed to support development of a repository in the time frame envisioned in Finding 2 will be realized.

NRC Response: The Commission acknowledges the difficulties that the U.S. HLW program has encountered over the years from the failed attempt to locate a repository in a salt mine in Lyons, Kansas, through the strong and continuous opposition to the proposed repository at YM. Nevertheless, the commenters overlook a number of key developments that support the Commission's confidence that a repository will be available when necessary.

First, the comments assume that any repository program must start over from the beginning. But any new repository program would build upon the lessons learned from the YM and other repository programs. Other countries are working toward development of a repository, and some have settled upon a process that is designed to deal with many of the societal and political issues that have delayed the U.S. program. *See* Finding 2 below.

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Second, the Secretary of Energy established the Blue Ribbon Commission on America's Nuclear Future. Department of Energy, Blue Ribbon Commission on America's Nuclear Future, Advisory Committee Charter (2010), available at http:// brc.gov/pdfFiles/BRC Charter.pdf. The Blue Ribbon Commission "will provide advice, evaluate alternatives, and make recommendations for a new plan to address" a number of issues associated with the back-end of the nuclear fuel cycle. Id. Specifically, the Blue Ribbon Commission will evaluate the existing fuel cycle technologies and research and development cycles; look at options for the safe storage of SNF while final disposal pathways are prepared; look at options for the permanent disposal of SNF and HLW; evaluate options to make legal and commercial arrangements for the management of SNF and HLW; prepare flexible, adaptive, and responsive options for decision-making processes related to the disposal and management of SNF and HLW; look at options to ensure that any decisions are open and transparent, with broad participation; evaluate the possible need for additional legislation or amendments to existing laws; and any additional issues that the Secretary of Energy deems appropriate. Id.

The NWPA still mandates by law a national repository program, and decades of scientific studies support the use of a repository for disposal of HLW and SNF. Federal responsibility for siting and building a repository remains controlling national policy. Finding 2 is a prediction that a repository will be available when the societal and political obstacles to a repository are overcome and sufficient resources are dedicated to the siting, licensing, and construction of a repository. It necessarily follows from the Waste Confidence Decision that the Commission has reasonable assurance that sufficient repository capacity will be available before there are safety or environmental issues associated with the SNF and HLW that would require the material to be removed from storage and placed in a disposal facility. If this were not the case, the Commission would be unable to express its reasonable assurance in the continued safe, secure, and environmentally sound storage of SNF and HLW.

Finally, the Commission reiterates Finding 1, which states that the Commission finds reasonable assurance that safe disposal of HLW and SNF in a mined geologic repository is technically feasible. This finding has remained unchanged since 1984. The more difficult problem challenging a repository program is achieving political and social acceptance, but the Commission has confidence that this problem can be solved. By applying the lessons learned in the YM program and in the different methodologies for achieving acceptance used in international HLW programs, the Commission remains confident that these issues impeding the construction of a repository can be resolved.

Comment 12: One commenter worried that "a decision in favor of this proposed rule change could prejudice a licensing decision in favor of the Yucca Mountain project simply because it would announce confidence in a waste site and that is the only one there." The commenter also fears that this rulemaking could bias a decision to lift or eliminate the statutory capacity limit on YM, which would be necessary for the repository to accept SNF from new reactors. Further, the commenter believes that if the YM project fails, there will be no basis for confidence that a waste site will be available in the future.

NRC Response: The Commission's reaffirmation of Finding 1-that disposal of HLW and SNF is technically feasible-and its revision of Finding 2, which states confidence that repository capacity will be available when necessary, are not tied to any particular site. In fact, the Commission's proposal assumed that YM would not go forward and become available as a repository. Moreover, the Waste Confidence Decision and Rule have no legal effect in the YM licensing proceeding. See Nevada v. NRC, No. 05-1350, 199 Fed. Appx. 1 (DC Cir. 2006). Therefore, the NRC does not believe that adopting these findings will prejudice a licensing decision on Yucca Mountain. In a 2008 report DOE predicted that by 2010 SNF would exceed the 70,000 metric tons of heavy metal (MTHM) statutory limit for YM, and that if all existing reactors continue to operate for a total of 60 years through license renewals, SNF will exceed 130,000 MTHM. See The Report to the President and the Congress by the Secretary of Energy on the Need for a Second Repository, DOE/ RW-0595, December, 2008. Thus, even if YM were to obtain NRC approval and be built, the amount of SNF from current reactors alone would require a change in the statutory limit or a second repository. Finally, as stated above, the proposed revision of Finding 2 assumed that YM would not go forward. The NRC's basis for continued confidence that a repository will be available when necessary is explained in its response to

Comment 11 and its discussion of Finding 2.

Comment 13: The State of Nevada favored the Commission's alternative approach to Finding 2, but also suggested that 10 CFR 51.23(a) be reworded as follows:

The Commission has made a generic determination that there is reasonable assurance all licensed reactor spent fuel will be removed from storage sites to some acceptable disposal site well before storage causes any significant safety or environmental impacts. This generic finding does not apply to a reactor or storage site if the Commission has found, in the 10 CFR Part 50, Part 52, Part 54 or Part 72 specific licensing proceeding, that storage of spent fuel during the term requested in the license application will cause significant safety or environmental impacts.

Nevada explains that the last sentence is added to be consistent with 10 CFR 51.23(c), which provides that 10 CFR 51.23(a) does not alter any requirement to consider environmental impacts during the requested license terms in specific reactor or spent fuel storage license cases. Nevada states that "NRC should not prejudge this review of potential safety or environmental impacts from storage during the requested license term in any pending or future licensing proceeding." Nevada also states that in the event the Commission adopts Finding 2 as proposed, "it needs to clear up the ambiguity inherent in the reference to the 50–60 year time period. Presumably the Commission means it expects a repository within 60 years.'

NRC Response: For the reasons explained in response to Comment 9, the Commission has decided to adopt a revised Finding 2 that states its confidence in the availability of a repository "when necessary." 10 CFR 51.23(c) points out that the generic determination in 10 CFR 51.23(a) only applies to the period following the term of the reactor operating license, reactor combined license or amendment, or initial ISFSI license or amendment in proceedings held under 10 CFR Parts 50, 52, 54 and 72. Nevada is concerned that in a case where the environmental impacts during the term of the license were judged to be significant, there would be reason to doubt the applicability of a generic determination that the impacts occurring after the requested license term would not be significant and so has proposed inclusion of a second sentence in 10 CFR 51.23(a). The Commission already has a rule, 10 CFR 2.335, that allows a party to an adjudicatory proceeding to seek a waiver or exception to a rule where its application would not serve

the purposes for which the rule was adopted. Thus, the Commission declines to adopt this additional sentence.

Issue 6: Whether the Commission Has an Adequate Basis To Reaffirm Finding 3

Comment 14: One commenter stated that the NRC appears to ignore the reality that available legal and corporate strategies exist that can provide for the transfer of NPPs and ISFSIs, and the SNF itself, to unfunded separate limited liability companies that can easily abandon SNF at existing sites once the economic value of the generating plants is exhausted.

NRC Response: The transfer of a license for a NPP is governed by 10 CFR 50.80. An applicant for transfer of its license must provide the same information on financial and technical qualifications for the proposed transferee as is required for the initial license. Therefore, the entity intended to receive the license must demonstrate its ability to meet the financial obligations of the license. Both general and specifically licensed ISFSIs are required to demonstrate financial qualifications before they are issued a license. The requirements for general licensees are in 10 CFR part 50, while the financial qualifications for specifically licensed ISFSIs are in 10 CFR part 72

A general license is issued to store spent fuel at an ISFSI "[a]t power reactor sites to persons authorized to possess or operate nuclear power reactors under 10 CFR part 50 or 10 CFR part 52." 10 CFR 72.210. Under 10 CFR 50.54(bb), NPP licensees must have a program to manage and provide funding for the management of spent fuel following permanent cessation of operations until title to and possession of the fuel is transferred to the Secretary of Energy. As required in 10 CFR 72.30(c), all general licensees must provide financial assurance for sufficient funds to decommission the ISFSI. In addition, general licensees who have decommissioned their site, with the exception of the ISFSI and support facilities, must demonstrate that they have sufficient funds to decommission the ISFSI after the spent fuel is permanently transported offsite.

Applicants for a specific license to store spent fuel under 10 CFR part 72 are required to demonstrate their financial qualifications. See 10 CFR 72.22(e). To meet the financial requirements, the applicant must show that it either possesses the necessary funds or has reasonable assurance of obtaining the necessary funds to cover ISFSI construction, operating, and decommissioning costs. In addition, a specific licensee that wants to transfer its license must submit an application that demonstrates that the proposed transferee meets the same financial qualifications as the initial license. See 10 CFR 72.50. Most specific licensees are financially backed by a utility with either an operating or shutdown NPP and are required under 10 CFR 50.54(bb) to have sufficient resources for spent fuel management after cessation of operations. Other specific licensees, not located at a NPP site, that are currently storing spent fuel are backed either by a large corporation, such as General Electric (the GE Morris ISFSI), or by the DOE, in the case of the Three Mile Island Unit 2, and Ft. Saint Vrain ISFSIs.

Issue 7: Whether the Commission Has an Adequate Basis for Finding That SNF Generated in Any Reactor Can Be Stored Safely and Securely and Without Significant Environmental Impact for at Least 60 Years (Finding 4)

Comment 15: Several commenters posited that the NRC does not have an adequate technical basis for finding reasonable assurance that SNF can be stored safely and without significant environmental impact because they believe that high-density spent fuel storage pools (SFPs) are vulnerable to catastrophic fires that may be caused by accidents or intentional attacks. These commenters do not believe that the NRC has properly assessed this risk. TSEP submitted a report, "Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination," prepared by Dr. Gordon R. Thompson, the Executive Director of the Institute for Resource and Security Studies (Thompson Report), which describes the potential risks associated with a fire in a SFP following a loss of water from the pool. The Thompson Report takes the view that the NRC documents published on the risk of SFP fires are inadequate and objects to the fact that some of the more recent documents rely on "secret studies," which cannot be verified by the public. The Attorney General of California requests that the NRC reconsider the information on the risks of SFP fires that California and Massachusetts submitted with their rulemaking petitions, which the NRC denied. See The Attorney General of Commonwealth of Massachusetts, The Attorney General of California; Denial of Petitions for Rulemaking (73 FR 46204; August 8, 2008) (MA and CA Petitions).

Dr. Thompson also questioned the analyses and assumptions that support the staff's conclusions regarding terrorist attacks on ISFSIs. Dr. Thompson defined four types of potential attack scenarios and noted that the staff's previous analyses, specifically the Diablo Canyon EA, focus only on Type III scenarios and ignore the far less dramatic, but far more effective, Type IV releases. Thompson Report at 47–48. Type I releases are those caused by the vaporization of the ISFSI by a nuclear explosion and are not considered by Dr. Thompson in his analysis. Thompson Report at Table 7-8. Type II releases deal with an attack by aerial bombing, artillery, rockets, etc., resulting in rupture of the ISFSI and large dispersal of the contents of the cask. Id. Type III events are similar to Type II, but involve small dispersal of the contents of the cask, and are caused by vehicle bombs, impact by commercial aircraft, or perforation by a shaped charge. Id. Finally, Type IV events are caused by missiles with tandem warheads, closeup use of shaped charges and incendiary devices, or removal of the overpack lid. Id. This type of attack results in scattering and plume formation similar to that of a Type III event, but the release of material far exceeds that of a Type III event. Id. Dr. Thompson claims that the staff's analysis does not consider the environmental impacts of a Type IV attack on an ISFSI. Id. at 48.

NRC Response: The NRC's 1990 Waste Confidence Decision described the studies of the catastrophic loss of reactor SFP water possibly resulting in a fuel fire in a dry pool that the NRC staff had undertaken prior to that time (55 FR 38511; September 18, 1990). The proposed update further details the considerable work that the NRC has done in evaluating the safety of SFP storage, including the scenario of a SFP fire, and notes that following the terrorist attacks of September 11, 2001, the NRC undertook a complete reexamination of SFP safety and security issues (73 FR 59564-59565; October 9, 2008) 10 The proposed update discusses, in particular, the Commission's careful consideration of this issue in responding to the MA and CA Petitions. The petitions asserted that spent fuel stored in high-density SFPs is more vulnerable to a zirconium fire than

the NRC had concluded in the GEIS for renewal of NPP licenses. The petitioner raised the possibility of a successful terrorist attack as increasing the probability of a SFP zirconium fire. The petitions claimed that they were proffering "new and significant information" on this issue, including a study by Dr. Thompson, see Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants, May 25, 2006 (Thompson 2006 Report), and a report by the National Academies Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage, see Safety and Security of Commercial Spent Nuclear Fuel Storage (National Academies Press: 2006) (NAS Report).

The Commission considered all of this information and concluded that "[g]iven the physical robustness of SFPs, the physical security measures, and SFP mitigation measures, and based upon NRC site evaluations of every SFP in the United States * * * the risk of an SFP zirconium fire, whether caused by an accident or a terrorist attack, is very low" (73 FR 46208; October 9, 2008). Later, the United States Court of Appeals for the Second Circuit rejected a challenge to the Commission's denial of the CA and MA petitions. New York v. NRC, 589 F.3d 551 (2d Cir. 2009). The court said that the "relevant studies cited by the NRC in this case constitute a sufficient 'basis in fact' for its conclusion that the overall risk is low." Id. at 555.

The commenters are dissatisfied with the NRC's analysis of this issue, but the only new information they have provided is Dr. Thompson's 2009 Report. The NRC has reviewed the 2009 Report and has found no information not previously considered by the NRC.

The Attorney General of California contends that the NRC should have considered the information supplied by the petitioners with the MA and CA Petition. The NRC did consider this information and explained that the information was neither new nor significant and would not lead to an environmental impact finding different from that set forth in the GEIS for license renewal. Dr. Thompson's contention that the NRC did not consider credible threats to ISFSIs that would cause significant environmental impacts has already been addressed by the Commission in Pacific Gas and Electric Co. (Diablo Canyon Independent Spent Fuel Storage Installation), 67 NRC 1, CLI-08-01 (2008). In that case, the San Luis Obispo Mothers for Peace submitted an affidavit and report by Dr. Thompson, which

argued that the NRC staff should have considered, but failed to consider, "scenarios with much larger releases of radiation [that] are also plausible and should have been considered. * [for] example [a scenario] * * * where the penetrating device is accompanied by an incendiary component that ignites the zirconium cladding of the spent fuel inside the storage cask, causing a much larger release of radioactive material than posited in scenarios where the cases sustain minimal damage." Id. at 19. The Commission considered this argument and found that "[a]djudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity." Id. at 20. Further, the Commission found that the staff's approach to its terrorism analysis, "grounded in the NRC Staff's access to classified threat assessment information, is reasonable on its face." Id. In his comment, Dr. Thompson attempts to revisit the Diablo Canyon proceeding by claiming that "the Staff limited its examination to Type III releases." Thompson Report at 48. Not only has this issue already been addressed by the Commission, but some of the specifics of Dr. Thompson's "Type IV" releases are discussed and dismissed by the Commission. Thompson Report Table 7-8; Diablo Canyon at 19-20.

Comment 16: A number of commenters urged the Commission to consider the increasing frequency of spent fuel pool leaks as evidence calling into question the NRC's confidence in the safety of SNF storage in the normal operation of spent fuel pools. Comments submitted by the Attorneys General of the States of New York and Vermont, a supplemental comment from the Attorney General of New York, and the Commonwealth of Massachusetts described leaks of tritium at reactor sites around the country. They believe that increased onsite storage increases the opportunity for human error resulting in unauthorized releases. They are concerned about the lack of monitoring requirements or guidelines for these spent fuel leaks.

¹NRC Response: The NRC's proposed update of the Waste Confidence Decision acknowledged incidents of groundwater contamination originating from spent fuel pool leaks. The Liquid Radioactive Releases Lessons Learned Task Force, created in response to these incidents, reported that near-term health impacts resulting from the leaking spent fuel pools that the NRC had examined were negligible but also that measures should be taken to avoid leaks in the

¹⁰NRC's reexamination of safety and security issues included consideration of reports issued by Sandia National Laboratories and the National Academy of Sciences, which are classified, SGI, or official-use-only security-related information, and thus cannot be released to the public; public versions of these reports are available. See response to comment 2 above.

future. The Task Force provided 26 specific recommendations for improvements to The NRC's regulatory programs regarding unplanned radioactive liquid releases. See Report Nos. 05000003/2007010 and 05000247/ 2007010, May 13, 2008 (ADAMS Accession Number ML081340425), as well as "Liquid Release Task Force **Recommendations Implementation** Status as of February 26, 2008," (ADAMS Accession Number ML073230982).

The NRC has also revised several guidance documents as well as an Inspection Procedure to address issues associated with leaking spent fuel pools. The NRC will continue to follow this issue and the NRC's regulatory oversight will continue to ensure safety and appropriate environmental protection. Thus, the Commission remains confident that storage of SNF in pools will not have any significant environmental impacts.

Comment 17: A number of commenters expressed the view that the NRC's updates to the Waste Confidence Decision and Rule do not comply with the holding of the Ninth Circuit Court of Appeals in San Luis Obispo Mothers for Peace v. NRC, 449 F. 3d 1016 (9th Cir. 2006), cert. denied, 127 S. Ct. 1124 (2007), that environmental analysis under NEPA requires an examination of the environmental impacts that would result from an act of terrorism against an ISFSI because an attack is reasonably foreseeable and not remote and speculative as the NRC had argued before the court.

NRC Response: Finding 4 considers the potential risks of accidents and acts of sabotage at spent fuel storage facilities. In 1984 and 1990, the NRC provided some discussion of the reasons why it believed that the possibility of a major accident or sabotage with offsite radiological impacts at a spent fuel storage facility was extremely remote. In the proposed update to the Waste Confidence Decision, the Commission gave considerable attention to the issue of terrorism and spent fuel management (See 73 FR 59567-59568; October 9, 2008). The Commission concluded that "[t]oday spent fuel is better protected than ever. The results of security assessments, existing security regulations, and the additional protective and mitigative measures imposed since September 11, 2001, provide high assurance that the spent fuel in both spent fuel pools and in dry storage casks will be adequately protected." Id.

Some commenters believe that the NRC's environmental analysis of the security of spent fuel storage facilities is deficient because it does not include consideration of the environmental impacts of a successful terrorist attack. The commenters recognize that the Commission continues to disagree with the Ninth Circuit and believes that, outside of the Ninth Circuit, the environmental effects of a terrorist attack do not need to be considered in its NEPA analyses. Amergen Energy Co., LLC (Oyster Creek Nuclear Generating Station), CLI-07-08, 65 NRC 124 (2007). Recently, the Third Circuit U.S. Court of Appeals upheld the NRC's view that terrorist attacks are too far removed from the natural or expected consequences of agency action to require an environmental impact analysis. New Jersey Department of Environmental Protection v. U.S. Nuclear Regulatory Commission, 561 F.3d 132 (3d Cir. 2009). The Third Circuit stated:

In holding that there is no "reasonably close causal relationship" between a relicensing proceeding and the environmental effects of an aircraft attack on the licensed facility, we depart from the reasoning of the Ninth Circuit * * *. The Mothers for Peace court held that, given "the policy goals of NEPA and the rule of reasonableness that governs its application, the possibility of terrorist attack is not so 'remote and highly speculative' as to be beyond NEPA's requirements." * * *. We note, initially, that Mothers for Peace is distinguishable on the ground that it involved the proposed construction of a new facility-a change to the physical environment arguably with a closer causal relationship to a potential terrorist attack than the mere relicensing of an existing facility. More centrally, however, we disagree with the rejection of the 'reasonably close causal relationship' test set forth by the Supreme Court and hold that this standard remains the law in this Circuit. We also note that no other circuit has required a NEPA analysis of the environmental impact of a hypothetical terrorist attack. Id. at 142 (citations and footnote omitted).

But even though, outside of the Ninth Circuit, the NRC continues to adhere to its traditional view that the environmental impacts of a terrorist attack do not need to be considered. outside of the Ninth Circuit, the environmental assessment for this update and rule amendment includes a discussion of terrorism in the discussion of the revision to Finding 4 that the NRC believes satisfies the Ninth Circuit's holding in Mothers for Peace v. NRC, as the decision explicitly left to agency discretion the precise manner in which the NRC undertakes a NEPA-terrorism review. See Pacific Gas and Electric Co. (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NRC 1

(2008), petition for judicial review

pending, No. 09–1268 (9th Cir.). Comment 18: TSEP and the Attorney General of New York (in a supplemental comment) point out that the NRC has treated the risk of a catastrophic fuel fire caused by an attack or an accident that leads to partial or complete drainage of a high-density SFP as a site-specific issue, imposing orders requiring NPPs to enhance security and improve their capabilities to respond to terrorist attack. Some of these orders required licensees to develop specific guidance and strategies to maintain or restore spent fuel pool cooling capabilities (See 73 FR 59567; October 9, 2008). TSEP and the Attorney General believe that this demonstrates that the NRC considers the risk of a pool fire to be specific to each nuclear plant and that site-specific measures to reduce these risks to an acceptable level must be taken at each plant. TSEP and the Attorney General believe that this is inconsistent with the NRC's reliance on its generic determination in 10 CFR 51.23(a) to deny hearing requests regarding the safety and environmental impacts of spent fuel storage, on contentions that are within the scope of the generic determination, in individual licensing cases. Because the NRC has (allegedly) acknowledged that its findings regarding the safety and security of spent fuel storage are sitespecific and not generic in nature, TSEP and the Attorney General believe that the NRC should withdraw its generic finding

NRČ Response: After the terrorist attacks of September 11, 2001, the Commission issued orders to NPP and ISFSI licensees requiring enhanced protective measures under its Atomic Energy Act authority to "establish by rule, regulation, or order, such standards and instructions to govern the possession and use of [nuclear materials] as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property. * * *" 42 U.S.C. 2201 (2006). These orders were site-specific and required each licensee to buttress its security arrangements to achieve the revised standards set by the Commission. Additionally, the orders were used as an expedient method to impose new security requirements on licensees. Subsequently, some of these new requirements and other additional requirements were codified in rulemaking (See 72 FR 56287; October 3, 2007, 73 FR 19443; April 10, 2008, 73 FR 51378; September 3, 2008, 73 FR 63546; October 24, 2008; 74 FR 13926; March 27, 2009, 74 FR 17115; April 14,

2009). The NRC's determination that SNF can be stored safely and without significant environmental impacts beyond the licensed life for operation of the reactor for at least 60 years is a generic determination that satisfies both the NRC's NEPA responsibilities and evaluates the safety of the ongoing storage of SNF and HLW. The determination considers reasonably foreseeable risks that could threaten the safety of SNF storage and the environmental impacts of these risks. There is no inconsistency between the NRC's orders enhancing security at each plant and its generic determination that SNF can be safely stored because the requirements imposed by the orders and rulemakings help to ensure the safety and security of the SNF. As the Third Circuit said in its decision upholding the NRC's determination that NEPA did not require that the NRC consider the environmental effects of an aircraft attack on a licensed facility, the fact that the NRC does not have a particular obligation under NEPA does not mean that the NRC "has no obligation to consider how to strengthen nuclear facilities to prevent and minimize the effects of a terrorist attack; indeed, the AEA gives broad discretion over the safety and security of nuclear facilities." New Jersey Department of Environmental Protection v. U.S. Nuclear Regulatory Commission, 561 F.3d 132, 142 fn 9 (3d Cir. 2009). As discussed in the Response to Comment 17, the NRC's analysis satisfies the Ninth Circuit's holding in San Luis Obispo Mothers for Peace.

Comment 19: A commenter stated that the NRC's implication that aboveground storage may be safely conducted for 60 years beyond the operating license of a reactor does not seem to account for probably rapidly changing climactic conditions in the next few decades. This is very critical since most reactor sites are located near large bodies of water.

NRC Response: The earliest impact to spent fuel storage casks from climate change is not from submergence of structures by rising ocean levels, but rather from an increased risk of potential flooding from storm surge and high winds caused by extreme weather events. Current NRC regulations for design characteristics specifically address severe weather events. Before certification or licensing of a dry storage cask or ISFSI, the NRC requires that the vendor or licensee include design parameters on the ability of the storage and spent fuel storage facilities to withstand severe weather conditions such as hurricanes, tornadoes, and floods.

The NRC's regulations, 10 CFR 72.236 (for casks) and 72.122 (for facilities), require that applications for a Certificate of Compliance (COC) for a dry storage cask and a license to store spent fuel in an ISFSI evaluate the effects of a design basis flood on the facility. The evaluation of a design basis flood includes both static pressure from standing water and the force from a uniform flood-current. In addition, all storage casks approved for use with the general license provisions in 10 CFR part 72 have been evaluated for static pressure and uniform flood-current in the same manner as those for a specific licensee. The NRC has published regulatory guidance that describes acceptable approaches to assessing these impacts; further, the staff is addressing climate change in updates to its guidance. Based on the NRC's activities related to climate change, and the relatively slow rate of this change, the NRC is confident that any regulatory action that may be necessary will be taken in a timely manner to ensure the safety of all nuclear facilities regulated by the NRC.

Based on the models discussed in the NAS study (Potential Impact of Climate Change on U.S. Transportation: Special Report 290), none of the U.S. NPPs (operational or decommissioned) will be under water or threatened by water levels by 2050. The climate change models used in the NAS study are based on work by the Intergovernmental Panel on Climate Change. Climate changes over the next century are expected to result in a sea-level rise of approximately 0.8 meters; see J.A. Church et al., Climate Change 2001: Impacts, Adaptation, and Vulnerability, Intergovernmental Panel on Climate Change, 642 (2001). Recently, the Intergovernmental Panel on Climate Change published a report confirming an accelerated sea-level rise in North America and concluding there will be further accelerated sea-level rise; the report found that the global mean sealevel is projected to rise by 0.35 ± 0.12 meters from the 1980 to 1999 period to the 2090 to 2099 period (*http://* www.ipcc.ch/ipccreports/ar4-wg2.htm). This conclusion is supported by the findings of the U.S. Global Change Research Program report published in 2009 (http://

downloads.globalchange.gov/ usimpacts/pdfs/climate-impactsreport.pdf). Based on these reports, sealevel rise is controlled by complex processes, and estimated to rise less than 1 meter by 2100. In addition to sealevel rise, NRC facilities may be affected by increased storm surges, erosion, shoreline retreat, and inland flooding. Impacts to coastal areas may be further exacerbated by the land subsiding, as is currently observed in some central Gulf Coast areas. NRC facilities, including ISFSIs, are designed to be robust. The facilities are evaluated to ensure that performance of their safety systems, structures, and components is maintained during flooding events, and are monitored when in use. The lowest grade above sea-level of concern for an NRC licensed facility is currently about 4.3 m (14 feet). In the event of climate change induced sea-level rise the NRC regulations require licensees to implement corrective actions to identify and correct or mitigate conditions adverse to safety.

Comment 20: A commenter stated that two events-the July 16, 2007, earthquake in Niigata Province, Japan, and an April 2008 earthquake in Michigan—and an August 2008 study, which discusses a newly-discovered fault line that could significantly increase estimates of the probability of an earthquake in New York City, undermine confidence in the safety of spent fuel storage. Further, the commenter believes that given the differing seismology of various plants around the country, a generic determination that SNF can be stored safely without significant environmental impacts for long periods of time is inappropriate.

NRC Response:

Japan Earthquake of July 2007:

Staff reviewed a report on the 2007 Japan Earthquake by the International Atomic Energy Agency (IAEA) in December 2008. See 2d Follow-up IAEA Mission in Relation to the Findings and Lessons Learned from the 16 July 2007 Earthquake at Kashiwazaki-Kariwa NPP, The Niigataken Chuetsu-oki Earthquake, Tokyo and Kashiwazaki-Kariwa NPP, Japan, 1-5 December 2008. The report was the third in a series issued by an IAEA-led team of international experts that completed the mission in December 2008. According to this report, "the safe performance of the Kashiwazaki-Kariwa nuclear power plant during and after the earthquake that hit Japan's Niigata and Nagano prefectures on 16 July 2007 has been confirmed." The head of the IAEA's Division of Installation Safety, and the leader of the mission, also stated that "[t]he four reactors in operation at the time in the seven unit complex---the world's largest nuclear power plantshut down safely and there was a very small radioactive release well below public health and environmental safety limits." The lessons learned from the results of the plant integrity evaluation

process will be reviewed by the NRC and may be incorporated, as necessary, to improve the approaches for design and evaluation criteria currently used for NPPs in the United States.

The Michigan Earthquake in April 2008:

NRC Staff reviewed NRC's Preliminary Notification of Event or Unusual Occurrence, PNO-III-08-004A, April 18, 2008 (ADAMS Accession Number ML081090639) on the April 2008 earthquake in Michigan. This Notification revealed that licensee personnel and NRC inspectors at the D.C. Cook and Palisades NPPs, both of which experienced onsite seismic activity, conducted independent equipment walkdowns after the initial earthquake and aftershock, and identified no issues. In addition, licensee personnel and NRC inspectors conducted equipment walkdowns at all operating power reactors that felt seismic activity and also identified no issues. The NRC staff concluded that the earthquake will have little overall influence on the postulated seismic hazard estimates at ISFSIs located in the CEUS,

The seismic design requirements for spent fuel pools are the same as for NPPs; these events do not undermine confidence in the safety of storage of spent fuel in spent fuel pools. With respect to dry storage, under 10 CFR 72.210, a general license for the storage of spent fuel in an ISFSI is granted to all holders of a license issued under 10 CFR Part 50 to possess or operate a NPP. The conditions of this general license are given in 10 CFR 72.212. The conditions of the license require a general licensee to perform written evaluations prior to use that establish that: (a) Conditions set forth in the Certificate of Compliance (CoC) have been met; (b) cask 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; and (c) the requirements of 10 CFR 72.104 (dose limitations for normal operation and anticipated occurrences) have been met. Additionally, the ISFSI foundation analysis must include soilstructure interaction and must address liquefaction potential. See 10 CFR 72.212(b)(2). Further, 10 CFR 72.212(b)(3) requires that a general licensee "[r]eview the Safety Analysis Report (SAR) referenced in the [CoC] and the related NRC Safety Evaluation Report, prior to use of the general license, to determine whether or not the

reactor site parameters, including analyses of earthquake intensity and tornado missiles, are enveloped by the cask design bases considered in these reports."

In the continental United States, geographic areas located east of the Rocky Mountain Front (east of approximately 104 degrees west longitude) are generally known as "CEUS." For NPP sites that have been evaluated under the criteria of 10 CFR part 100, appendix A, the Design Earthquake must be equivalent to the safe shutdown earthquake for the NPP, but in no case less than 0.10g. For the existing NPPs in the United States, the design basis response spectra used for the design of dry cask storage systems are based on the response spectrum defined in NRC Regulatory Guide 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," Rev. 1, December 1973, anchored at a Peak Ground Acceleration of 0.3g in the horizontal direction and 0.2g in the vertical direction.

As a condition for using a general license to operate an ISFSI, licensees are required to perform written evaluations to establish, for their site-specific conditions, that the conditions set forth in the CoC have been met and that cask 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. The Indian Point, Vermont Yankee, and Palisades NPPs, which were specifically cited in the comment, have ISFSIs co-located at their existing NPPs and are operating their ISFSIs under an NRC general license. Entergy Nuclear Generation Company has informed the NRC of its intentions to store spent fuel in dry casks at the Pilgrim NPP.

Based on currently available information, the NRC concludes that the storage casks being used at Indian Point, Vermont Yankee, and Palisades (all located in CEUS) demonstrate an adequate margin of safety for any design-basis earthquake loads postulated at these respective sites. There is no safety concern; however, there were a few limitations to the risk methodology employed and uncertainties associated with the data used. As a result, licensees of operating power reactors and ISFSI facilities in the CEUS may need to evaluate whether the updated seismic hazard estimates will have any adverse impact on their current design/licensing basis. This is

currently being considered as part of the NRC's Generic Issue Resolution Process. Additionally, the storage cask analyses and designs at operating ISFSIs provide an adequate safety margin and comply with the requirements in 10 CFR part 72. Since Generic Issue No. 199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants," November 17, 2008, is still an open issue, implications of any new information and its effects, if any, on CEUS-ISFSI seismic design for the storage casks and support pads will be evaluated as part of the resolution of that issue.

On September 2, 2010, the NRC issued Information Notice (IN) 2010–18, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" to all operating reactors licensees. IN 2010–18 discusses recent updates to estimates, which apply to ISFSIs as well as existing plants, of the seismic hazard in the central and eastern United States. In summary, the information provided by the commenters has little overall influence on the postulated seismic hazard estimates in the CEUS.

August 2008 Study of Seismic Hazard Estimates in the Eastern United States:

In August 2008, a technical paper, Observations and Tectonic Setting of Historic and Instrumentally Located Earthquakes in the Greater New York City—Philadelphia Area by Lynn R. Sykes et al. was published in the Bulletin of the Seismological Society of America, Vol. 98, No. 4. NRC staff from the Office of Nuclear Regulatory Research (RES) reviewed this paper to assess the impacts, if any, of this new information on the existing design basis seismic hazard estimates used for NPPs located in this area of Central and Eastern United States (CEUS). RES's assessment was as follows:

In addition to publishing a seismicity map of the area covering the time period from 1677 to 2006, the paper identifies for the first time a boundary in seismicity, with earthquakes with magnitudes less than 3 occurring south of the boundary but not north of it. The boundary intersects the Ramapo Fault on the northwest near Peekskill, NY, and this point appears to coincide with an offset in the Hudson River. The southeast terminus of the boundary is near Stamford, CT, with a length of about 30 miles (50 km). The authors inferred that the boundary is a fault.

If the boundary is a fault, it is only about 30 miles long and much shorter than the Ramapo Fault, which has already been considered in the seismic hazard of the area and in the seismic design of the Indian Point NPPs. The Ramapo Fault was already considered in a probabilistic seismic hazard assessment (PSHA) covering the Indian Point area. The newly identified boundary/fault would not change the maximum magnitude in the PSHA calculations; the Ramapo already controls that. The vast majority of earthquakes identified in the paper and the general seismicity of the area were known and were used in the US Geological Survey PSHA. Thus, the rate of seismicity used in their PSHA is little changed by the paper. Thus, with the maximum magnitude and the rate of seismicity little changed or unchanged by the paper, the PSHA assessment is not expected to have changed.

This means that the paper would have little overall influence on the perceived hazard near Buchanan, NY. E-mail from Andrew Murphy to Scott Burnell, Diane Screnci, and Neil Sheehan, August 22, 2008 (ADAMS Accession Number ML091530483).

The rate of seismicity of the area used in the USGS PSHA is little changed by the information published in the paper. As the maximum magnitude and the rate of seismicity changed little or was practically unchanged by the information in the paper, the USGS PSHA assessment is not expected to change.

Comment 21: A commenter believes that the NRC, in judging the safety and security of onsite storage for time periods extending to the middle of the next century, should seriously consider the safety of subsequent pick-up and transport of the SNF.

NRC Response: The NRC's regulations establish the safety standards for the design, construction and use of spent fuel transportation packages. See 10 CFR part 71. The NRC conducts rigorous independent reviews to certify that spent fuel transportation packages meet the design standards and test conditions in the regulations. In addition, the NRC reviews and approves the operational procedures and conditions for use of the transport package. These requirements include maintenance of the transport package in full compliance with the NRC-approved package design and material conditions, and the requirements include strict adherence to the NRC-approved operating procedures for the preparation for and loading of the spent fuel transport package. The requirements for use of an NRCapproved spent fuel transport package apply irrespective of how long the spent fuel may have been in interim storage.

Packages that are designed, tested, operated and maintained according to NRC requirements will provide for the safe transport of spent fuel. Spent fuel packages are very robust and are designed to withstand severe accidents. Numerous studies and physical testing programs have demonstrated that the safety standards that the NRC uses to certify transportation packages provide a very high degree of protection against real world accidents. See NUREG/CR-4829, Shipping Container Response to Severe Highway and Railway Accident Conditions; NUREG/CR-6894, Spent Fuel Transportation Package Response to the Caldecott Tunnel Fire Scenario; NUREG/CR-6886, Spent Fuel Transportation Package Response to the Baltimore Tunnel Fire Scenario; NUREG-0170, Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes; "Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States," National Research Council of the National Academies, National Academies Press, Washington DC, 2006, available at http:// www.nap.edu/

catalog.php?record_id=11538. Additionally, the NRC periodically reviews the basis for the transportation regulations to ensure that the regulations continue to provide an adequate level of safety for the shipment of spent fuel. These reviews account for changes in analytical methods, materials, package contents, and operating history. The last periodic review confirmed that initial transportation studies done in the 1970s (which are the basis for the NRC's regulations) contained very conservative assumptions and that the risk to the public from transportation of spent fuel is very low. See NUREG/CR-6672, Reexamination of Spent Fuel Shipment Risk Estimates, March 2000. The same robust design features that make spent fuel packages safe also make them secure from terrorist attack.

Comment 22: The Decommissioning Plant Coalition (DPC) noted that in 1990 the Commission expressed support for timely disposal of SNF and HLW and stated that it did not intend to support storage of spent fuel for an indefinitely long period (See 55 FR 38482; September 18, 1990). The DPC urges the Commission to explicitly reaffirm this position and, further, express its expectation that the Federal Government will soon provide a demonstration that it can reach a consensus on a plan to take title to and remove SNF and Greater-Than-Class-C (GTCC) waste from permanently shutdown, single-site facilities. The DPC outlines the burdens imposed on decommissioned sites by continuing long-term onsite storage, such as restricting the property owners and other local stakeholders from other potential uses for the site. The National Association of Regulatory Utility Commissioners agrees with the NRC

that today SNF is better protected than ever, but also believes that the SNF will be even more secure in a centralized interim storage or permanent disposal facility. Similarly, a number of commenters expressed the view that a centralized interim storage facility would be a safe and cost-effective option for managing and storing SNF until a repository is available. The DPC also takes exception to the NRC's "analysis" of difficulties that may block the opening of the Private Fuel Storage (PFS) ISFSI and the NRC's "analysis" of a February 2006 NAS study, in footnote 24 of the proposed update to the Waste Confidence Decision, and would like the footnote eliminated or rewritten.

NRC Response: The Commission continues to support timely disposal of HLW and SNF, but recognizes in this Waste Confidence Decision that storage of SNF may safely continue for at least 60 years beyond the licensed life for operation of a reactor. The Commission agrees that centralized interim storage would be an acceptable method for managing and storing SNF until a repository is available, but determining when DOE will take spent fuel and GTCC wastes from reactor sites and how waste will then be managed are issues for DOE to resolve.

The NRC's proposed update noted that the issuance of a license for the PFS ISFSI confirmed the feasibility of licensing an away-from-reactor ISFSI under 10 CFR Part 72, but also noted that several issues would have to be resolved before the PFS ISFSI could be built and operated (See 73 FR 59566; October 9, 2008). Footnote 24 identified these issues as two approvals from the Department of the Interior and a NAS Report on the transportation of SNF in the United States (National Research Council 2006, Going the Distance: The Safe Transport of [SNF and HLW] in the United States). The footnote is not an analysis of these issues; it simply acknowledges issues raised by the Department of the Interior and NAS that need to be addressed. With respect to PFS, the DPC states: "The Commission would do well to comment that it is THE safe and secure licensed facility that should be utilized to reduce waste confidence concerns. You can observe, consistent with historical Commission concerns about dual and multiple regulation, that legislation can effect a reduction in the multiple and redundant political and regulatory jurisdictions over use of such facilities." The license issued to PFS demonstrates that the Commission believes that the facility can be constructed and operated without jeopardizing public health and safety, but it is up to the licensee and

other agencies to resolve issues within their purview that may block construction of the facility.

Issue 8: Miscellaneous Comments

Comment 23: One commenter stated that the proposed rulemaking appears to countenance the stranding of SNF at or near plant sites for up to 150 years or more and contains no effective or reasonable time frame in 20 or so years to revisit this matter, or to contain any form of limitations, guidelines, or other provisions to ensure the ultimate safe and proper disposal of SNF.

NRC Response: The Commission, in its 1999 review of the Waste Confidence Decision, stated that it would consider undertaking a comprehensive reevaluation of the Waste Confidence Findings when the impending repository development and regulatory activities run their course or if significant and pertinent unexpected events occur, raising substantial doubt about the continuing validity of the Waste Confidence Findings (See 64 FR 68005; December 6, 1999). Although those criteria have not triggered this update, it is apparent that the ultimate disposition of the YM application is uncertain. This update reflects the uncertainty regarding the ultimate grant or denial of the YM license by considering the possibility that the license is not granted. For this reason, termination of the YM program would not be a basis for a further review of the Waste Confidence Decision. However, if significant and pertinent unexpected events that raise substantial doubt about the continuing validity of the Waste Confidence Findings occur, the Commission will consider undertaking another review of the Waste Confidence Decision. Further, the Commission has directed the NRC staff to begin an EIS to consider the long-term (greater than 120 years) storage of SNF and HLW and to consider further rulemaking in accordance with the findings of this review. The Commission will revisit the criteria for reopening the Waste Confidence Decision and Rule as part of this longer-term effort.

Comment 24: A commenter stated that the cost of the proposed rule change is only briefly and minimally discussed and expressed the view that there would be significant costs to both ratepayers and taxpayers stemming from storage of this waste for an additional 50 to 60 years at plant sites. The commenter recommended that the full cost of implementing this rule be completely evaluated by the NRC under the NRC's Regulatory Analyses Guidelines and the requirements for assessing the impacts of proposed rules which have a certain threshold cost. TSEP believes it is not reasonable to assume that the present 1.0 mil per kWh fee will suffice to pay for the U.S. repository program.

NRC Response: The Commission's action of enlarging its generic determination in 10 CFR 51.23(a) by 30 years is not a licensing decision and does not give permission to reactor licensees to store spent fuel that they do not already possess (or may not obtain) under a 10 CFR Part 72 general or specific license. See Response to Comment 6. Finding 4 only states the Commission's reasonable assurance that SNF can be stored safely and without significant environmental impact for at least 60 years beyond the licensed life for operation of any reactor, if necessary. The NRC generally provides a Regulatory Analysis for actions that "would affect a change in the use of resources by its licensees." *Regulatory* Analysis Guidelines of the U.S. Nuclear Regulatory Commission, NUREG/BR-0058, 5 (September 2004). A Regulatory Analysis may be appropriate when the NRC is considering placing burdens on its licensees through a licensing or regulatory action (e.g., in the prospective ISFSI security rulemaking), but that is not the case here. The NRC recognizes that many commenters are concerned about the burden placed on ratepayers charged by utilities for the cost of continued storage of SNF at reactor sites and on taxpayers paying the cost of DOE's default in failing to remove SNF from reactor sites as specified in DOE's contracts with the utilities. However, until DOE is able to fulfill its contracts, these burdens will exist irrespective of these updates to the Waste Confidence Decision and Rule; and NRC licensees still have to comply with the NRC's regulations, which continue to provide reasonable assurance that SNF and HLW will be stored safely.

The fee mandated by the NWPA that reactor licensees must pay into the Nuclear Waste Fund to provide for eventual disposal of HLW and SNF has so far been more than adequate to support DOE's HLW program with approximately \$25 billion in the Fund as of July 2010. See Statement of Kristina M. Johnson, Undersecretary of Energy, before the Committee on the Budget, U.S. House of Representatives, 1 (July 27, 2010).¹¹ Moreover, the NWPA provides a mechanism for increasing the fee if the current fee becomes inadequate to cover costs. See Section 302(a)(4) of NWPA, 42 U.S.C. 10222 (2006). DOE has periodically issued a total system cost estimate for the disposal program to provide a basis for assessing the adequacy of the fee.¹² See, e.g., 2008 Fee Adequacy Assessment Letter Report, (January 13, 2009).

Comment 25: A commenter raised the question of how the Commission's expectation that repository capacity can reasonably be expected to be available within 50-60 years beyond the licensed life for operation of any reactor would be met in the case of the Humboldt Bay 3 NPP which was decommissioned in 1976, meaning that 50 years beyond its decommissioning would be 2026. The commenter asked if this meant that SNF would be removed from Humboldt Bay 3 by 2026 and, if so, what is the need for amending Finding 2.

NRC Response: The commenter has confused the end of operation of the reactor with the end of the licensed life for operation. Humboldt Bay 3 was issued a 40-year operating license in 1962. The end of its licensed life for operation, therefore, was 2002 and 50 years beyond that would be 2052. Even if a reactor is retired prematurely, resulting in the need to manage and store SNF for a longer period after the end of reactor operation, the Commission is confident, for all the reasons expressed in reaching Findings 3 and 4, that the management and storage of the SNF will be conducted safely and securely without significant impact to the environment.

Comment 26: The Attorney General of New York submitted supplemental comments, many of which are discussed above. These comments did, however, raise an issue that, although similar to other comments, the NRC is addressing here: "Recent actions by the Commission, particularly since 2001, have demonstrated that a significant number of substantial environmental and safety issues related to indefinite storage of spent fuel at the site of shutdown nuclear reactors are specific to the particular reactor and site and cannot be addressed on a generic basis." More generally, the Attorney General argues that there are environmental and safety issues associated with spent fuel storage (not just indefinite storage) that

¹³ Congress must make annual appropriations for the HLW program from the Fund, so the amount actually available to DOE in any given year is dependent upon the amount appropriated.

¹² NRC is aware that there is a pending DC Circuit case—National Association of Regulatory Utility Commissioners v. DDE, Nos. 10–1074 and 10–1076 (consolidated) (DC Cir.)—where petitioners have asked the court of appeals to suspend further payments to the nuclear waste fund. The pending DC Circuit-litigation relates to Yucca Mountainrelated developments. Whatever that litigation's outcome, DOE's fee-adjustment authority would remain in the NWPA, available to be exercised in appropriate circumstances.

are site and facility-specific and therefore cannot be addressed through a generic rulemaking. The Attorney General believes that the NRC could address these concerns by permitting States to raise site-specific concerns with respect to issues that are now foreclosed by the Waste Confidence Decision and Rule.

NRC Response: The Attorney General is correct that there may be some issues that cannot be addressed through a generic process like the Waste Confidence Decision. The Commission has long recognized this, even in cases where issues are resolved through a generic rulemaking. Site-specific circumstances may require a sitespecific analysis; the Commission has provided for these situations through its regulations in 10 CFR 2.335, which allows parties to adjudicatory proceedings to petition for the waiver of or an exception to a rule in a particular proceeding. These requests require the petitioning party to demonstrate that special circumstances exist so that the application of the rule or regulation would not serve the purposes for which the rule or regulation was adopted.

Further, in the case of license renewal proceedings, the licensee is required to look for and identify "new and significant" information that would put the facility outside of the generic assessment in the GEIS for license renewal: the NRC staff also looks for new and significant information as part of its review. If no new and significant information is found, the staff concludes that the issue is generic and within the environmental impacts of the GEIS. With respect to the ongoing Indian Point license renewal proceeding, where the State of New York is a party, and has raised similar issues in the context of that proceeding, the license renewal proceeding is the proper venue in which to seek a waiver to the Waste Confidence Rule. If the State believes that there are site-specific issues associated with the Indian Point license renewal proceeding, the State should seek a waiver of the rule through that proceeding using the procedures in 10 CFR 2.335.13 But the potential that one or more sites might not fall under the generic determination in the Waste Confidence Decision and Rule is not sufficient reason for the Commission to

require to a site-specific analysis for all sites. The 10 CFR 2.335 waiver process is intended to address the circumstances that the Attorney General claims are present at Indian Point; and the adjudicatory proceeding for the Indian Point license renewal, not this rulemaking, is the proper venue to raise these issues.

Comment 27: The Attorney General of New York's supplemental comments raised two new "conclusions" to support its original comments:

Subsequent to 2001, the Commission has abandoned any attempt to treat safety and environmental issues associated with spent fuel storage at reactor sites on a generic basis. Rather, the Commission, operating through its regulatory staff, has ordered implementation of site-specific mitigation measures for each reactor to address concerns with spent fuel storage. NRC has acknowledged that there are differences in spent fuel pool designs and capabilities. NRC has also required the implementation of sitespecific mitigation measures in response to Congressional directives to NRC to develop site-specific analyses and measures for each spent fuel pool. Moreover, while these mitigation measures have been the subject of extensive discussion between NRC and industry, their details have not been disclosed to the States, and there has not been any opportunity for public input regarding the adequacy of the measures being taken or even whether measures are being taken to address all the potential environmental and safety issues associated with spent fuel storage at reactors sites or whether more effective alternatives are available.

And

Previous indications that the Yucca Mountain waste repository would never come to fruition have now become more certain as the funding for the program has been removed from the proposed federal budget and DOE staff have publicly stated that the project will not go forward.

NRC Response: Contrary to the State's assertion, the NRC continues to treat some issues associated with spent fuel storage on a generic basis; the Commission's approval of these updates to the Waste Confidence Decision and Rule are evidence of that fact. To the extent that the Attorney General's comments relate to the license renewal process at Indian Point, the Commission has a process in place to ensure that generic issues at specific sites under review for license renewal are, in fact, generic. Although spent fuel storage is a Category 1 (generic) issue and does not require a site-specific evaluation, the licensee and the staff both evaluate these generic issues to ensure that there is no new and significant information that would require a site-specific analysis for these issues. To the extent that the rest of the Attorney General's

conclusion raises issues associated with the Indian Point license renewal, this rulemaking is not the appropriate venue to raise these issues; the State should raise these concerns in its capacity as a party to the Indian Point relicensing proceeding.

As acknowledged in the Attorney General's conclusion, the Commission discussed the relationship between the YM repository and the draft final updates to the Waste Confidence Decision and Rule in the attachments to SECY-09-0090. In these documents (the draft final Decision and Rule), the Commission discussed how the Waste Confidence Decision and Rule assume that YM will not be opened as a repository. This conclusion continues in these documents: The Waste Confidence Decision and Rule assume that YM is not an option. As the Commission states throughout this document and has stated on multiple occasions, the availability of the YM repository has no bearing on the outcome of this rulemaking or update to the Waste Confidence Decision.

Evaluation of Waste Confidence Findings

Having considered and addressed the comments received on the Commission's proposed updates to the Waste Confidence Decision and Rule, the Commission now reexamines the 1984 and 1990 bases for its findings and supplements those bases with an evaluation of events and issues that have arisen since 1990 and affect the findings.

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¹³ On July 8, 2010, the Commission directed the ASLB to deny admission of two new contentions regarding waste confidence in the Indian Point proceeding. The Commission explained that it has been longstanding policy to preclude initiating litigation on issues that will soon be resolved generically. See In the Matter of Entergy Nuclear Operations. Inc. (Indian Point Nuclear Generating Units 2 and 3). CLI-10-19, 2010 WL 2753785 (2010).

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I. Finding 1: The Commission Finds **Reasonable Assurance That Safe Disposal of High-Level Radioactive** Waste and Spent Fuel in a Mined **Geologic Repository Is Technically** Feasible

A. Bases for Finding 1

The Commission reached this finding in 1984 and reaffirmed it in 1990. The focus of this finding is on whether safe disposal of HLW and SNF is technically possible using existing technology and without a need for any fundamental breakthroughs in science and technology. To reach this finding, the Commission considered the basic features of a repository designed for a multi-barrier system for waste isolation and examined the problems that the DOE would need to resolve as part of a final design for a mined geologic repository. The Commission identified three major technical problems: (1) The selection of a suitable geologic setting as host for a technically acceptable repository site; (2) the development of waste packages that will contain the waste until the fission products are greatly reduced; and (3) the development of engineered barriers, such as backfilling and sealing of the drifts and shafts of the repository, which can effectively retard migration of radionuclides out of the repository (49 FR 34667; August 31, 1984).

DOE's selection of a suitable geologic setting is governed by the NWPA. DOE explored potential repository sites before the NWPA was enacted, but that Act set in place a formal process and schedule for the development of two geologic repositories. The following brief summary of key provisions of this Act may assist readers in understanding DOE's process for locating a suitable geologic setting.

As initially enacted, the Nuclear Waste Policy Act of 1982 directed DOE to issue guidelines for the recommendation of sites and then to nominate at least five sites as suitable for site characterization for selection as the first repository site and, not later than January 1, 1985, to recommend three of those sites to the President for characterization as candidate sites. Nuclear Waste Policy Act of 1982, §112, 96 Stat. 2201 (1983) (current version at 42 U.S.C. 10132 (2006)). Not later than July 1, 1989, DOE was to again nominate five sites and recommend three of them to the President for characterization for selection as the second repository. Id. DOE was then to carry out site characterization activities for the approved sites. Nuclear Waste Policy Act of 1982, § 113, 96 Stat. 2201 (1983) (current version at 42 U.S.C. 101323 (2006)). Following site characterization, DOE was to recommend sites to the President as suitable for development as repositories and the President was to recommend one site to the Congress by March 31, 1987, and another site by March 31, 1989, for development as the first two repositories. Nuclear Waste Policy Act of 1982, § 114, 96 Stat. 2201 (1983) (current version at 42 U.S.C. 10134 (2006)). States and affected Indian tribes were given the opportunity to object, but if the recommendations were approved by Congress, DOE was to submit applications for a construction authorization to the NRC. Id. The NRC was given until January 1, 1989, to reach a decision on the first application, and until January 1, 1992, on the second. The Commission was directed to prohibit the emplacement in the first repository of more than 70,000 MTHM until a second repository was in operation. Id. The NWPA, inter alia, restricted site characterization solely to a site at Yucca Mountain, NV (YM) and terminated the program for a second repository. The NWPA provided that if DÔE at any time determines Yucca Mountain to be unsuitable for development as a repository, DOE must report to Congress its recommendations for further action to ensure the safe, permanent disposal of SNF and HLW, including the need for new legislation. Section 113 of NWPA, 42 U.S.C. 10133 (2006).

In 1984, the Commission reviewed DOE's site exploration program and concluded that it was providing information on site characteristics at a sufficiently large number and variety of sites and geologic media to support the expectation that one or more technically acceptable sites would be identified (49) FR 34668; August 31, 1984). In 1990, the

Commission noted that the 1987 amendment of the Nuclear Waste Policy Act of 1982, which focused solely on the YM site, could cause considerable delay in opening a repository if that site were found not suitable for licensing. But the possibility of that delay did not undermine the Commission's confidence that a technically acceptable site would be located, either at YM or elsewhere. The Commission observed that the NRC staff had provided extensive comments on DOE's draft environmental assessments of the nine sites it had identified as being potentially acceptable and on the final environmental assessments for the five sites nominated.14 The NRC had not identified any fundamental technical flaws or disqualifying factors that would render any of the sites unsuitable for characterization or potentially unlicenseable, although the NRC noted that many issues would need to be resolved during site characterization for YM or any other site (55 FR 38486; September 18, 1990).

With respect to the development of effective waste packages, the Commission, in 1984, reviewed DOE's scientific and engineering program on this subject. The Commission also considered whether the possibility of renewed reprocessing of SNF could affect the technical feasibility of the waste package because it would need to consider waste form other than spent fuel. The Commission concluded that the studies by DOE and others demonstrated that the chemical and physical properties of SNF and HLW can be sufficiently understood to permit the design of a suitable waste package and that the possibility of commercial reprocessing would not substantially affect this conclusion (49 FR 34671; August 31, 1984). In 1990, the Commission reviewed DOE's continued research and experimentation on waste packages, which primarily focused on work in Canada and Sweden. The NRC noted that the DOE had narrowed the range of waste package designs to a design tailored for unsaturated tuff 15 at the YM site due to the 1987 redirection of the HLW program. The NRC also noted that some reprocessing wastes from the defense program and the West Valley Demonstration Project were now

¹⁴ Under the program established by the initial NWPA, DOE had nominated sites at Hanford WA Yucca Mountain, NV, Deaf Smith County, TX, Davis Canyon, UT. and Richton Dome, MS, and had recommended the first 3 sites for site characterization.

¹⁵ Tuff is a type of rock consisting of successive layers of fine-grained volcanic ash. See DOE/RW-0573, Rev. 0 Yucca Mountain Repository GI. (ADAMS Accession Numbers ML081560408, ML081560409, and ML081560410).

anticipated to be disposed of in the repository. The NRC remained confident that, given a range of waste forms and conservative test conditions, the technology is available to design acceptable waste packages (55 FR 38489; September 18, 1990).

With respect to the development of effective engineered barriers, the Commission's confidence in 1984 rested upon its consideration of DOE's ongoing research and development activities regarding backfill materials and borehole and shaft sealants, which led the Commission to conclude that these activities provided a basis for reasonable assurance that engineered barriers can be developed to isolate or retard radioactive material released by the waste package (49 FR 34671; August 31, 1984). In 1990, although DOE's research had narrowed to focus on YM, the Commission continued to have confidence that backfill or packing materials can be developed as needed for the underground facility and waste package and that an acceptable seal can be developed for candidate sites in different geologic media (55 FR 38489-38490; September 18, 1990).

B. Evaluation of Finding 1

Today, the scientific and technical community engaged in waste management continues to have high confidence that safe geologic disposal is achievable with currently available technology. See, e.g., National Research Council, "Technical Bases for Yucca Mountain Standards," 1995. No insurmountable technical or scientific problem has emerged to disturb this confidence that safe disposal of SNF and HLW can be achieved in a mined geologic repository. To the contrary, there has been significant progress in the scientific understanding and technological development needed for geologic disposal over the past 18 years. There is now a much better understanding of the processes that affect the ability of repositories to isolate waste over long periods. Id. at 71-72; International Atomic Energy Agency (IAEA), "Scientific and Technical Basis for the Geologic Disposal of Radioactive Wastes, Technical Reports Series No. 413," 2003. The ability to characterize and quantitatively assess the capabilities of geologic and engineered barriers has been repeatedly demonstrated. NRC, "Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada; Proposed Rule," (64 FR 8640, 8649; February 22, 1999); Organization for Economic Cooperation and Development, Nuclear Energy Agency,

"Lessons Learned from Ten Performance Assessment Studies," 1997. Specific sites have been investigated and extensive experience has been gained in underground engineering. IAEA, "Radioactive Waste Management Studies and Trends, IAEA/WMDB/ST/ 4," 2005; IAEA, "The Use of Scientific and Technical Results from Underground Research Laboratory Investigations for the Geologic Disposal of Radioactive Waste, IAEA-TECDOC-1243," 2001. These advances and others throughout the world continue to confirm the soundness of the basic concept of deep geologic disposal. IAEA, "Joint Convention on Safety of Spent Fuel Management and on Safety of Radioactive Waste Management, INFCIRC/546," 1997.

In the United States, the technical approach for safe HLW disposal has remained unchanged for several decades: Use a deep geologic repository containing natural barriers to hold canisters of HLW with additional engineered barriers to further retard radionuclide release. Although some elements of this technical approach have changed in response to new knowledge (e.g., engineered backfill was removed as a design concept for YM in the late 1990s in response to enhanced understandings of heat and water transfer processes in the near-field drift environment), safe disposal still appears to be feasible with current technology. In 1998, DOE conducted assessments for long-term performance of a potential repository at YM (DOE/RW-0508, Viability Assessment) and 2002 (DOE/ RW-0539, Site Recommendation). These assessments used existing technology and available scientific information and did not identify areas where fundamental breakthroughs in science or technology were needed to support safe disposal.

With respect to the issue of identifying a suitable geologic setting as host for a technically acceptable site, DOE made its suitability determination for the YM site in 2002. On June 3, 2008, DOE submitted the application for construction authorization to the NRC and on September 8, 2008, NRC staff notified DOE that it found the application acceptable for docketing (73 FR 53284; September 15, 2008). Whether YM is technically acceptable must await the outcome of an NRC licensing proceeding, which, if completed, would rule on the technical acceptability of a repository at YM. Even if DOE does not construct a repository at YM, this would not change the fact that the Commission continues to have reasonable assurance that the technology exists today to safely dispose of SNF and HLW in a geologic repository. Although the 1987 amendments to NWPA barred DOE from continuing site investigations elsewhere, the U.S. Congress's decision to focus solely on YM was not based on any finding that any of the other sites were unsuitable for technical reasons; rather, the decision was aimed at controlling the costs of the HLW program (55 FR 38486; September 18, 1990).

Repository programs in other countries, which could inform the U.S. program, are actively considering crystalline rock, clay, and salt formations as repository host media. IAEA, "Radioactive Waste Management Status and Trends, IAEA/WMDB/ST/4,' 2005; IAEA, "The Use of Scientific and Technical Results from Underground **Research Laboratory Investigations for** the Geologic Disposal of Radioactive Waste, IAEA-TECDOC-1243," 2001. Many of these programs have researched these geologic media for several decades. Although there are relative strengths to the capabilities of each of these potential host media, no geologic media previously identified as a candidate host, with the exception of salt formations for SNF, has been ruled out based on technical or scientific information. Salt formations are being considered as hosts only for reprocessed nuclear materials because heatgenerating waste, like SNF, exacerbates a process by which salt can rapidly deform. This process could cause problems with keeping drifts stable and open during the operating period of a repository.

In 2001, the NRC amended its regulations to include a new 10 CFR part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada," (66 FR 55732; November 2, 2001).

Part 63 requires use of both natural and engineered barriers to meet overall total system performance objectives without pre-determined subsystem performance requirements, which are required in 10 CFR part 60.¹⁶ Accordingly, U.S. research and development activities have focused on understanding the long-term capability of natural and engineered barriers, which can prevent or substantially reduce the release rate of radionuclides

¹⁶ NRC's regulations at 10 CFR part 63 apply only to the proposed repository at YM. NRC's regulations at 10 CFR part 60. "Disposal of High-Level Radioactive Wastes in Geologic Repositories," govern the licensing of any repository other than one located at YM. However, at the time part 63 was proposed, the Commission indicated it would consider revising Part 60 if it seemed likely to be used in the future. (64 FR 8640, 8643; February 22, 1999).

from a potential repository system. Although the performance of individual barriers may change over time, the overall performance of the total system is required to be acceptable throughout the performance period of the repository. In this context of total system performance, research and development has found that it appears technically possible to design and construct a waste package and an engineered barrier system that, in conjunction with natural barriers, could prevent or substantially reduce the release rate of radionuclides from a potential repository system during the performance period. NRC, "Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada; Proposed Rule," (64 FR 8649; February 22, 1999); IAEA, "Joint Convention on Safety of Spent Fuel Management and on Safety of Radioactive Waste Management, INFCIRC/546," 1997.

Since the Commission last considered Waste Confidence, the NRC has issued design certifications for new reactors under its regulations at 10 CFR part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," and is currently reviewing several plant designs in response to applications for design certifications. The NRC is also considering COL applications for nuclear power plants that reference these certified and under-review designs. These facilities would use the same or similar fuel assembly designs as the nuclear power plants currently operating in the United States. If these new facilities use a new fuel type or different cladding, then it may be necessary to modify the design of a repository to accommodate these changes. But if limited reliance is placed on the barrier capabilities of cladding or fuel type to comply with repository safety requirements, then minimal design changes may be needed to accommodate new types of SNF or cladding. As such, the new reactor designs and specific license applications currently under review would not raise issues as to the technical feasibility of repository disposal.

The NRC is also engaged in preliminary interactions with DOE and possible reactor vendors proposing advanced reactor designs that are different from the currently operating light-water reactors. Some of these advanced reactors use gas-cooled or liquid metal cooled technologies and have fuel and reactor components that might require different transportation and storage containers. Geometric,

thermal, and criticality constraints could conceivably require a design modification to disposal containers from those currently proposed for YM. Nevertheless, the technical requirements for disposal of advanced reactor components appear similar to the requirements for disposal of components for current light-water reactors. For example, DOE had planned to dispose of spent fuel at YM from both gas-cooled (Peach Bottom 1) and liquidmetal cooled (Fermi 1) reactors, using the same basic technological approach as for SNF from light-water reactors. Although radionuclide inventory, fuel matrix, and cladding characteristics for advanced fuels might be different from current light-water reactors, the safe disposal of advanced fuel appears to involve the same scientific and engineering knowledge as used for fuel from current light-water reactors.

There is currently a high uncertainty regarding the growth of advanced reactors in the U.S. In the licensing strategy included in a joint report to Congress in August 2008 from the NRC and the DOE for the next generation nuclear plant (NGNP) program, the agencies found that an aggressive licensing approach may lead to operation of a prototype facility in 2021. (ADAMS Accession Number ML082290017). Based on comparison with current disposal strategies for fuel from existing gas cooled or liquid-metal cooled reactors, the NRC is confident that current technology is adequate to support the safe disposal of spent fuel from a potential prototype facility. Small modular light-water reactors being developed will use fuel very similar in form and materials to the existing operating reactors and will not, therefore, introduce new technical challenges to the disposal of spent fuel. In addition to the NGNP activities related to the prototype reactor, various activities, such as DOE's Fuel Cycle Research and Development Program, are underway to evaluate fuel cycle alternatives that could affect the volume and form of waste from the prototype reactor or other nuclear reactor designs. The need to consider waste disposal as part of the overall research and development activities for advanced reactors is recognized and included in the activities of designers, the DOE, and the NRC. See, e.g., DOE Nuclear Energy Research Advisory Committee and the Generation IV International Forum, "A Technology Roadmap for Generation IV Nuclear Energy Systems," December 2002

Based on the above discussion, including its response to the public

comments, the Commission reaffirms Finding 1.

II. Finding 2 (1990): The Commission Finds Reasonable Assurance That at Least One Mined Geologic Repository Will Be Available Within the First Quarter of the Twenty-First Century, and That Sufficient Repository Capacity Will Be Available Within 30 Years Beyond the Licensed Life for Operation (Which May Include the Term of a Revised or Renewed License) of Any Reactor To Dispose of the Commercial High-Level Radioactive Waste and Spent Fuel Originating in Such Reactor and Generated Up to That Time

A. Bases for Finding 2

In the 1984 and 1990 Waste Confidence Decisions, the dual objectives of this finding were to predict when a repository will be available for use and to predict how long spent fuel may need to be stored at a reactor site until repository space is available for the spent fuel generated at that reactor. With respect to the first prediction, the Commission's focus in 1984 was on the vears 2007-2009-the years during which the operating licenses for the Vermont Yankee 17 and Prairie Island 18 nuclear power plants would expire.¹⁹ In 1984, DOE anticipated that the first repository would begin operation in 1998 and the second in 2004. But the NRC concluded that technical and institutional uncertainties made it preferable to focus on the 2007-2009 time period. The technical uncertainties involved how long it would take DOE to locate a suitable geologic setting for a potentially technically acceptable repository and how long it would take to develop an appropriate waste package

¹⁶ The Commission amended Prairie Island 1 and 2's operating licenses on September 23, 1986, to extend the expiration date of the licenses to August 9, 2013, and October 29, 2014 (ADAMS Accession Number ML022200335). Prairie Island 1 and 2 have applied for license renewals, which are being reviewed by the Commission and would extend the plants' operating licenses for 20 years. http:// www.nrc.gov/reactors/operating/licensing/renewal/ applications.html (last visited September 15, 2010).

¹⁹ Under the court remand that precipitated the initial waste confidence review, NRC was required to consider whether there was reasonable assurance that an offsite storage solution would be available by the years 2007–2009 and, if not, whether there was reasonable assurance that the spent fuel could be stored safely at those sites beyond those dates. See State of Minnesota v. NRC, 602 F.2d 412, 418 (DC Cir. 1979).

¹⁷ The Commission amended Vermont Yankee's operating license on January 23, 1991, to extend the expiration date of the license to 2012. (56 FR 2568; January 24, 1991). Vermont Yankee has applied for a license renewal, which is being reviewed by the Commission and would extend the plant's operating license for 20 years. http://www.nrc.gov/reactors/operating/licensing/renewal/ applications.html (last visited September 15, 2010).

and engineered barriers. The Commission expressed the view that despite early delays, DOE's program was on track and, under the impetus given by the recently-enacted NWPA, would timely resolve the technical problems (49 FR 34674-34675; August 31, 1984).

The Commission also identified institutional uncertainties that needed to be resolved: (1) Measures for dealing with Federal-state disputes; (2) An assured funding mechanism that would be sufficient over time to cover the period for developing a repository; (3) An organizational capability for managing the HLW program; and (4) A firm schedule and establishment of responsibilities. The Commission expressed its confidence in the ability of the provisions of the then recentlypassed NWPA to timely resolve these uncertainties (49 FR 34675-34679; August 31, 1984).

With respect to the second prediction, the NRC reviewed DOE's estimates of the amount of installed generating capacity of commercial nuclear power plants in the year 2000 and concluded that the total amount of spent fuel that would be produced during the operating lifetimes of these reactors would be about 160,000 MTHM. To accommodate this volume of spent fuel, the NRC assumed that two repositories would be needed. The NRC calculated that if the first repository began to receive SNF in 2005 and the second in 2008, then all the SNF would be emplaced by about 2026. This would mean that sufficient repository capacity would be available within 30 years beyond the expiration of any reactor license for disposal of its SNF (49 FR 34679; August 31, 1984).

In reviewing these predictions in 1990, the Commission faced a considerably changed landscape. First, DOE's schedule for the availability of a repository had slipped several times so that its then-current projection was 2010. Second, Congress's 1987 amendment of NWPA had confined site characterization to the YM site, meaning that there were no "back-up" sites being characterized in case the YM site was found unsuitable or unlicenseable. Finally, site characterization activities at YM had not proceeded without problems, notably in DOE's schedule for subsurface exploration and in development of its quality assurance program. Given these considerations, the Commission found it would not be prudent to reaffirm its confidence in the availability of a repository by 2007-2009 (55 FR 38495; September 18, 1990).

Instead, the Commission found that it would be reasonable to assume that DOE could make its finding whether

YM was suitable for development of a repository by the year 2000. The Commission was unwilling to assume that DOE would make a finding of suitability (which would be necessary for a repository to be available by 2010). To establish a new time frame for repository availability, the Commission made the assumption that DOE would find the YM site unsuitable by the year 2000 and that (as DOE had estimated) it would take 25 years for a repository to become available at a different site. The Commission then considered whether it had sufficient bases for confidence that a repository would be available by 2025 using the same technical and institutional criteria it had used in 1984. The Commission found no reason to believe that another potentially technically acceptable site could not be located if the YM site were found unsuitable. The development of a waste package and engineered barriers was tied to the question of the suitability of the YM site, but the NRC found no reason to believe that a waste package and engineered barriers could not be developed for a different site by 2025, if necessary (55 FR 38495; September 18, 1990).

The institutional uncertainties were perhaps more difficult to calculate. The Commission acknowledged that DOE's efforts to address the concerns of states, local governments, and Indian tribes had met with mixed results. Nevertheless, the Commission retained its confidence that NWPA had achieved the proper balance between providing for participation by affected parties and providing for the exercise of Congressional authority to carry out the national program for waste disposal (55 FR 38497; September 18, 1990) Similarly, the Commission believed that management and funding issues had been adequately resolved by NWPA and would not call into question the availability of a repository by 2025 (55 FR 38497-38498; September 18, 1990). Thus, except for the schedule, the Commission was confident that the HLW program set forth in the NWPA would ultimately be successful.

The Commission also considered whether the termination of activities for a second repository, combined with the 70,000 MTHM limit for the first repository, together with its new projection of 2025 as the date for the availability for a repository, undermined its assessment that sufficient repository capacity would be available within 30 years beyond expiration of any reactor operating license to dispose of the SNF originating in such reactor and generated up to that time (55 FR 38501– 38504; September 18, 1990). The Commission noted that almost all reactor licenses would not expire until sometime in the first three decades of the twenty-first century and license renewal was expected to extend the terms of some of these licenses. Thus, a repository was not needed by 2007-2009 to provide disposal capacity within 30 years beyond expiration of most operating licenses.²⁰ The Commission acknowledged, however, that it appeared likely that two repositories would be needed to dispose of all the SNF and HLW from the current generation of reactors unless Congress provided statutory relief from the 70,000 MTHM limit for the first repository and unless the first repository had adequate capacity to hold all the SNF and HLW generated. This was because DOE's 1990 spent fuel projections, which assumed that no new reactors would be constructed, called for 87,000 MTHM to be generated by 2036. The Commission believed that that assumption probably underestimated the expected total spent fuel discharges due to the likelihood of reactor license renewals.

Further, the Commission expressed the belief that if the need for a second repository was established, Congress would provide the needed institutional support and funding, as it had for the first repository.21 The Commission reasoned that if work began on the second repository program in 2010, that repository could be available by 2035. Two repositories available in approximately 2025 and 2035, each with acceptance rates of 3400 MTHM/ year within several years after commencement of operations, would provide assurance that sufficient repository capacity will be available within 30 years of operating license expiration for reactors to dispose of the spent fuel generated at their sites up to that time. The Commission concluded that a second repository, or additional capacity at the first repository, would be

²¹ DOE was statutorily required to report to the President and to Congress on the need for a second repository between lanuary 1. 2007. and january 1. 2010. Section 161 of NWPA, 42 U.S.C. 10172a. DOE submitted the report to Congress in December 2008. The report recommended that Congress remove the 70,000 MTHM limit for the YM repository, but Congress has not yet responded to the recommendation. The Report to the President and the Congress by the Secretary of Energy on the Need for a Second Repository. 1. (2008) available at http://www.energy.gov/media/ Second_Repository_Rpt_120908.pdf (last visited October 16, 2010).

 $^{^{20}}$ NRC identified Dresden 1, licensed in 1959, as the earliest licensed power reactor and noted that 30 years beyond its licensed life for operation would be 2029 and that it was possible, if a repository were to become available by 2025, for all the Dresden 1 SNF to be removed from that facility by 2029 (55 FR 38502; September 18, 1990).

needed only to accommodate the additional quantity of spent fuel generated during the later years of reactors operating under a renewed license. The Commission stated that the availability of a second repository would permit spent fuel to be shipped offsite well within 30 years after expiration of these reactors' operating licenses and that the same would be true of the spent fuel discharged from any new generation of reactor designs (55 FR 38503-38504; September 18, 1990).

The Commission acknowledged that there were several licenses that had been prematurely terminated where it was possible that SNF would be stored more than 30 years beyond the effective expiration of the license and that there could be more of these premature terminations. But the Commission remained confident that in these cases the overall safety and environmental impacts of extended spent fuel storage would be insignificant. The Commission found that spent fuel could be safely stored for at least 100 years (Finding 4) 22 and that spent fuel in at-reactor storage would be safely maintained until disposal capacity at a repository was available (Finding 3). The Commission emphasized that it had not identified a date by which a repository must be available for health and safety reasons. Under the second part of Finding 2, safe management and safe storage would not need to continue for more than 30 years beyond expiration of any reactor's operating license because sufficient repository capacity was expected to become available within those 30 years (55 FR 38504; September 18, 1990).

B. Evaluation of Finding 2

As explained previously, the Commission based its estimate in 1990—that at least one geologic repository would be available within the first quarter of the twenty-first century on an assumption that DOE would make its suitability determination under section 114 of NWPA around 2000. To avoid being put in the position of assuming the suitability of the YM site, the Commission then assumed that DOE would find that site unsuitable and, as DOE had estimated, that it would take 25 years before a repository could become available at an alternate site.

The DOE made its suitability determination in early 2002 and found the YM site suitable for development as a repository.²³ Although DOE's application for a construction authorization for a repository was considerably delayed from the schedule set out in the NWPA,²⁴ on June 3, 2008, the DOE submitted the application to the NRC and on September 8, 2008, the NRC staff notified the DOE that it found the application acceptable for docketing (73 FR 53284; September 15, 2008). Although the licensing proceeding for the YM repository is ongoing, DOE and the Administration have made it clear that they do not support construction of Yucca Mountain. On March 3, 2010, the DOE filed its Notice of Withdrawal with the Atomic Safety and Licensing Board (ASLB) that is presiding over the Yucca Mountain licensing proceeding (ADAMS Accession Number ML100621397). On June 29, 2010, the ASLB denied the Department's motion; and on June 30, 2010, the Secretary of the Commission invited the parties to file briefs regarding whether the Commission should review, reverse, or uphold the ASLB's decision (ADAMS Accession Numbers ML101800299 and ML101810432). The Commission has not yet issued its decision.

In 2005, the State of Nevada filed a petition for rulemaking with the NRC (PRM-51-8) that questioned whether continued use of the 2025 date, in effect, indicated prejudgment of the outcome of any licensing proceeding that might be held. The Commission rejected this notion in its denial of the petition:

Even if DOE's estimate as to when it will tender a license application should slip further, the 2025 date would still allow for unforeseen delays in characterization and licensing. It also must be recognized that the Commission remains committed to a fair and comprehensive adjudication and, as a result, there is the potential for the Commission to deny a license for the Yucca Mountain site based on the record established in the

²⁴ Section 114(b) of NWPA directs the Secretary of Energy to submit a construction authorization application to NRC within 90 days of the date the site designation becomes effective. 42 U.S.C. 10134(b). adjudicatory proceeding. That commitment is not jeopardized by the 2025 date for repository availability. The Commission did not see any threat to its ability to be an impartial adjudicator in 1990 when it selected the 2025 date even though then, as now, a repository could only become available if the Commission's decision is favorable. Should the Commission's decision be unfavorable and should DOE abandon the site, the Commission would need to reevaluate the 2025 availability date, as well as other findings made in 1990. State of Nevada: Denial of a Petition for Rulemaking (70 FR 48329, 48333; August 17, 2005); affirmed, Nevada v. NRC, 199 Fed. Appx. 1 (DC Cir., Sept. 22, 2006).

In the absence of an unfavorable NRC decision or DOE's abandonment of the site, the Commission found no reason to reopen its Waste Confidence Decision. Now that it appears uncertain whether the YM project will ever be constructed, the Commission would have adequate reasons to reopen the Waste Confidence Decision; but the Commission, in any event, had already decided to revisit its decision before DOE filed its motion to withdraw.

The initial decision to revisit the Waste Confidence Decision was supported by the recommendations of the Combined License Review Task Force Report. In its June 22, 2007 SRM on that report, the Commission approved rulemaking to resolve generic issues associated with combined license applications. SRM-COMDEK-07-0001/ COMJSM-07-0001-Report of the Combined License Review Task Force (ADAMS Accession Number ML071760109). In a subsequent SRM, issued on September 7, 2007, the Commission expressed the view that a near-term update to the Waste Confidence Findings was appropriate. SRM—Periodic Briefing on New Reactor Issues (ADAMS Accession Number ML072530192). The staff, in its response to these SRMs, recognized that there would likely be long-term inefficiencies in combined license application proceedings due to the need to respond to potential questions and petitions directed to the existing Waste Confidence Decision and committed to evaluate possible updates to the decision.²⁵ See Memorandum from Luis

²² The Commission conservatively assumed that licenses would be renewed for 30-year terms (55 FR 38503: September 18, 1990). Thus, the initial 40year term of the operating license, plus 30 years for the renewed operating license term and 30 years beyond the expiration of the renewed license amounts to storage for at least 100 years.

²³ On February 14, 2002, the Secretary of Energy recommended the YM site for the development of a repository to the President thereby setting in motion the approval process set forth in sections 114 and 115 of the NWPA. See 42 U.S.C. 10134(a)(1); 10134(a)(2); 10135(b), 10136(b)(2) (2006). On February 15, 2002, the President recommended the site to Congress. On April 8, 2002, the State of Nevada submitted a notice of disapproval of the site recommendation to which Congress responded on July 9, 2002, by passing a joint resolution approving the development of a repository at YM, which the President signed on July 23, 2002. See Public Law 107–200, 116 Stat. 735 (2002) (codified at 42 U.S.C. 10135 note (Supp. IV 2004)).

²⁵ Challenges to 10 CFR 51.23 in individual COL proceedings would likely be addressed through application of 10 CFR 2.335, "Consideration of Commission rules and regulations in adjudicatory proceedings." This rule generally prohibits attacks on NRC rules during adjudicatory proceedings, but does allow a party to an adjudicatory proceeding to petition that application of a specified rule be waived or an exception made for the particular proceeding. 10 CFR 2.335(b). The sole grounds for a waiver or exception is that "special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule

A. Reyes, Executive Director for Operations, to the Commissioners, "Rulemakings that Will Provide the Greatest Efficiencies to Complete the Combined License Application Reviews in a Timely Manner," December 17, 2007, at 3 (ADAMS Accession Number ML073390094).

Based upon these and more recent developments, undertaking a public rulemaking proceeding now to consider revisions to the Waste Confidence Decision and Rule is appropriate and has allowed sufficient time to conduct a studied and orderly reassessment and to revise and update the findings and rule. In particular, the Commission has been able to consider alternative time frames (including no specific time frame) that would provide reasonable assurance for the availability of a repository. Further, the Commission does not believe that any of the developments since it issued its proposed update and proposed rule would require it to revise any of its proposed findings-the alternative to proposed Finding 2 that the Commission approves in this update to the Waste Confidence Decision was proposed as part of the initial proposed rulemaking and update (73 FR 59561; October 9, 2008). Although none of the developments in the last year requires the Commission to revise any of the proposed findings, the Commission does believe that recent developments make it imprudent to continue to include a target date in Finding 2. Therefore, as discussed in the response to Comment 9, the Commission has decided to remove the target date from Finding 2 and to express its confidence that a repository will be available when necessary. The proposed findings assumed that YM would not be built and that DOE would have to select a new repository site. The proposal to eliminate the YM project simply reinforces the appropriateness of revisiting the 1990 decision at this time.

In response to developments involving YM, as well as for other reasons, the Secretary of Energy appointed the Blue Ribbon Commission on America's Nuclear Future to assess the state of SNF storage and disposal in the United States. Because of the decades of scientific studies supporting the use of a geologic repository for the disposal of HLW and SNF, the Commission believes that the Blue Ribbon Commission could conclude that geologic disposal remains the

or regulation * * * would not serve the purposes for which the rule or regulation was adopted." *Id.* Thus, a review of the Waste Confidence findings and rule now might be expected to obviate such challenges in individual COL proceedings. preferred course of action. Further, the NWPA still mandates a national repository program, and until the law is changed disposal in a repository remains the controlling policy. But if the Blue Ribbon Commission were to recommend an option that does not involve eventual geologic disposal of waste in a repository and the Congress were to amend the NWPA to change the national policy, then the Commission would likely have to revisit the Waste Confidence Decision.

One possible approach to revising Finding 2 might be to set the expected availability of a new repository at a time around 25 years after the conclusion of the YM licensing process in accordance with DOE's 1990 estimate of the time it would take to make a repository available at a different site. But the Commission rejected this approach when denying the Nevada petition:

[T]he use of a Commission acceptability finding as the basis for repository availability is impossible to implement because it would require the Commission to prejudge the acceptability of any alternative to Yucca Mountain in order to establish a reasonably supported outer date for the Waste Confidence finding. That is, if the Commission were to assume that a license for the Yucca Mountain site might be denied in 2015 and establish a date 25 years hence for the "availability" of an alternative repository (*i.e.*, 2040), it would still need to presume the "acceptability" of the alternate site to meet that date (70 FR 48333; August 17, 2005).

Another approach, which the Commission included in its proposed Finding 2, would be to revise the finding to include a target date or time frame for which it now seems reasonable to assume that a repository would be available. A target date for when a disposal facility can reasonably be expected to be available would result from an examination of the technical and institutional issues that would need to be resolved before a repository could be available. The target date approach would be consistent with the HLW disposal programs in other countries, as explained below:

But the Commission has concerns about the use of this approach and has not adopted it. A target date requires the Commission to have reasonable assurance of when a repository will become available, and without the resolution of the political and societal issues associated with the siting and construction of a repository, the Commission cannot reasonably predict that a repository can and will become available within a specific time frame. The Commission does, however, believe that a repository can be constructed within 25–35 years of a Federal decision to construct a repository. Further, given the ongoing activities of the Blue-Ribbon Commission, events in other countries, the viability of safe long-term storage for at least 60 years (and perhaps longer) after reactor licenses expire, and the Federal Government's statutory obligation to develop a HLW repository, the Commission has confidence that a repository will be made available well before any safety or environmental concerns arise from the extended storage of spent nuclear fuel and highlevel waste. In other words, a repository will be available when necessary.

It must be emphasized that the removal of a target date from Finding 2 should not be interpreted as a Commission endorsement of indefinite storage. Instead, the Commission has confidence that the SNF and HLW can continue to be safely stored without significant environmental impacts for at least 60 years beyond the licensed life for operation of any nuclear power plant. The Commission is therefore amending Finding 2 to state that a deep geologic repository will be available when necessary.

This change to Finding 2 does not affect the Commission's confidence that spent fuel can be safely stored with minimal environmental impacts. This revision reflects the Commission's inability to predict with precision when the societal and political uncertainties associated with the construction of a repository can be resolved; the Commission is unwilling to predict a starting point for a new repository program-the time to complete a repository program remains unchanged from the discussion in the proposed rule. As discussed below, the Commission continues to have confidence that a deep geologic disposal facility can be completed within a reasonable time (25-35 years) and that disposal capacity for HLW and SNF will be available when necessary

Most countries possessing HLW and SNF plan to eventually confine these wastes using deep geologic disposal. Currently, there are 24 other countries considering disposal of spent or reprocessed nuclear fuel in deep geologic repositories. From the vantage point of near-term safety, there has been little urgency in these countries for implementing disposal facilities because of the perceived high degree of safety provided by interim storage, either at reactors or at independent storage facilities. Of these 24 countries, 10 have established target dates for the availability of a repository. Most of the 14 countries that have not established target dates rely on centralized interim storage, which may include a protracted

period of onsite storage before shipment to a centralized facility.²⁶

Unlike these other countries, recent events in the United States (e.g., the DOE's motion to withdraw the YM application and the current Administration's decision to seek no funding for the YM Program) have not diminished the Commission's confidence that a repository is technologically feasible, but have diminished its confidence in the targetdate approach. The Commission now believes that there is insufficient support for the continued use of a target date because of the difficulty associated with predicting the start-date for any repository program. The Commission is therefore adopting the position regarding the removal of a target date proposed in the "Additional Question for Public Comment" section of the proposed update (73 FR 59567; October 9, 2008). The Commission is revising Finding 2 to state that it has reasonable assurance that disposal capacity in a deep geologic repository will become available "when necessary." Although the Commission has declined to set a target date for the availability of a repository, it does believe that it would be beneficial to analyze the time required to successfully site, license, construct, and open a repository

The technical problems should be the same as those examined in the earlier Waste Confidence reviews, namely, how long it would take DOE to locate a suitable site and how long it would take to develop a waste package and engineered barriers for that site. For the reasons explained in the evaluation of Finding 1, the Commission continues to have reasonable assurance that disposal in a geologic repository is technically feasible. That is the approach being taken in all the countries identified previously that have set target dates for the availability of a repository. It is also the approach of the 14 other countries that have HLW disposal programs but have not set target dates.27 These target dates can be used to provide a reasonable idea of how much time is required to site, license, construct, and open a repository. In addition, when Congress amended the Nuclear Waste Policy Act in 1987 to focus exclusively

²⁷ These countries are: Brazil, Canada, Hungary, Lithuania, Romania, South Korea, Slovak Republic, Spain (direct disposal of SNF); Bulgaria, India, Italy, Russia, United Kingdom, Ukraine (disposal of reprocessed SNF and HLW). on the YM site, it did so for budgetary reasons and not because the other sites DOE was considering were technically unacceptable. The ongoing research in the U.S. and other countries strongly suggests that many acceptable sites exist and can be identified.

The amount of time DOE might need to develop an alternative repository site would depend upon any enabling legislation, budgetary constraints, and the degree of similarity between a candidate site and other wellcharacterized sites with similar HLW disposal concepts. DOE began characterization of the YM site in 1982, made its suitability determination in 2002, and submitted a license application in 2008. But the history of potential repository development at YM may be a poor indicator of the amount of time needed to develop a new repository. Many problems extraneous to site characterization activities adversely affected DOE's repository program, such as changes in enabling legislation, public confidence issues, funding, and a significant delay in issuing environmental standards. In terms of the technical work alone, much would depend on whether Congress establishes a program involving characterization of many sites preliminary to the recommendation of a single site (similar to the 1982 NWPA) or a program focused on a single site (similar to the amended NWPA). The former would likely take longer, but might have a better chance of success if problems develop with a single site. The time needed to characterize the sites would also depend on whether the one or more sites chosen for characterization are similar to sites in this or other countries, which would allow DOE to use already existing knowledge and research to increase the efficiency of its repository program.

Alternatively, the sites could present novel challenges, which would require more time than sites that are similar to those that have already been studied. There are also many "lessons learned" from the YM repository program that could help to shorten the length of a new program. For example, performance assessment techniques have significantly improved over the past 20 years (e.g., the Goldsim software package of DOE's Total System Performance Assessment that replaced the original FORTRAN based software); performance assessment models are now easier to develop and more reliable than those that were available 20 years ago. Similarly, operational and manufacturing techniques developed during the YM program (e.g., manufacturing of waste packages,

excavation of drifts, waste handling), would be applicable to another program. Regulatory issues considered during the YM program (*e.g.*, burn-up credit for nuclear fuel and seismic performance analysis) should provide useful information for setting new standards or revising current standards.²⁸ Finally, the experience gained by completing the NRC licensing process, if that were to occur, should help the DOE and the NRC improve the licensing process for any future repositories.

Whether waste package and engineered barrier information developed during the YM repository program would be transferable to a new program depends on the degree of similarity between an alternative site and YM. The fundamental physical characteristics of Yucca Mountain are significantly different from other potential repository sites that were considered in the U.S. repository program before 1987. DOE could select an alternative candidate site that is similar to YM in important physical characteristics (such as oxidizing conditions, drifts above the water table with low amounts of water infiltration, water chemistry buffered by volcanic tuff rocks). In this instance, much of the existing knowledge for engineered barrier performance at YM might be transferable to a different site. Nevertheless, much of DOE's current research on engineered barriers for YM could be inapplicable if an alternative site has significantly different characteristics from the YM site, such as an emplacement horizon in reducing conditions below the water table. In this instance, research from other DOE, industry, or international programs might provide important information on engineered barriers, provided the new site is analogous to sites and engineered barriers being considered elsewhere.

But broader institutional issues have emerged since 1990 that bear on the time it takes to implement geologic disposal. International developments have made it clear that technical experience and confidence in geologic disposal, on their own, are not sufficient to bring about the broad social and political acceptance needed to construct a repository. It is these issues that have caused the Commission to remove a target date as part of the revised Finding 2. As stated above, the Commission continues to have confidence that a repository can be constructed within

²⁶ The three countries with target dates that plan direct disposal of SNF are: Czech Republic (2050), Finland (2020), and Sweden (2023). The seven countries with target dates for disposal of reprocessed SNF and HLW are: Belgium (2035). China (2050), France (2025), Germany (2025), Japan (2030s), Netherlands (2013), Switzerland (2042).

²⁸ Both NRC's 10 CFR part 63 and EPA's 40 CFR part 197 are applicable only for a repository at YM. NRC and EPA have in place standards for a repository at a different site, but these standards would likely be revised in a new repository program.

25–35 years of a Federal decision to do so and that a repository will become available when one is necessary.

As part of its evaluation of this finding, the Commission evaluated the programs in a number of other countries that support its conclusion that a repository will be available when necessary and that siting, licensing, construction, and operation can occur within 25–35 years of a Federal decision to do so.

In 1997, the United Kingdom rejected an application for the construction of a rock characterization facility at Sellafield, leaving the country without a path forward for long-term management or disposal of either intermediate-level waste or SNF. In 1998, an inquiry by the UK House of Lords endorsed geologic disposal, but specified that public acceptance was required. As a result, the UK Government embraced a repository plan based on the principles of voluntarism and partnership between communities and implementers. This led to the initiation of a national public consultation, and major structural reorganization within the UK program. The UK Nuclear Decommissioning Authority envisions availability of a geologic disposal facility for ILW in 2040 and a geologic facility for SNF and HLW in 2075. In 2007, however, the Scottish Government officially rejected any further consultation with the UK Government on deep geologic disposal of HLW and SNF. This action by the Scottish Government effectively ends more than 7 years of consultations with stakeholders near Scottish nuclear installations and represents yet another major setback for the UK program.

In Germany, a large salt dome at Gorleben had been under study since 1977 as a potential SNF repository. After decades of intense discussions and protests, the utilities and the government reached an agreement in 2000 to suspend exploration of Gorleben for at least three, and at most ten, years. In 2003, the Federal Ministry for the Environment set up an interdisciplinary expert group to identify, with public participation, criteria for selecting new candidate sites. In October, 2010 Germany resumed exploration of Gorleben as a potential SNF repository. A decision on whether the site is suitable for a repository could be reached in 2015.

Initial efforts in France, during the 1980s. also failed to identify potential repository sites, using solely technical criteria. Failure of these attempts led to the passage of nuclear waste legislation that prescribed a period of 15 years of research. Reports on generic disposal options in clay and granite media were prepared and reviewed by the safety authorities in 2005. In 2006, conclusions from the public debate on disposal options, held in 2005, were published. Later that year, the French Parliament passed new legislation designating a single site for deep geologic disposal of intermediate and HLW. This facility, to be located in the Bure region of northeastern France, is scheduled to open in 2025, some 34 years after passage of the original Nuclear Waste Law of 1991.

In Switzerland, after detailed site investigations in several locations, the Swiss National Cooperative for Radioactive Waste Disposal proposed, in 1993, a deep geologic repository for low- and intermediate-level waste at Wellenberg. Despite a 1998 finding by Swiss authorities that technical feasibility of the disposal concept was successfully demonstrated, a public cantonal referendum rejected the proposed repository in 2002. Even after more than 25 years of high quality field and laboratory research, Swiss authorities do not expect that a deep geologic repository will be available before 2040.

In 1998, an independent panel reported to the Governments of Canada and Ontario on its review of Atomic Energy of Canada Ltd.'s concept of geologic disposal. Canadian Nuclear Fuel Waste Disposal Concept Environmental Assessment Panel, Report of the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel, February 1998. The panel found that from a technical perspective, safety of the concept had been adequately demonstrated, but from a social perspective, it had not. The panel concluded that broad public support is necessary in Canada to ensure the acceptability of a concept for managing nuclear fuel wastes. The panel also found that technical safety is a key part, but only one part, of acceptability. To be considered acceptable in Canada, the panel found that a concept for managing nuclear fuel wastes must: (1) Have broad public support; (2) be safe from both a technical and social perspective; (3) have been developed within a sound ethical and social assessment framework; (4) have the support of Aboriginal people; (5) be selected after comparison with the risks, costs, and benefits of other options; and (6) be advanced by a stable and trustworthy proponent and overseen by a trustworthy regulator. Resulting legislation mandated a nationwide consultation process and widespread organizational reform. Eight years later, in 2005, a newly-created Nuclear Waste

Management Organization (NWMO), recommended an Adaptive Phased Management approach for long-term care of Canada's SNF, based on the outcomes of the public consultation. This approach includes both a technical method and a new management system. According to NWMO, it "provides for centralized containment and isolation of used nuclear fuel deep underground in suitable rock formations, with continuous monitoring and opportunity for retrievability; and it allows sequential and collaborative decisionmaking, providing the flexibility to adapt to experience and societal and technological change." NWMO, Choosing a Way Forward: The Future Management of Canada's Used Nuclear Fuel, Final Study Report, November 2005.

In 2007, the Government of Canada announced its selection of the Adaptive Phased Management approach and directed NWMO to take at least two years to develop a "collaborative community-driven site-selection process." NWMO will use this process to open consultations with citizens, communities, Aboriginals, and other interested parties to find a suitable site in a willing host community. For financial planning and cost estimation purposes only, NWMO assumes the availability of a deep geological repository in 2035, 27 years after initiating development of new site selection criteria, 30 years after embarking on a national public consultation, and 37 years after rejection of the original geologic disposal concept. NWMO, Annual Report 2007: Moving Forward Together, March 2008. In 2009, NWMO proposed a site selection process for public comment, and after considering the comments and input received is now welcoming expressions of interest from potential host communities. NWMO, Annual Report 2009: Moving Forward Together, March 2010.

Repository development programs in Finland and Sweden are further along than in other countries, but have nonetheless taken the time to build support from potential host communities. In Finland, preliminary site investigations started in 1986, and detailed characterizations of four locations were performed between 1993 and 2000. In 2001, the Finnish Parliament ratified the Government's decision to proceed with a repository project at a chosen site only after the 1999 approval by the municipal council of the host community. Finland expects this facility to begin receipt of SNF for disposal in 2020, 34 years after the start of preliminary site investigations.

Between 1993 and 2000, Sweden conducted feasibility studies in eight municipalities. Based on technical considerations, one site was found unsuitable for further study, and two sites, based on municipal referenda, decided against allowing further investigations. Three of the remaining five sites were selected for detailed site investigations. Municipalities adjacent to two of these sites agreed to be potential hosts and one refused.

On June 3, 2009, the Swedish Nuclear Fuel and Waste Management Company, SKB, selected a site near Oesthammer as the site for the final repository for disposal of Swedish SNF. Since 2007, detailed site investigations were conducted at both Oesthammer and Oskarshamn, both of which already host nuclear power stations. All Swedish spent fuel will be disposed of in the Oesthammer repository. It will be located at a depth of 500 meters, in crystalline bedrock that is relatively dry with few fractures. SKB plans to submit a license application in March 2011, along with an Environmental Impact Assessment and safety analysis. A government decision is expected in 2015. If Swedish authorities authorize construction, the repository could be available for disposal around 2025, some 30 years after feasibility studies began.

Before DOE can start the development of a new site, Congress may need to provide additional direction, beyond the current NWPA, for the long-term management and disposal of SNF and HLW. Whatever approach Congress mandates, international experience since 1990 would appear to suggest that greater attention may need to be paid to developing societal and political acceptance in concert with essential technical, safety, and security assurances. While there is no technical basis for making precise estimates of the minimum time needed to accomplish these objectives, examination of the international examples cited previously would support a range of between 25 and 35 years. The Commission believes that societal and political acceptance must occur before a successful repository program can be completed, and that this is unlikely to occur until a Federal decision is made, whether for technical, environmental, political legal, or societal reasons, that will allow the licensing and construction of a repository to proceed.

Another important institutional issue is whether funding for a new repository program is likely to be available. The provisions of NWPA for funding the repository have proved to be adequate for the timely development of a

repository in the sense that there have always been more than sufficient funds available to meet the level of funding Congress appropriates for the repository program. Section 302(e)(2) of NWPA provides that the Secretary of Energy may make expenditures from the Nuclear Waste Fund (NWF), subject to appropriations by the Congress. In her July 27, 2010 statement to the Committee on the Budget, Kristina M. Johnson, Undersecretary of Energy, testified that the NWF has a balance of approximately \$25 billion. Thus, the NWF has the capacity to ensure timely development of a repository consistent with Congressional funding direction. Moreover, DOE has prepared updated contracts and a number of utility companies have signed contracts with the Department that provide for payment into the NWF (See, e.g., ADAMS Accession Numbers ML100280755 and ML083540149). Therefore, there will be a source of funding for disposal of the fuel to be generated by these reactors

Arriving at an estimate of the time necessary to successfully construct a repository involves considering the technical and institutional factors discussed previously. It appears that the technical work needed to make a repository available could be done in less time than it took DOE to submit a license application for the YM site (26 years measured from the beginning of site characterization). But as discussed previously, the time needed to develop societal and political acceptance of a repository might range between 25 and 35 years. Therefore, once a decision is made that it is necessary to construct a repository, it is likely that a repository could be sited, licensed, constructed, and in operation within 25-35 years.

Finding 2, as adopted in 1990, also predicts that sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of HLW and SNF originating in such reactor and generated up to that time. As explained previously, in 1990 DOE projected that 87,000 MTHM would be generated by 2036. Given the statutory limit of 70,000 MTHM for the first repository, either statutory relief from that limit or a second repository would be needed. The Commission's continued confidence that sufficient repository capacity would be available within 30 years of license expiration of all reactors rested on an assumption that two repositories would be available in approximately 2025 and 2035, each with acceptance rates of 3400 MTHM/year within several years

after commencement of operations (See 55 FR 38502; September 18, 1990). DOE acknowledged that a second repository, or an expansion of the statutory disposal limit for a single repository, would be necessary to accommodate all the spent fuel from the currently operating and future reactors. The Report to the President and the Congress by the Secretary of Energy on the need for a second repository, 1, (2008), available at http://brc.gov/library/docs/Second_Repository_Rpt_120908.pdf (last visited September 17, 2010). The revision to Finding 2 in this

update to the Waste Confidence Decision reflects the Commission's concern that it may no longer be possible to have reasonable assurance that sufficient repository space will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license).²⁹ According to the NRC's "High-Value Datasets", there are 14 reactor operating licenses that will expire between 2012 and 2020 and an additional 36 licenses that will expire between 2021 and 2030. NRC High-Value Datasets, http://www.nrc.gov/ public-involve/open.html#datasets (last visited October 8, 2010). Many of these licenses could be renewed, which would extend their operating lifetimes, but this cannot be assumed.³⁰ For licenses that are not renewed, some spent fuel will need to be stored for more than 30 years beyond the expiration of the license if a repository is not available until after 2025. There are 23 reactors that were formerly licensed to operate by the NRC or the AEC and have been permanently shut down. Id. Thirty years beyond their licensed life of operation will come as early as 2029 for Dresden 1 and as late as 2056 for Millstone 1; but for many of these plants, 30 years beyond the licensed life for operation will occur in the 2030s and 2040s. Given the time necessary to successfully complete a repository program-25-35 years-and the uncertainty surrounding the start date of this program, it is likely that spent fuel will have to be stored beyond

²⁹ Based on the inventory of SNF in nuclear power plant pools and interim storage facilities, the amount of spent fuel is anticipated to exceed the 70,000 MTHM disposal limit in the NWPA by 2010. See The Report to the President and the Congress by the Secretary of Energy on the Need for a Second Repository. DOE/RW-0595. December 2008. Therefore, a new repository program would need to remove this limit or provide for more than one repository.

³⁰ Seven of the licenses that will expire between 2021 and 2030 are renewed licenses (Dresden 2, Ginna, Nine Mile Point 1, Robinson 2, Point Beach 1, Monticello. and Oyster Creek). Fify-two other reactor operating licenses have been renewed and the renewed licenses will expire after 2030.
30 years after the expiration of the license at a number of these plants.

In 1990, the Commission emphasized that this 30 year period did not establish a safety limit on the length of SNF and HLW storage. It was only an estimate of how long SNF might need to be stored given the Commission's confidence that repository disposal would be available by 2025. In fact, the Commission said it was not concerned about the fact that it was already clear in 1990 that a few reactors would need to store spent fuel onsite beyond 30 years after the effective expiration date of their licenses (i.e., the date the license prematurely terminated) due to its confidence in the safety of spent fuel storage (55 FR 38503; September 18, 1990). For the reasons presented in the evaluation of Finding 4, the Commission is now able to conclude that there is no public health and safety or environmental concern if the availability of a disposal facility results in the need to store fuel at some reactors for 60 years after expiration of the license or even longer.

If the Commission had not already issued a proposed rule and update to the Waste Confidence Decision, then the Administration's proposed budget and plan to terminate the YM project and DOE's filing of a motion to withdraw would likely have forced it to do so. The Commission's proposed update to the Waste Confidence Decision, although it could not consider these yet-to-occur developments, did assume that YM would not be built and that DOE would have to search for another repository location, which now appears quite possible.

The Commission has, in sum, reconsidered the use of a target date and, as discussed above, has elected to remove the target date from Finding 2 and adopt a finding that deep geologic disposal will be available "when necessary." This change adopts the alternative approach presented in the proposed update to the Waste **Confidence Decision to revise Finding 2** without reference to a time frame for the availability of a repository (73 FR 59561; October 9, 2008). As discussed in the proposed update, this revision to Finding 2 is based both on the Commission's understanding of the technical issues involved and on predictions of the time needed to bring about the necessary societal and political acceptance for a repository site. Id. Because the Commission cannot predict when this societal and political acceptance will occur, it is unable to express reasonable assurance in a specific target date for the availability of a repository.

Based on the above information and consideration of the public comments, the Commission revises Finding 2 to eliminate its expectation that a repository will be available within the first quarter of the twenty-first century and to state that a repository may reasonably be expected to be available when necessary.

C. Finding 2

The Commission finds reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.

III. Finding 3: The Commission Finds Reasonable Assurance That HLW and Spent Fuel Will Be Managed in a Safe Manner Until Sufficient Repository Capacity Is Available To Assure the Safe Disposal of all HLW and Spent Fuel

A. Bases for Finding 3

The Commission reached this finding in 1984 and reaffirmed it in 1990. This finding focuses on whether reactor licensees can be expected to safely store their spent fuel in the period between the cessation of reactor operations and the availability of repository capacity for their fuel. The Commission found that the spent fuel would be managed safely because, under either a possession-only 10 CFR part 50 license or a 10 CFR part 72 license, the utility would remain under the NRC's regulatory control and inspections and oversight of storage facilities would continue (49 FR 34679-34680; August 31, 1984, 55 FR 38508; September 18, 1990). In 1990, when extended storage at the reactor site seemed more probable, the Commission noted that 10 CFR part 72 allowed for license renewals and that the NRC was considering issuance of a general 10 CFR part 72 license under which spent fuel could be stored in NRC-certified casks (55 FR 38508; September 18, 1990).³¹ The Commission reasoned that these regulations would provide additional NRC supervision of spent fuel management. The Commission was not concerned about then-looming contractual disputes between the DOE and the utilities over the DOE's inability to remove spent fuel from reactor sites in 1998 because NRC licensees cannot abandon, and remain responsible for,

spent fuel in their possession (55 FR 38508; September 18, 1990).

The Commission also considered the unusual case where a utility was unable to manage its spent fuel. If a utility were to become insolvent, the Commission believes that the cognizant state public utility commission would require an orderly transfer to another entity, which could be accomplished if the new entity satisfied the NRC's requirements (49 FR 34680; August 31, 1984). Further, the Commission expressed the view that, while the possibility of a need for Federal action to take over stored spent fuel from a defunct utility or from a utility that lacked technical competence to assure safe storage was remote, the authority for this type of action exists in sections 186c and 188 of the Atomic Energy Act. Id.

B. Evaluation of Finding 3

As explained above, the focus of Finding 3 is on whether reactor licensees can be expected to safely store their spent fuel in the period between the cessation of reactor operations and the availability of repository capacity for their fuel. In this regard, the NRC is successfully regulating four decommissioned reactor sites that continue to hold 10 CFR part 50 licenses and consist only of an ISFSI under the 10 CFR part 72 general license provisions.³² In addition, the NRC staff has discussed plans to build and operate ISFSIs under the 10 CFR part 72 general license provisions with the licensees at the La Crosse and Zion plants, which are currently undergoing decommissioning. The La Crosse plant plans to load its ISFSI in July 2011 and the Zion plant is discussing its plans with the NRC staff. The NRC is also successfully regulating ISFSIs at two fully decommissioned reactor sites (Trojan and Ft. St. Vrain) under 10 CFR Part 72 specific licenses.33

The NRC monitors the performance of ISFSIs at decommissioned reactor sites by conducting periodic inspections that are identical to ISFSI inspections at operating reactor sites. When conducting inspections at these ISFSIs, NRC inspectors follow the guidance in NRC Inspection Manual Chapter 2690, "Inspection Program for Dry Storage of Spent Reactor Fuel at Independent Spent Fuel Storage Installations and for 10 CFR part 71 Transportation Packages." At all six decommissioned reactor sites mentioned previously, all

³¹ 10 CFR Part 72 was, in fact, amended to provide for storage of spent fuel in NRC-certified casks under a general license (55 FR 29191; July 18, 1990).

³² These reactor sites include Maine Yankee, Yankee Rowe, Connecticut Yankee (also known as Haddam Neck), and Big Rock Point.

³³ There are several additional sites with specific Part 72 ISFSI licenses that are in the process of decommissioning (e.g., Humbolt Bay, Rancho Seco).

spent fuel on site has been successfully loaded into the ISFSI; only those inspection procedures applicable to the existing storage configurations are conducted. Also, any generally licensed ISFSI where decommissioning and final survey activities related to reactor operations have been completed is treated as an "away from reactor" (AFR) ISFSI for inspection purposes. Therefore, those programs that rely upon a 10 CFR part 50 license for the operation of a generally licensed ISFSI are also subject to inspection.

The NRC has not encountered any management problems associated with the ISFSIs at these six decommissioned reactor sites. Further, the NRC's inspection findings have not found any unique management problems at any currently operating ISFSI. Generally, the types of issues identified through NRC inspections of ISFSIs are similar to issues identified for 10 CFR part 50 licensees. Most issues are identified early in the operational phase of the dry cask storage process, during loading preparations and actual spent fuel loading activities. Once a loaded storage cask is placed on the storage pad, relatively few inspection issues are identified due to the passive nature of these facilities.

Further, the NRC's regulations require that every nuclear power reactor operating license issued under 10 CFR part 50 and every COL issued under 10 CFR part 52 must contain a condition requiring each licensee to submit written notification to the Commission of the licensee's plan for managing irradiated fuel between cessation of reactor operation and the time the DOE takes title to and possession of the irradiated fuel for ultimate disposal in a repository. The submittal, required by 10 CFR 50.54(bb), must include information on how the licensee intends to provide funding for the management of its irradiated fuel. Specifically, 10 CFR 50.54(bb) requires the licensee to:

Within 2 years following permanent cessation of operation of the reactor or 5 years before expiration of the reactor operating license, whichever occurs first, 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 * * * Final Commission review will be undertaken as part of any proceeding for continued licensing under part 50 or 72 of this chapter. The licensee must demonstrate to NRC that the elected actions will be consistent with

NRC requirements for licensed possession of irradiated nuclear fuel and that the actions will be implemented on a timely basis. Where implementation of such actions requires NRC authorizations, the licensee shall verify in the notification that submittals for such actions have been or will be made to NRC and shall identify them. A copy of the notification shall be retained by the licensee as a record until expiration of the reactor operating license. The licensee shall notify the NRC of any significant changes in the proposed waste management program as described in the initial notification.

To date, the NRC has also renewed four specific 10 CFR part 72 ISFSI licenses. These renewals include the part 72 specific licenses for the General Electric Morris Operation (the only wet, or pool-type ISFSI), as well as the Surry, H.B. Robinson, and Oconee ISFSIs. Additionally, the NRC received a renewal application for the Fort St. Vrain ISFSI on November 23, 2009. Specific licenses for six additional ISFSIs will expire between 2012 and 2020. It is expected that license renewals will be requested by these licensees, unless a permanent repository or some other interim storage option is made available.

Although the NRC staff's experience with renewal of ISFSI licenses is limited to these four cases, it is noteworthy that the Surry, H.B. Robinson and Oconee ISFSI licenses were renewed for a period of 40 years, instead of the 20-year renewal period currently provided for under 10 CFR part 72. The Commission authorized the staff to grant exemptions to allow the 40-year renewal period after the staff reviewed the applicants' evaluations of aging effects on the structures, systems, and components important to safety. The Commission determined that the evaluations, supplemented by the licensees' aging management programs, provide reasonable assurance of continued safe storage of spent fuel in these ISFSIs. See SECY-04-0175, "Options for Addressing the Surry Independent Spent Fuel Storage Installation License-Renewal Period Exemption Request," September 28, 2004 (ADAMS Accession Number ML041830697)

With regard to generally licensed ISFSIs, the NRC staff submitted a draft final rule to the Commission on May 3, 2010, to clarify the processes for the renewal of ISFSIs operated under the general license provisions of 10 CFR part 72 and for renewal of the CoC for dry cask storage systems. See SECY 10– 0056, "Final Rule: 10 CFR Part 72 License and Certificate of Compliance Terms (RIN 3150–A109)" (ADAMS Accession Number ML100710052). There are currently nine sites operating generally licensed ISFSIs that will reach the prescribed 20-year limit on storage between 2013 and 2020.

The Commission concludes that the events that have occurred since the last formal review of the Waste Confidence Decision in 1990 support a continued finding of reasonable assurance that HLW and spent fuel will be managed in a safe manner until sufficient repository capacity is available. Specifically, the NRC has continued its regulatory control and oversight of spent fuel storage at both operating and decommissioned reactor sites, through both specific and general 10 CFR part 72 licenses. With regard to general 10 CFR part 72 licenses, the NRC has successfully implemented a general licensing and cask-certification program, as envisioned by the Commission in 1990. There are currently 16 certified spent fuel storage cask designs. 10 CFR 72.214 (2010). In addition, the Commission's reliance on the license renewal process in its 1990 review has proven well-placed, with three specific 10 CFR part 72 ISFSI licenses having been successfully renewed for an extended 40-year renewal period, and a fourth having been renewed for a period of 20 years. NRC licensees have continued to meet their obligation to safely store spent fuel in accordance with the requirements of 10 CFR parts 50 and 72.34

Based on the above discussion, including its response to the public comments, the Commission reaffirms Finding 3.

³⁴ Section 302 of NWPA authorizes the Secretary of Energy to enter into contracts with utilities generating HLW and SNF under which the utilities are to pay statutorily imposed fees into the NWF in return for which the Secretary, "beginning not later than January 31, 1998, will dispose of the [HLW] or [SNF] involved * * *." 42 U.S.C. 10222(a)(5)(B). The NWPA also prohibits NRC from issuing or renewing a reactor operating license unless the prospective licensee has entered into a contract with DOE or is engaged in good-faith negotiations for a contract. 42 U.S.C. 10222(b)(1). When it became evident that a repository would not be available in 1998, DOE took the position that it did not have an unconditional obligation to accept the HLW or SNF in the absence of a repository. See Final Interpretation of Nuclear Waste Acceptance Issues (60 FR 21793; May 3, 1995). The U.S. Court of Appeals for the District of Columbia Circuit, however, held that DOE's statutory and contractual obligation to accept the waste no later than january 31, 1998, was unconditional. Indiana Michigan Power Co. v. DOE, 88 F.3d 1272 (DC Cir. 1996). Subsequently, the utilities have continued to safely manage the storage of SNF in reactor storage pools and in ISFSIs and have received damage awards as determined in lawsuits brought before the U.S. Court of Federal Claims. See, e.g., System Fuels Inc. v. U.S., 78 Fed. Cl. 769 (October 11, 2007).

IV. Finding 4 (1990): The Commission Finds 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 or Renewed License) of That Reactor at Its Spent Fuel Storage Basin, or at Either Onsite or Offsite Independent Spent Fuel Storage Installations

A. Bases for Finding 4

This finding focuses on the safety and environmental effects of long-term storage of spent fuel. In 1984, the Commission found that spent fuel can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of reactor operating licenses (49 FR 34660; August 31, 1984). In 1990, the Commission determined that if the reactor operating license were renewed for 30 years,35 storage would be safe and without environmental significance for at least 30 years beyond the term of licensed operation for a total of at least 100 years (55 FR 38513; September 18, 1990). The Commission looked at four broad issues in making this finding: (1) The longterm integrity of spent fuel under water pool storage conditions, (2) the structure and component safety for extended facility operation for storage of spent fuel in water pools, (3) the safety of dry storage, and (4) the potential risks of accidents and acts of sabotage at spent fuel storage facilities (49 FR 34681; August 31, 1984; 55 FR 38509; September 18, 1990).

With respect to the safety of water pool storage, the Commission found in 1984 that research and experience in the United States, Canada, and other countries confirmed that long-term storage could be safely undertaken (49 FR 34681-34682; August 31, 1984). In 1990, the Commission determined that experience with water storage of spent fuel continued to confirm that pool storage is a benign environment for spent fuel that does not lead to significant degradation of spent fuel integrity and that the water pools in which the assemblies are stored will remain safe for extended periods. Further, degradation mechanisms are well understood and allow time for appropriate remedial action (55 FR 38509-38511; September 18, 1990). In sum, based on both experience and scientific studies, the Commission

found wet storage to be a fullydeveloped technology with no associated major technical problems.

In 1984, the Commission based its confidence in the safety of dry storage on an understanding of the material degradation processes, derived largely from technical studies, together with the recognition that dry storage systems are simple and easy to maintain (49 FR 34683-34684; August 31, 1984). By 1990, the NRC and ISFSI licensees had considerable experience with dry storage. NRC staff safety reviews of topical reports on storage system designs, the licensing and inspection of dry storage at two reactor sites under 10 CFR part 72, and the NRC's promulgation of an amendment to 10 CFR part 72 that incorporated a monitored retrievable storage installation (MRS) (a dry storage facility) into the regulations confirmed the 1984 conclusions on the safety of dry storage. In fact, under the environmental assessment for the amendment (NUREG-1092), the Commission found confidence in the safety and environmental insignificance of dry storage at an MRS for 70 years following a period of 70 years of storage in spent fuel storage pools (55 FR 38509-38513; September 18, 1990).

The Commission also found that the risks of major accidents at spent fuel storage pools resulting in offsite consequences were remote because of the secure and stable character of the spent fuel in the storage pool environment and the absence of reactive phenomena-"driving forces"-that might result in dispersal of radioactive material. The Commission noted that storage pools and ISFSIs are designed to safely withstand accidents caused by either natural or man-made phenomena, and that, due to the absence of high temperature and pressure conditions, human error does not have the capability to create a major radiological hazard to the public (49 FR 34684-34685; August 31, 1984). By 1990, the NRC staff had spent several years studying catastrophic loss of reactor spent fuel pool water, which could cause a fuel fire in a dry pool and concluded that because of the large inherent safety margins in the design and construction of a spent fuel pool no action was needed to further reduce the risk (55 FR 38511: September 18, 1990).

In 1984, the Commission recognized that the intentional sabotage of a storage pool was theoretically possible, but found that the consequences would be limited because, with the exception of some gaseous fission products, the radioactive content of spent fuel is in the form of solid ceramic material encapsulated in high-integrity metal cladding and stored underwater in a reinforced concrete structure (49 FR 34685; August 31, 1984). Under these conditions, the Commission noted that the radioactive content of spent fuel is relatively resistant to dispersal to the environment. Similarly, because of the weight and size of the sealed protective enclosures, dry storage of spent fuel in dry wells, vaults, silos, and metal casks is also relatively resistant to sabotage and natural disasters. Id. Although the 1990 decision examined several studies of accident risk, no considerations affected the Commission's confidence that the possibility of a major accident or sabotage with offsite radiological impacts at a spent fuel storage facility is extremely remote (55 FR 38512; September 18, 1990).

Finally, the Commission noted that the generation and onsite storage of more spent fuel as a result of reactor license renewals would not affect the Commission's findings on environmental impacts. Finding 4 is not based on a determination of a specific number of reactors and amount of spent fuel; Finding 4 evaluates the safety of spent fuel storage and lack of environmental impacts overall. Further, individual license renewal actions are subject to separate safety and environmental reviews (55 FR 38512; September 18, 1990).

B. Evaluation of Finding 4

As discussed above, Finding 4 focuses on the safety and environmental significance of long-term storage of spent fuel. Specifically, the Commission examined four broad issues in making this finding: (1) The long-term integrity of spent fuel under water pool storage conditions; (2) the structure and component safety for extended facility operation for storage of spent fuel in water pools; (3) the safety of dry storage; and (4) the potential risks of accidents and acts of sabotage at spent fuel storage facilities.

1. Storage in Spent Fuel Pools

Since 1990, the NRC has continued its periodic examination of spent fuel pool storage to ensure that adequate safety is maintained and that there are no adverse environmental effects from the storage of spent fuel in pools. The Office of Nuclear Reactor Regulation (NRR) and the former Office for Analysis and Evaluation of Operational Data independently evaluated the safety of spent fuel pool storage, and the results of these evaluations were documented in a memorandum to the Commission dated July 26, 1996, "Resolution of Spent Fuel Storage Pool Action Plan

³⁵ Subsequently, the Commission limited the renewal period for power reactor licenses to 20 years beyond expiration of the operating license or combined license (10 CFR 54.31; 56 FR 64943, 64964; December 13, 1991).

Issues," (ADAMS Accession Number ML003706364) and a separate memorandum to the Commission dated October 3, 1996, "Assessment of Spent Fuel Pool Cooling," (ADAMS Accession Number ML003706381) (later published as NUREG-1275, Vol. 12, "Operating Experience Feedback Report: Assessment of Spent Fuel Cooling," February 1997). As a result of these studies, the NRC staff and industry identified a number of follow-up activities that are described by the NRR staff in a memo to the Commission dated September 30, 1997, "Followup Activities on the Spent Fuel Pool Action Plan," (ADAMS Accession Number ML003706412). These evaluations became part of the investigation of Generic Safety Issue 173, "Spent Fuel Pool Storage Safety," which found that the relative risk posed by loss of spent fuel cooling is low when compared with the risk of events not involving the SFP.

The safety and environmental effects of spent fuel pool storage were also addressed in conjunction with regulatory assessments of permanently shutdown nuclear plants and decommissioning nuclear power plants. NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants," (August 1997) addressed the appropriateness of regulations (e.g., requirements for emergency planning and insurance) associated with spent fuel pool storage. The study identified a number of regulations that apply only to an operating reactor and not to spent fuel storage. These regulations are not needed to ensure the safe maintenance of a permanently shutdown plant. The study also provided conservative bounding estimates of fuel coolability and offsite consequences for the most severe accidents, which involve draining of the spent fuel pool.

More recently, the NRC issued NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," (February 2001), which provides a newer and more robust analysis of the safety and environmental effects of spent fuel pool storage. This study provided the results of the NRC staff's latest evaluation of the accident risk in a spent fuel pool at decommissioning plants. The report discussed fuel coolability for various types of accidents and included potential offsite consequences based on assumed radiation releases. The study demonstrated that by using conservative and bounding assumptions regarding the postulated accidents, the predicted risk estimates were below those

associated with reactor accidents and well below the Commission's safety goal.

Following the terrorist attacks of September 11, 2001, the NRC undertook an extensive reexamination of spent fuel pool safety and security issues. This reexamination included a significantly improved methodology, based on detailed state-of-the-art analytical modeling, for assessing the response of spent fuel assemblies during security events including those that might result in draining of the spent fuel pool. This more detailed and realistic analytical modeling was also supported by extensive testing of zirconium oxidation kinetics in an air environment and full scale coolability and "zirc fire" testing of spent fuel assemblies. This effort both confirmed the conservatism of past analyses and provided more realistic analyses of fuel coolability and potential responses during accident or security event conditions. Importantly, the new more detailed and realistic modeling led to the development of improvements in spent fuel safety, which were required to be implemented at spent fuel pools by the Commission for all operating reactor sites. (See 73 FR 46204; August 8, 2008).

In 2003, the U.S. Congress asked the NAS to provide independent scientific and technical advice on the safety and security of commercial SNF storage, including the potential safety and security risks of SNF presently stored in cooling pools and dry casks at commercial nuclear reactor sites. In July 2004, the NAS issued a classified report—a publicly available unclassified summary was made available in 2006 (as noted above, the unclassified summary of the NAS report can be purchased or downloaded for free by accessing the NAS Web site at: http:// www.nap.edu/

catalog.php?record_id=11263). As part of the information gathering for the study, the NRC and Sandia National Laboratories briefed the NAS authoring committee on the ongoing work to reassess spent fuel pool safety and security issues. The NAS report contains findings and recommendations for reducing the risk of events involving spent fuel pools as well as dry casks. NRC Chairman Nils J. Diaz provided the Commission's response to the NAS in a letter to Senator Pete V. Domenici, dated March 14, 2005 (ADAMS Accession Number ML050280428) (Diaz Letter). In essence, the NRC concluded, as a result of its own study and subsequent regulatory actions, that it had adopted the important recommendations of the report relevant to spent fuel pools. As a result of the improvements in spent fuel

pool safety and security, and the inherent safety and robustness of spent fuel pool designs, the NRC concluded that the risk associated with security events at spent fuel pools is acceptably low. Because these safety improvements in spent fuel pool storage are applicable to non-security events (randomly initiated accidents), accident risk was also further reduced.

While the Commission continues to have reasonable assurance that storage in spent fuel pools provides adequate protection of public health and safety and the common defense and security, and will not result in significant impacts on the environment, the NRC acknowledges several incidents of groundwater contamination originating from leaking reactor spent fuel pools and associated structures. In 1990, the Commission specifically acknowledged two incidents where radioactive water leaked from spent fuel pools, one of which resulted in contamination outside of the owner controlled area (See 55 FR 38511; September 18, 1990). The Commission addressed these events stating, "[t]he occurrence of operational events like these have been addressed by the NRC staff at the plants listed. The staff has taken inspection and enforcement actions to reduce the potential for such operational occurrences in the future." Id.

On March 10, 2006, the NRC Executive Director for Operations established the Liquid Radioactive Release Lessons Learned Task Force in response to incidents at several plants involving unplanned, unmonitored releases of radioactive liquids into the environment. Liquid Radioactive Release Lessons Learned Task Force Final Report, September 1, 2006 (Task Force Report) (ADAMS Accession Number ML062650312). One of the incidents that prompted formation of the Task Force involved leaks from the Unit 1 and 2 spent fuel pools at Indian Point.³⁶ Task Force Report, at 1, 5-6, 11.

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³⁶ In May 2008, the NRC staff completed an inspection at Indian Point Units 1 and 2. NRC Inspection Report Nos. 05000003/2007010 and 05000247/2007010, May 13, 2008 (ADAMS Accession Number ML081340425). The purpose of the inspection was to assess Entergy's site groundwater characterization conclusions and the radiological significance of Entergy's discovery of spent fuel pool leaks at Units 1 and 2. The NRC staff concluded that Entergy's response to the spent fuel pool leaks was reasonable and technically sound. The NRC staff stated that "[t]he existence of onsite groundwater contamination, as well as the circumstances surrounding the causes of leakage and previous opportunities for identification and intervention, have been reviewed in detail. Our inspection determined that public health and safety has not been, nor is likely to be, adversely affected, and the dose consequence to the public that can be attributed to current onsite conditions associated with groundwater contamination is negligible." Id.

The Task Force reviewed historical data on inadvertent releases of radioactive liquids, including four additional incidents involving leaks from spent fuel pools (Seabrook, Salem, Watts Bar, and Palo Verde). As a result of its review, the Task Force concluded that "[b]ased on bounding dose calculations and/or actual measurements, the nearterm public health impacts have been negligible for the events at NRC-licensed operating power facilities discussed in this report." Task Force Report, at 15. While concluding that near-term public health impacts from the leaks the NRC had investigated were negligible, the Task Force also recommended that measures be taken to avoid leaks in the future. The Task Force made 26 specific recommendations for improvements to the NRC's regulatory programs concerning unplanned or unmonitored releases of radioactive liquids from nuclear power reactors.

The NRC staff has addressed, or is in the process of addressing, the Task Force recommendations. See "Liquid. Release Task Force Recommendations Implementation Status as of February 26, 2008" (ADAMS Accession Number ML073230982) (Implementation Status). Actions taken in response to Task Force recommendations included revisions to several guidance documents, development of draft regulatory guidance on implementation of the requirements of 10 CFR 20.1406 (i.e. DG-4012),37 revisions to Inspection Procedure 71122.01, and an evaluation of whether further action was required to enhance the performance of SFP telltale drains.38

For example, Regulatory Guide 4.1 is being revised to provide guidance to industry for detecting, evaluating, and monitoring releases from operating facilities via unmonitored pathways; to ensure consistency with current industry standards and commercially available radiation detection methodology; to clarify when a licensee's radiological effluent and environmental monitoring programs

³⁸ In addition to the NRC's efforts, the nuclear industry collectively responded to these incidents of unplanned, unmonitored releases of radioactive liquids through the Industry Initiative on Groundwater Protection. The Industry Initiative has resulted in publication of voluntary industry guidance on the implementation of groundwater protection programs at nuclear power plants. See "Industry Ground Water Protection Initiative-Final Guidance Document," NEI-07-07, August 2007 (ADAMS Accession Number ML0/2610036); "Groundwater Protection Guidelines for Nuclear Power Plants: Public Edition, EPRI, Palo Alto, CA: EPRI Doc. No. 1016099, 2008. should be expanded based on data or environmental conditions; and to ensure that leaks and spills are detected before radionuclides migrate offsite via an unmonitored pathway. Also, Regulatory Guide 1.21 is being revised to provide a definition of "significant contamination" that should be documented in a licensee's decommissioning records under 10 CFR 50.75(g); to clarify how to report summaries of spills and leaks in a licensee's Annual Radioactive Effluent Release Report; to provide guidance on remediation of onsite contamination; and to upgrade the capability and scope of the in-plant radiation monitoring system to include additional monitoring locations and the capability to detect lower risk radionuclides. Further, Inspection Procedure 71122.01 has been revised to provide for review of onsite contamination events, including events involving groundwater; evaluation of effluent pathways so that new pathways are identified and placed in the licensee's Offsite Dose Calculation Manual, as applicable; and inclusion of limited, defined documentation of significant radioactive releases to the environment in inspection reports for those cases where such events would not normally be documented under current inspection guidance. See Implementation Status (ADAMS Accession Numbers ML073230982 and ML020730763).

Additionally, the NRC monitors the condition of SFPs through onsite Resident Inspectors, reviews of license amendment applications, and participation in industry forums. For example on October 28, 2009, the NRC issued Information Notice (IN) 2009-26, "Degradation of Neutron-Absorbing Materials in the Spent Fuel Pool" to all operating reactors licensees and construction permit holders. IN 2009-26 is the latest in a series of generic communications regarding material issues in SFPs. These and other documents demonstrate the NRC's continuing evaluation of the SFPs and their ability to provide an adequate level of safety. This engagement ensures any issues are identified and addressed through the current regulatory process before they could advance to a state where there is a significant environmental impact. Therefore the Commission has reasonable assurance that SFPs designed, tested, operated and maintained according to NRC requirements will provide for the safe storage of spent nuclear fuel.

2. Storage in Dry Casks

With regard to dry cask storage, studies of the accident risk of dry

storage since 1990 have focused on specific dry cask storage systems located at either a generic Pressurized Water Reactor (PWR) site or a specific Boiling Water Reactor (BWR) site. In 2004, the Electric Power Research Institute (EPRI) performed a Probabilistic Risk Assessment (PRA) of a bolted dry spent fuel storage cask at a generic PWR site. K. Canavan, "Probabilistic Risk Assessment (PRA) of Bolted Storage Casks Updated Quantification and Analysis Report," Electric Power Research Institute, Palo Alto, California; EPRI Doc. No. 1009691, December 2004. In 2007, the NRC published a pilot PRA methodology that assessed the risk to the public and identified the dominant contributors to risk associated with a welded canister dry spent fuel storage system at a specific BWR site. NUREG-1864, "A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant," March 2007. Both studies calculated the annual individual radiological risk and consequences associated with a single cask lifecycle where the lifecycle is divided into three phases: Loading, onsite transfer, and onsite storage. The EPRI study showed that risk is extremely low with no calculated early fatalities, a first year risk of latent cancer fatality of 5.6E-13 per cask, and subsequent year cancer risk of 1.7E-13 per cask. The NRC study also showed that risk is extremely low with no prompt fatalities expected, a first year risk of latent cancer fatality of 1.8E-12 per cask and subsequent year cancer risk of 3 2E-14 per cask.

The major contributors to the low risk associated with dry cask storage are that they are passive systems, relying on natural air circulation for cooling, and are inherently robust massive structures that are highly damage resistant. Current design light water reactor (LWR) uranium oxide based fuel and carbon coated uranium oxide fuel of low burnup from a high temperature gas cooled reactor have been successfully stored in dry storage facilities for approximately 20 years. Extended dry-storage of this fuel has been approved for an additional 40-year term for facilities that have incorporated an appropriate aging management plan. Other potential new fuel types, such as fuels having different cladding alloys, fuel internal materials. new assembly designs, different operating conditions, or fuel higher than current burn-up limits, can be approved by the NRC for extended storage if the applicant provides sufficient data to demonstrate that storage of the newer designs can be safely accomplished.

NRC and licensee experience to date with ISFSIs and with certification of

³⁷ DG-4012 was formally issued as Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning" in June 2008.

casks has indicated that interim storage of spent fuel at reactor sites can be safely and effectively conducted using passive dry storage technology. There have not been any safety problems during dry storage. The problems that have been encountered primarily occur during cask preparation activities, after initial loading of spent fuel and before placement on the storage pad. One issue involved the unanticipated collection and ignition of combustible gas during cask welding activities. The NRC issued generic communications in 1996 to address the problem and provide direction for preventing its recurrence. NRC Bulletin 96-04, "Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transportation Casks," and NRC Information Notice 96-34: "Hydrogen Gas Ignition During Closure Welding of a VSC-24 Multi-Assembly Sealed Basket." The NRC also revised its inspection and review guidance to ensure that appropriate measures are in place to preclude these events. See NRC Inspection Manual, Inspection Procedure 60854 Item 60854-02 and 02.03.a.6 and SFPO Interim Staff Guidance No. 15, dated January 10, 2001.

In addition, issuance of Materials License No. SNM-2513 for the Private Fuel Storage, LLC (PFS) facility has confirmed the feasibility of licensing an AFR ISFSI under 10 CFR Part 72. While there are several issues that have to be resolved before the PFS AFR ISFSI can be built and operated,³⁹ the extensive

³⁹ For example, on July 17, 2007, Private Fuel Storage and the Skull Valley Band of Goshute Indians (the Band) filed suit against the U.S. Department of Interior (DOI) in federal district court, challenging DOI's decisions to disapprove the lease between PFS and the Band and to deny PFS's application for right-of-way across public iand. On July 26, 2010, the district court vacated both of DOI's denials and remanded the case to DOI for further consideration. *Skull Valley Band of Goshute Indions v. Davis*,—F.Supp.2d—, 2010 WL2990781 (D. Utah July 26, 2010). On September 27th, 2010, the Salt Lake Tribune reported that the Department of Interior would not challenge the court's ruling. *http://www.sltrib.com/sltrib/home/50365983-76/ interior-nuclear-departmentruling.httml.csp?page=1*.

In addition, timely petitions for review challenging the NRC's decision to issue a license to Private Fuel Storage for the construction of an interim spent fuel storage facility were filed in the Court of Appeals for the DC Circuit. Ohngo Gaudadeh Devia v. NRC, No. 05–1419 (and consolidated cases) (DC Cir.). By Order dated June 27, 2007, the court held the petitions for review in abeyance pending further court order, requiring the parties to file status reports every 120 days on the status of actions challenging DOI's lease and rightof-wav decisions.

Another issue is associated with the February 2006 (NAS) Report on the transport of SNF in the United States, which concluded that while safe transport is technically viable, "the societal risks and related institutional challenges may impinge on the successful implementation of large-quantity review of safety and environmental issues associated with licensing the PFS facility provides additional confidence that spent fuel may be safely stored at an AFR ISFSI for long periods after storage at a reactor site.

In addition, as noted in its 1990 Waste Confidence Decision, the Commission has confidence in the safety and environmental insignificance of dry storage at an MRS for 70 years following a period of 70 years of storage in spent fuel storage pools. Specifically, the Commission stated:

Under the environmental assessment for the MRS rule [NUREG-1092], the Commission has found confidence in the safety and environmental insignificance of dry storage of spent fuel for 70 years following a period of 70 years of storage in spent fuel storage pools. Thus, this environmental assessment supports the proposition that spent fuel may be stored safely and without significant environmental impact for a period of up to 140 years if storage in spent fuel pools occurs first and the period of dry storage does not exceed 70 years. (55 FR 38509-38513; September 18, 1990).

Further, a commenter on the 1990 Waste Confidence Decision asserted that there was reasonable assurance that spent fuel could be stored safely and without significant environmental risk in dry casks at reactor sites for up to 100 years. The Commission responded:

The Commission does not dispute a conclusion that dry spent fuel storage is safe and environmentally acceptable for a period of 100 years. Evidence supports safe storage for this period. A European study published in 1988 states, "in conclusion, present-day technology allows wet or dry storage over very long periods, and up to 100 years without undue danger to workers and population (See Fettel, W., Kaspar, G., and Guntehr, H., "Long-Term Storage of Spent Fuel from Light-Water Reactors" (EUR 11866 EN), Executive Summary, p.v., 1988).

Although spent fuel can probably be safely stored without significant environmental impact for longer periods, the Commission does not find it necessary to make a specific conclusion regarding dry cask storage in this proceeding, as suggested by the commenter, in part because the Commission's Proposed Fourth Finding states that the period of safe storage is "at least" 30 years after expiration of a reactor's operating license. The Commission supports timely disposal of

shipping programs." National Research Council 2006, "Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States." Washington. DC: National Academy Press, TIC: 217588, at pp. 214. The NAS committee found that "malevolent acts against spent fuel and high-level waste shipment are a major technical and societal concern," and recommended that "an independent examination of security of spent fuel and high-level waste transportation be carried out prior to the commencement of large-quantity shipments to a Federal repository or to interim storage." *Id.* spent fuel and high-level waste in a geologic repository, and by this decision does not intend to support storage of spent fuel for an indefinitely long period. (55 FR 38482; September 18, 1990).

The Commission also explained the nature of its finding that spent fuel could be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation, stating:

[1]n using the words "at least" in its revised Finding Four, the Commission is not suggesting 30 years beyond the licensed life for operation * * represents any technical limitation for safe and environmentally benign storage. Degradation rates of spent fuel in storage, for example, are slow enough that it is hard to distinguish by degradation alone between spent fuel in storage for less than a decade and spent fuel stored for several decades. (55 FR 38509; September 18, 1990).

As explained above under the discussion of Finding 3, the NRC has renewed three specific ISFSI licenses for an extended 40-year period under exemptions granted from 10 CFR Part 72, which provides for 20-year renewals. In addition, the NRC staff submitted a final rule package to the Commission on May 3, 2010, that would provide a 40-year license term for an ÎSFSI with the possibility of renewal. See SECY 10–0056, "Final Rule: 10 CFR Part 72 License and Certificate of Compliance Terms (RIN 3150-A109)" (ADAMS Accession Number ML100710052). Continued suitability of materials is a prime consideration for ISFSI license renewals. As discussed under Finding 3 in this document, the applicants' evaluation of aging effects on the structures, systems, and components important to safety, supplemented by the licensees' aging management programs, provided reasonable assurance of continued safe storage of spent fuel in these ISFSIs. Thus, these cases reaffirm the Commission's confidence in the safety of interim dry storage for an extended period. While these license renewal cases only address storage for a period of up to 60 years (20-year initial license, plus 40-year renewal), studies performed to date have not identified any major issues with long-term use of dry storage. See, e.g., NUREG/CR-6831, "Examination of Spent PWR Fuel rods after 15 Years in Dry Storage," (September 2003); J. Kessler, "Technical Bases for Extended Dry Storage of Spent Nuclear Fuel," Electric Power Research Institute, Palo Alto, California; EPRI Doc. No. 1003416, December 2002 (55 FR 38509; September 18, 1990). As noted above, the Commission has directed the NRC staff, separate from

these updates to the Waste Confidence Decision and Rule, to examine the possibility of storage for more than 60 years after licensed life for operation. This longer-term analysis will be supported by an Environmental Impact Statement.

3. Terrorism and Spent Fuel Management

The NRC has, since the 1970s, regarded spent fuel in storage as a potential terrorist target and provided for appropriate security measures. Before September 11, 2001, spent fuel was well protected by physical barriers, armed guards, intrusion detection systems, area surveillance systems, access controls, and access authorization requirements for persons working inside nuclear power plants and spent fuel storage facilities. Since September 11, 2001, the NRC has significantly enhanced its requirements, and licensees have significantly increased their resources to further enhance and improve security at spent fuel storage facilities and nuclear power plants. See (Diaz Letter), at 20.

Consistent with the approach taken at other categories of nuclear facilities, the NRC responded to the terrorist attacks of September 11, 2001, by promptly developing and requiring security enhancements for spent fuel storage both in spent fuel pools and dry casks. In February 2002, the NRC required power reactor licensees to enhance security and improve their capabilities to respond to terrorist attacks. The NRC's orders included requirements for spent fuel pool cooling to deal with the consequences of potential terrorist attacks. These enhancements to security included increased security patrols, augmented security forces, additional security posts, increased vehicle standoff distances, and improved coordination with law enforcement and intelligence communities, as well as strengthened safety-related mitigation procedures and strategies. The February 2002 orders required licensees to develop specific guidance and strategies to maintain or restore spent fuel pool cooling capabilities using existing or readily available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with the loss of large areas of the plant due to large fires and explosions.

In January and April 2003, the NRC issued additional orders on security, including security for spent fuel storage. The NRC subsequently inspected each facility to verify the licensee's implementation, evaluated inspection findings and, as necessary, required actions to address any noted deficiencies. The NRC's inspection activities in this area are ongoing. In 2004, the NRC reviewed and approved revised security plans submitted by licensees to reflect the implementation of new security requirements. The enhanced security at licensee facilities is routinely inspected using a revised baseline inspection program, and power reactor licensees' capabilities (including spent fuel pools) are tested in periodic (every 3 years) force-on-force exercises. Diaz Letter at iii, 7, 9. The NRC's ongoing ISFSI security rulemaking is discussed below.

In 2002, the NRC required power reactors in decommissioning, wet ISFSIs, and dry storage ISFSIs to enhance security and improve their capabilities to respond to, and mitigate the consequences of, a terrorist attack. In the same year, the NRC required licensees transporting more than a specified amount of spent fuel to enhance security during transport. Diaz Letter at 7, 8.

In 2002, the NRC also initiated a classified program on the capability of nuclear facilities to withstand a terrorist attack. The early focus of the program was on power reactors, including spent fuel pools, and on dry cask storage and transportation. As the results of the program became available, the NRC provided additional guidance to licensees on the Commission's expectations regarding the implementation of the orders on the spent fuel mitigation measures. Diaz Letter at iv.

In 2007 the NRC issued a final rule revising the Design Basis Threat, which also increased the security requirements for power reactors and their spent fuel pools (72 FR 12705; March 19, 2007). More recently, on March 27, 2009, the NRC issued a final rule to improve security measures at nuclear power reactors (74 FR 13926).

i. Spent Fuel Pools

Spent fuel pools that are designed, tested, operated and maintained according to NRC requirements will provide for the safe storage of spent nuclear fuel. Spent fuel pools are extremely robust structures that are designed to safely contain spent fuel under a variety of normal, off-normal, and hypothetical accident conditions (e.g., loss of electrical power, floods, earthquakes, tornadoes). The pools are massive structures made of reinforced concrete with walls typically over six feet thick, lined with welded stainless steel plates to form a generally leak-tight barrier, fitted with racks to store the fuel assemblies in a controlled configuration, and provided with redundant monitoring, cooling, and make-up water systems. Spent fuel stored in pools is typically covered by about 25 feet of water, which serves as both shielding and an effective protective cover against direct impacts on the stored fuel. Diaz Letter at 2 (73 FR 46206; August 8, 2008).

The post-September 11, 2001 studies discussed above confirm the effectiveness of additional mitigation strategies to maintain spent fuel cooling in the event the pool is drained and its initial water inventory is reduced or lost entirely. Based on this recent information and the implementation of additional strategies following September 11, 2001, the risk of a spent fuel pool zirconium fire initiation will be less than reported in NUREG-1738 and previous studies. Given the physical robustness of the pools, the physical security measures, and the spent fuel pool mitigation measures, and based upon NRC site evaluations of every spent fuel pool in the United States, the NRC has determined that the risk of a spent fuel pool zirconium fire, whether caused by an accident or a terrorist attack, is very low. In addition, the NRC has approved license amendments and issued safety evaluations to incorporate mitigation measures into the plant licensing bases of all operating nuclear power plants in the United States (See 73 FR 46207-46208; August 8, 2008).

ii. Dry Storage Casks

Dry storage casks are massive canisters, either all metal or a combination of concrete and metal, and are inherently robust (*e.g.*, some casks weigh over 100 tons). Storage casks contain spent fuel in a sealed and chemically-inert environment. Diaz Letter at 3.

The NRC has evaluated the results of security assessments involving large commercial aircraft attacks, which were performed on four prototypical spent fuel cask designs, and concluded that the likelihood is very low that a radioactive release from a spent fuel storage cask would be significant enough to cause adverse health consequences to nearby members of the public. While differences exist between storage cask designs, the results of the security assessments indicate that any potential radioactive releases were consistently very low.

The NRC also evaluated the results of security assessments involving vehicle bomb and ground assault attacks against these same four cask designs. The NRC concluded that, while a radiological release was possible, the size and nature of the release did not require the Commission to immediately implement additional security compensatory measures. Accordingly, the NRC staff recommended, and the Commission approved, development of riskinformed, performance-based security requirements and associated guidance applicable to all ISFSI licensees (general and specific), which would enhance existing security requirements. This proposed ISFSI security rulemaking would apply to all existing and future licensees. See SECY-07-0148, "Independent Spent Fuel Storage Installation Security Requirements for Radiological Sabotage," (August 28, 2007) (ADAMS Accession Number ML080250294); SRM-SECY-07-0148-Independent Spent Fuel Storage Installation Security Requirements for Radiological Sabotage, (December 18, 2007) (ADAMS Accession Number ML073530119).

On August 26, 2010, the NRC staff recommended an extension of the proposed rulemaking schedule to reassess the technical approach and evaluate the impacts from shifting technical approaches. See SECY 10-0114, "Recommendation to Extend the Proposed Rulemaking on Security **Requirements For Facilities Storing** Spent Nuclear Fuel and High-Level Radioactive Waste," (August 26, 2010) (ADAMS Accession Number ML101880013). In addition, the NRC has noted that distributing spent fuel over many discrete storage casks (e.g., in an ISFSI) limits the total quantity of spent fuel that could be attacked at any one time, due to limits on the number of adversaries and the amount of equipment they can reasonably bring with them. Diaz Letter at 17, 18, 22.

iii. Conclusion-Security

Today, spent fuel is better protected than ever. The results of security assessments, existing security regulations, and the additional protective and mitigative measures imposed since September 11, 2001, provide high assurance that the spent fuel in both spent fuel pools and in dry storage casks will be adequately protected. The ongoing efforts to update the ISFSI security requirements to address the current threat environment will integrate the additional protective measures imposed since September 11, 2001, into a formalized regulatory framework in a transparent manner that balances public participation against protection of exploitable information.

4. Conclusion

The Commission concludes that the events that have occurred since the last

formal review of its Waste Confidence Decision in 1990 provide support for a continued finding of 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 of that reactor at its spent fuel storage basin. Specifically, the NRC finds continued support for this finding in the extensive study of spent fuel pool storage that has occurred since 1990, and the continued regulatory oversight of operating plants, which has been enhanced by the recommendations of the Liquid Release Task Force.

Further, the Commission is revising Finding 2 to reflect its expectation that repository capacity will be available when necessary. The analysis supporting Finding 2 concludes that a repository can be constructed within 25-35 years of a Federal decision to do so. This means that the earliest a repository could be available is 2035-2045, which is beyond the 30 years after licensed life of operation in the 1990 rule. But as the Commission discussed above, there is no safety finding that would preclude the extension of the 30. years of safe storage without significant environmental impacts. Indeed, the current technical information supports a finding that storage for at least 60 years after licensed life for operation is safe. Consistent with the changes to Finding 2 and its supporting analysis, the Commission is revising Finding 4 to reflect that spent fuel can be safely stored in dry casks for a period of at least 60 years without significant environmental impacts. Specifically, the inherent robustness and passive nature of dry cask storage-coupled with the operating experience and research accumulated to date, the 70-year finding in the Environmental Assessment for the MRS rule, and the renewal of three specific 10 CFR Part 72 licenses for an extended 40-year period (for a total ISFSI operating life of at least 60 years)-support this finding. Further, this finding is consistent with the Commission's statements in 1990 that it did not dispute that dry spent fuel storage is safe and environmentally acceptable for a period of 100 years (55 FR 38482; September 18, 1990); that spent fuel could probably be safely stored without significant environmental impact for periods longer than 30 years Id; and that the 30 year finding did not represent a technical limitation for safe and environmentally benign storage (55 FR 38509; September 18, 1990).

Therefore, based on all of the information set forth above and after

consideration of the public comments received, the Commission is revising Finding 4 as proposed.

C. Finding 4

The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite independent spent fuel storage installations.

V. Finding 5: The Commission Finds Reasonable Assurance That Safe, Independent Onsite Spent Fuel Storage or Offsite Spent Fuel Storage Will Be Made Available if Such Storage Capacity Is Needed

A. Bases for Finding 5

The focus of this finding is on the timeliness of the availability of facilities for storage of spent fuel when the fuel can no longer be stored in the reactor's spent fuel storage pool. At the outset of the Waste Confidence proceeding, there was uncertainty as to who had the responsibility for providing this storage, with the expectation that the Federal . Government would provide away-fromreactor (AFR) facilities for this purpose. But in 1981 DOE announced its decision to discontinue the AFR program. The Commission found that the industry's response to this change was a general commitment to do whatever was necessary to avoid shutting down reactors. The NWPA provided Federal policy on this issue by defining public and private responsibilities for spent fuel storage and by providing for an MRS program, an interim storage program at a Federal facility for utilities for which there was no other solution, and a research, development, and demonstration program for dry storage designed to assist utilities in using dry storage methods. These NWPA provisions, together with the availability of ISFSI technology and the fact that the 10 CFR part 72 regulations and licensing procedures were in place, gave the Commission reasonable assurance that safe, independent onsite or offsite spent fuel storage would be available when needed (49 FR 34686-34687; August 31, 1984).

In 1990, the Commission saw no need to revise this finding. It recognized that the NWPA had undermined the ability of an MRS to provide for timely storage by linking the MRS to the siting and schedule for a repository (*i.e.*, DOE was not permitted to select an MRS site until it had recommended a site for development as a repository). See Section 145(b) of NWPA, 42 U.S.C. 10165 (2006) and Section 148(d)(1) of NWPA, 42 U.S.C. 10168 (2006). But the Commission found that whatever the uncertainty introduced by these NWPA provisions, it was more than compensated for by operational and planned spent fuel pool expansions and dry storage investments by the utilities themselves.

The Commission also considered the fact that it seemed probable that DOE would not meet the 1998 deadline for beginning to remove spent fuel from the utilities. This did not undermine the Commission's confidence that storage capacity would be made available as needed because NRC licensees cannot abrogate their safety responsibilities and would remain responsible for the stored fuel despite any possible contractual disputes with DOE. The Commission noted that DOE's research program had successfully demonstrated the viability of dry storage technology and that the utilities had continued to add dry storage capacity at their sites. Further, the Commission believed that there would be sufficient time for construction and licensing of any additional storage capacity that might be needed due to operating license renewals (55 FR 38513-38514; September 18, 1990).

B. Evaluation of Finding 5

In 1990, the Commission reaffirmed Finding 5 despite significant uncertainties regarding DOE's MRS and repository programs, and the potential for the renewal of reactor operating licenses. Specifically, in reaffirming Finding 5 the Commission stated:

In summary, the Commission finds no basis to change the Fifth Finding in its Waste Confidence Decision. Changes by the NWPAA, which may lessen the likelihood of an MRS facility, and the potential for some slippage in repository availability to the first quarter of the twenty-first century * * * are more than offset by the continued success of utilities in providing safe at-reactor-site storage capacity in reactor pools and their progress in providing independent onsite storage. Therefore, the Commission continues to find '* * reasonable assurance that safe independent onsite spent fuel storage or offsite spent fuel storage will be made available if such storage is needed.' (55 FR 38514; September 18, 1990).

In reaching this conclusion, the Commission stressed that—regardless of the outcome of possible contractual disputes between DOE and utilities—the utilities possessing spent fuel could not abrogate their safety responsibilities, which by law the NRC imposes and enforces. In addition, the Commission cited three situations where dry storage had been licensed at specific reactor sites (Surry, H.B. Robinson, and Oconee), and several additional applications for licenses permitting dry cask storage at reactor sites. *Id*.

1. Operating and Decommissioned Reactors

As in 1990, the NRC is not aware of any current operating reactor that has an insurmountable problem with safe storage of SNF. Spent fuel pool reracking, fuel-pin consolidation, and onsite dry cask storage are successfully being used to increase onsite storage capacity. While there are cases where a licensee's ability to use an onsite dry cask storage option may be limited by State or Public Utility Commission authorities, the NRC is successfully regulating six fully decommissioned reactor sites that contain ISFSIs licensed under either the general or specific license provisions of 10 CFR part 72. The NRC has not encountered any management problems associated with the ISFSIs at these six decommissioned reactor sites and has discussed plans to build generally licensed ISFSIs with two additional licensees that are in the process of decommissioning.

In addition, since 1990, the NRC has renewed the specific 10 CFR part 72 ISFSI licenses for the Surry, H.B. Robinson, and Oconee plants for an extended 40-year period, instead of the 20-year renewal period currently provided for under 10 CFR part 72. As discussed above under Finding 3, the Commission authorized the staff to grant exemptions to allow the 40-year renewal period after the staff reviewed the applicants' evaluations of aging effects on the structures, systems, and components important to safety and determined that the evaluations, supplemented by the applicants' aging management programs, provided reasonable assurance of continued safe storage of spent fuel in these ISFSIs. See SECY-04-0175, "Options for Addressing the Surry Independent Spent Fuel Storage Installation License-Renewal Period Exemption Request," September 28, 2004 (ADAMS Accession Number ML041830697).

With regard to the uncertainty surrounding the contractual disputes between DOE and the utilities referenced by the Commission in 1990, the U.S. Court of Appeals for the District of Columbia Circuit has since held that DOE's statutory and contractual obligation to accept the waste no later than January 31, 1998, was unconditional. *Indiana Michigan Power Co.* v. DOE, 88 F.3d 1272 (DC Cir. 1996). Subsequently, the utilities have continued to manage spent fuel safely in spent fuel pools and ISFSIs and have received damage awards as determined in lawsuits brought before the U.S. Federal Claims Court. See, e.g., System Fuels Inc. v. U.S., 78 Fed. Cl. 769 (October 11, 2007); 92 Fed. Cl. 101 (March 11, 2010).

In total, there are currently 51 licensed ISFSIs being managed at 47 sites across the country, under either specific or general 10 CFR Part 72 NRC licenses. As explained in the discussion of Finding 3, the NRC's inspection findings do not indicate unique management problems at any currently operating ISFSI regulated by the NRC. Generally, the types of issues identified through NRC inspections of ISFSIs are similar to issues identified for 10 CFR Part 50 licensees. Most issues are identified early in the operational phase of the dry cask storage process, during loading preparations and actual spent fuel loading activities. Once an ISFSI is fully loaded with spent fuel, relatively few inspection issues are identified due to the passive nature of these facilities.

2. New Reactors

With regard to the status of contracts requiring DOE to take title to and possession of the irradiated fuel generated by utilities, DOE has prepared updated contracts, and a number of utility companies have signed contracts with the department (See, e.g., ML100280755 and ML083540149). In addition, before licensing a new reactor, the NRC must find that the applicant has entered into a contract with DOE for removal of spent fuel from the reactor site or received written affirmation from DOE that the applicant is actively and in good faith negotiating with the DOE for such a contract. NWPA, Section302(b). This finding will be documented in the Safety Evaluation Report produced by the NRC staff in response to specific license applications for new reactors (See, e.g., ML100280755).

The near-term design certifications and existing or planned combined license applications do not undermine the Commission's confidence that spent fuel storage will become available when storage is needed. These facilities will use the same or similar fuel assembly designs as the nuclear power plants currently operating in the United States, and the spent fuel will be accommodated using existing or similar transportation and storage containers. As discussed under Finding 1, the NRC is also engaged in preliminary interactions with DOE on advanced reactors (e.g., gas-cooled or liquid-metal

cooled technologies). The fuel and reactor components associated with some of these advanced reactor designs would likely require different storage, transportation, and disposal packages than those currently used for spent fuel from light-water reactors. The possible need for further assessment of performance and storage capability for new and different fuels would depend on the number and types of reactors actually licensed and operated. There is currently high uncertainty regarding the construction of advanced reactors in the U.S. In addition, the need to consider waste disposal as part of the overall research and development activities for advanced reactors is one of the issues being considered by DOE, reactor designers, and the NRC (see, e.g., "A Technology Roadmap for Generation IV Nuclear Energy Systems," issued by the U.S. DOE Nuclear Energy Research Advisory Committee and the Generation IV International Forum, December 2002).

Nonetheless, the addition of new plants (if any are licensed and constructed) would add to the amount of spent fuel requiring disposal. This fact does not affect the Commission's confidence that safe storage options will be available when needed because, as

the Commission stated in 1990, utilities have sought to meet storage capacity needs at their respective reactor sites (55 FR 38514; September 18, 1990). Specifically, as discussed under Finding 3, NRC licensees have successfully and safely used onsite storage capacity in spent fuel pools and, more recently, in onsite ISFSIs licensed under 10 CFR part 72. In addition, while construction. and operation of an MRS facility by DOE is uncertain, the NRC has promulgated regulations that provide a framework for licensing an MRS (See 10 CFR part 72; 53 FR 31651; August 19, 1988). Further, while there are unresolved issues that are currently preventing construction and operation of the PFS facility, the extensive safety and environmental reviews that supported issuance of an NRC license for PFS provide added confidence that licensing of a private AFR facility is technically feasible.

The Commission concludes that the events that have occurred since the last formal review of the Waste Confidence Decision in 1990 support a continued finding of reasonable assurance that safe independent onsite spent fuel storage or offsite spent fuel storage will be made available if storage capacity is needed. Specifically, since 1990, NRC licensees

have continued to develop and successfully use onsite storage capacity in the form of pool and dry cask storage in a safe and environmentally sound fashion. With regard to offsite storage, the Commission licensed the PFS facility after an extensive safety and environmental review process and a lengthy adjudicatory hearing that resulted in over 70 ASLB and Commission decisions. The Commission also has a regulatory framework for licensing an MRS facility, should the need arise. In addition, DOE has prepared updated contracts to provide for disposal of spent fuel and a number of utility companies have signed contracts with the DOE. This provides the NRC with continued confidence in the Federal commitment to providing for the ultimate disposal of spent fuel.

Based on the above discussion, including its response to the public comments, the Commission reaffirms Finding 5.

Dated at Rockville, Maryland, this 9th day of December 2010.

For the Nuclear Regulatory Commission. Annette L. Vietti-Cook,

Secretary of the Commission.

[FR Doc. 2010-31637 Filed 12-22-10; 8:45 am] BILLING CODE 7590-01-P

Attachment 10

excerpt from an Entergy document entitled Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 3, Document E11-1583-006, prepared by TLG Services, Inc. for Entergy Nuclear, December 2010, ML103550608, including pages 8-11

Document E11-1583-006

PRELIMINARY DECOMMISSIONING COST ANALYSIS

for the

INDIAN POINT ENERGY CENTER, UNIT 3



prepared for

Entergy Nuclear

prepared by

TLG Services, Inc. Bridgewater, Connecticut

December 2010

Document E11-1583-006 Page ii of v

APPROVALS

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12/09/2010 Date

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rancis W. Seymore

10 Date

• Pricing changes for basic inputs, such as labor, energy, materials, and burial.

This cost study does not add any additional costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities.

1.7 SITE-SPECIFIC CONSIDERATIONS

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impacts of the considerations identified below were included within the estimate.

1.7.1 Spent Fuel Disposition

Congress passed the "Nuclear Waste Policy Act"^[13] (NWPA) in 1982, assigning the federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The NWPA provided that DOE would enter into contracts with utilities in which DOE would promise to take the utilities' spent fuel and high-level radioactive waste and utilities would pay the cost of the disposition services for that material. NWPA, along with the individual contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to accept any spent fuel or high level waste, as required by the NWPA and utility contracts. Delays continue and, as a result, generators have initiated legal action against the DOE in an attempt to obtain compensation for DOE's breach of contract.

A federal appeals court has ruled that DOE's obligation to take possession of spent nuclear fuel is unconditional and cannot be excused either by the absence of a repository or by a claim of unavoidable delay. Entergy has filed a lawsuit claiming damages for DOE's failure to perform as originally prescribed in the standard disposal contract.

¹³ "Nuclear Waste Policy Act of 1982 and Amendments," U.S. Department of Energy's Office of Civilian Radioactive Management, 1982.

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It is expected that, based upon industry experience, the lawsuit will be eventually settled in exchange for payments. The payments would cover those costs incurred for managing and storing the spent fuel that the owner would not have incurred but for DOE's delay in performance. Until a settlement is reached, certain assumptions are needed to assess the financial impact on the identified decommissioning cost scenario.

It is generally necessary that spent fuel be actively cooled and stored for a minimum period at the generating site prior to transfer. The NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).^[14] This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimate, for example, costs associated with the isolation and continued operation of the spent fuel pool and ISFSI.

At shutdown, the spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the following eight years, the assemblies are transferred to the IP-2 pool where they are packaged into multipurpose canisters for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the transfer canister and for the final core to meet the design requirements for decay heat for the dry storage systems.

DOE's contracts with utilities generally order the acceptance of spent fuel from utilities based upon the oldest fuel receiving the highest priority. For purposes of this analysis, acceptance of commercial spent fuel by the DOE was expected to begin in 2020. The first IP-3 spent fuel assemblies were assumed to be removed from the site in 2023. With an estimated rate of transfer of 3,000 metric tons of uranium (MTU)/year for the commercial industry (based on DOE's latest Acceptance Priority Ranking and Annual Capacity Report, dated June 2004, DOE/RW-0567), completion of the removal of all fuel from the site was projected to be in the year 2047, assuming shutdown of IP-3 in 2015 (and a transfer of approximately 30 additional MTUs in 2047 should IP-3 requiring refueling in 2015 prior to the cessation of operations). Entergy Nuclear's analysis assumes, for purposes only of this report, that Entergy Nuclear does not employ DOE

U.S. Code of Federal Regulations, Title 10. Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses."

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spent fuel disposal contract allowances for up to 20% additional fuel designation for shipment to DOE each year.

Entergy Nuclear's position is that the DOE has a contractual obligation to accept IPEC fuel earlier than the projections set out above. No assumption made in the study should be interpreted to be inconsistent with this claim. However, at this time, including the cost of storing spent fuel in this study is the most reasonable approach because it insures the availability of sufficient decommissioning funds at the end of the station's life if, contrary to its contractual obligation, the DOE has not performed earlier.

<u>ISFSI</u>

An ISFSI, which is operated under a general (10 CFR Part 50) license, has been constructed to support site operations. With a capacity of 75 casks, however, the current facility will not be able to accommodate all of the spent fuel from the IP-3 pool. The estimate assumes, therefore, that a second ISFSI will be constructed at the site to support the decommissioning of IP-3. Once the IP-3 pool is emptied, the spent fuel storage and handling facilities are available for decommissioning or readied for long-term storage.

Operation and maintenance costs for the ISFSIs are included within the estimate and address the costs for staffing the facility, as well as security, insurance, and licensing fees.

Article IV.B of Entergy's contract with the DOE for spent fuel disposal requires the DOE to bring a cask "suitable for use at the [IP-3] site." To date, the DOE has failed to provide casks, or even to identify what casks suitable to IP-3 it will provide. In the absence of identifiable DOE transport cask requirements, the design and capacity of the ISFSI is based upon a commercial dry cask storage system. While Entergy's contract with the DOE requires DOE to provide transport canisters to Entergy, for present purposes, this estimate includes this cost.

Storage Canister Design

For purposes of this estimate only, and in the absence of DOE cask specifications, the design and capacity of the ISFSI is based upon the Holtec HI-STORM dry cask storage system. The Holtec multi-purpose canister or MPC has a capacity of 32 fuel assemblies.

Attachment 11

November 29, 2007 Declaration of Dr. Stephen C. Sheppard with accompanying report, Potential Impacts of Indian Point Relicensing on Property Values

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

In re:

License Renewal Application Submitted by

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. Docket Nos. 50-247-LR and 50-286-LR

ASLBP No. 07-858-03-LR-BD01

DPR-26, DPR-64

DECLARATION OF STEPHEN C. SHEPPARD

Stephen C. Sheppard, hereby declares under penalty of perjury that the following is true

and correct:

1. I have been retained by the New York State Office of the Attorney General to provide expert services in connection with the application by Entergy Nuclear Operations, Inc. and its affiliates (collectively Entergy) for a renewal of the two separate operating licenses for the

nuclear power generating facilities located at Indian Point.

2. I am a Professor of Economics at Williams College where I teach in the Economics Department. In addition to teaching, I also conduct research on issues that include environmental and natural resources economics, public finance, and land use economics. In 2006 I was a Fellow at the Weimer School of Advanced Studies in Real Estate and Land Economics. Before that, I was the Herman H. Lehman Fellow at the Oakley Center for the Humanities and Social Sciences at Williams. And in 2004 I shared with a colleague the Royal Economic Society Prize. My CV, which is attached, includes a list of my published papers and other work.

I received a B.S. from the University of Utah in 1977, and received from

Washington University (St. Louis) an A.M. in 1979 and a Ph.D. in 1984.

4. Attached to this Declaration is a Report I prepared and a copy of my current CV.

Both of these documents were prepared by me and are true and correct to the best of my personal

knowledge.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true

and correct.

Dated: November 29, 2007 Williamstown, Massachusetts

Stephen C. Sheppard

September 18, 2007

Curriculum Vita

Stephen Charles Sheppard

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Published Papers:

- 'The Qualitative Economics of Development Control', by Stephen Sheppard, Journal of Urban Economics, 24, 310-330, (1988). [17]
- British Planning Policy and Access to Housing', by Paul Cheshire and Stephen Sheppard, Urban Studies, 26, 469-485, (1989). [37]
- 'Nice Demand in Rough Neighborhoods: Continuity in Non-Convex, Dispersed Economies', by Stephen Sheppard, in Economic Theory and International Trade: Essays in Memoriam of J. Trout Rader, edited by Wilhelm Neuefeind and Raymond Riezman, Berlin: Springer - Verlag, (1992).
- 'A Model of Regional Contraction and Unemployment', by Barry McCormick and Stephen Sheppard, Economic Journal, 102, 366-377, (1992). [10]
- The Benefits of Transport Improvements in a City with Efficient Development Control', by Stephen Sheppard and Mark Stover, Regional Science and Urban Economics, 25, 211-223, (1995).
- 'Capturing Land Value Based Externalities in U.S. Communities' (in Japanese), by Stephen Sheppard, in Land Use and Capturing Land Value Based Externality, edited by Makato Ikeda, Tokyo: Mitsubishi Research Institute (1995).
- 'On the Price of Land and the Value of Amenities', by Paul Cheshire and Stephen Sheppard, Economica, 62, 247-267 (1995). [37]
- 'Housing Supply under Rapid Economic Growth and Varying Regulatory Stringency: An International Comparison', by Stephen Mayo and Stephen Sheppard, Journal of Housing Economics, 5, 274-289 (1996). [9]
- Welfare Economics of Land Use Regulation', by Paul Cheshire and Stephen Sheppard, LSE Research Papers in Environmental and Spatial Analysis No. 42, London: London School of Economics, February, 1997, ISBN 0-7530-017-5.

Published Papers, continued:

'The Costs of Constraint', by Paul Cheshire and Stephen Sheppard, Parliamentary Review, February 1997, p. 38.

An economic analysis of land use planning: some welfare and distributional effects of the British system - or the costs of constraint', by Paul C. Cheshire and Stephen Sheppard, VOGON Journaal, 5, May 1997, 11-16.

*Estimating hedonic demand using single-market data: a practical solution using "nearby" instruments', by Paul C. Cheshire and Stephen Sheppard, LSE Research Papers in Environmental and Spatial Analysis No. 51, (August, 1998) London: London School of Economics, ISBN 0 7530 1251 0.

'Estimating Demand for Housing, Land, and Neighbourhood Characteristics', by Paul Cheshire and Stephen Sheppard, Oxford Bulletin of Economics and Statistics, 60, August 1998, 357-382. [18]

Hedonic Analysis of Housing Markets', by Stephen Sheppard, in Handbook of Regional and Urban Economics Volume 3: Applied Urban Economics, edited by Paul Cheshire and Edwin Mills, Amsterdam: North Holland, 1999, Chapter 41, pp 1595 – 1635. [23]

'Land strapped', by Paul Cheshire and Stephen Sheppard, ROOF Housing Market Healthcheck, Issue 2, Winter 1999.

'Building on brown fields: the long term price we pay', by Paul Cheshire and Stephen Sheppard, *Planning In London*, Issue 33, April-June 2000, 34-36.

Fiscal Austerity and Public Servant Quality', by Nadeem ul Haque, Peter Montiel, and Stephen Sheppard, Economic Inquiry, 38, July 2000, 487-500.

Public Investment and Regional Labour Markets: The Role of UK Higher Education', by Phil McCann and Stephen Sheppard, in *Public Investment and Regional Development: Essays in Honour of Moss Madden*, Felsenstein D., et al. (eds), 2001, Edward Elgar, Cheltenham.

- 'Housing Supply and the Effects of Stochastic Development Control', by Stephen Mayo and Stephen Sheppard, Journal of Housing Economics, 10, 109-128 (2001). [2]
- Review of Economics of Cities: Theoretical Perspectives by Jean-Marie Huriot and Jacques-Francois Thisse', by Stephen Sheppard, Journal of Regional Science, 42, 423-427 (2002).
- The Welfare Economics of Land Use Planning', by Paul Cheshire and Stephen Sheppard, Journal of Urban Economics, 52, 242-269, (2002). [14]
- 'Income inequality and residential segregation: labour sorting and the demand for positional goods', by Paul Cheshire, Vasillis Monastiriotis and Stephen Sheppard, in R. Martin and P. Morrison (eds) Geographies of Labour Market Inequality, London: Routledge, 83-109, (2003).
- 'The Rise, Fall and Rise Again of Industrial Location Theory', by Philip McCann and Stephen Sheppard, Regional Studies, 37, 6-7, 649-663, (2003). [10]
- 'Taxes Versus Regulation: the Welfare Impacts of Policies for Containing Sprawl', by Paul Cheshire and Stephen Sheppard, in The Property Tax, Land Use and Land Use Regulation, edited by Dick Netzer, Edward Elgar Publishing, Cheltenham (2003).

'Introduction to Feature: The Price of Access to Better Neighbourhoods' by Paul Cheshire and Stephen Sheppard, The Economic Journal, 114, F391-F396, (2004).

Published Papers, continued:

- Capitalising The Value Of Free Schools: The Impact of Supply Characteristics and Uncertainty' by Paul Cheshire and Stephen Sheppard, The Economic Journal, 114, F397-F424, (2004). [4]
- Land Markets and Land Market Regulation: Progress Towards Understanding' by Paul Cheshire and Stephen Sheppard, Regional Science and Urban Economics, 34, 619-837, (2004). [2]
- 'Land Use Regulation and Its Impact on Welfare' by Stephen Sheppard, Chapter 10 (pp 285-318) in Urban Dynamics and Growth: Advances in Urban Economics, edited by Roberta Capello and Peter Nijkamp, Elsevier, Amsterdam (2004).
- 'The Introduction of Price Signals into Land Use Planning Decision-making: a proposal' by Paul Cheshire and Stephen Sheppard, Urban Studies, 42, 647-663, (2005).
- 'The Distributional Impact of Housing Discrimination in a Non-Walrasian Setting', by Ralph Bradburd, Stephen Sheppard, Joseph Bergeron, Eric Engler and Evan Gee, Journal of Housing Economics, 14, 61-91, (2005).
- 'An Analysis of Ethnic Differences in UK Graduate Migration Behaviour', by Alessandra Faggian, Philip McCann and Stephen Sheppard, Annals of Regional Science, 40 (2), 461-471, (2006).
- 'Impact of Rent Controls in Non-Walrasian Markets: An Agent-Based Modeling Approach', by Ralph Bradburd, Stephen Sheppard, Joseph Bergeron and Eric Engler, *Journal of Regional Science*, 46, 455-491, (2006).
- The Impacts of Terrorism on Urban Form' by S. Brock Blomberg and Stephen Sheppard, Brookings-Wharton Papers on Urban Affairs, p. 257-290, (2007).

Other Papers:

- 'Equilibria in Spatial Economies with a Continuum of Consumers', unpublished doctoral dissertation submitted to Washington University, 1984.
- 'Regional Shifts in Population and Changes in Metro-Nonmetro Boundaries in the U.S.', by Charles Leven and Stephen Sheppard.

'Structure of Demand and Equilibria in a Spatial Economy', Virginia Tech Working Paper.

'Historical Perspective on Population Change Within Urban Component Boundaries in the United States', by Charles Leven and Stephen Sheppard.

'Migration, Signaling, and the Efficiency of Regional Decline', by Barry McCormick and Stephen Sheppard.

'Unemployment, Regional Decline, and Efficient Policy', by Barry McCormick and Stephen Sheppard

- 'CAFE Economics: a note on the Limits and Effectiveness of Fuel Economy Regulation', by Stephen Sheppard and Adam Werner.
- 'Hedonic Perspectives on 'the' Price of Land: Space, access, and amenity', by Paul Cheshire and Stephen Sheppard.

'Human Capital, Higher Education, and Graduate Migration', by Philip McCann and Stephen Sheppard.

'Higher education and migration across the Celtic frontier: mobility of Scottish and Welsh students', by Philip McCann and Stephen Sheppard

Other Papers, continued:

- 'An Analysis of the Gender Differences in UK Graduate Migration Behaviour', by Philip McCann and Stephen Sheppard
- 'The Impact of Rental Housing Vouchers: A non-Walrasian Simulation Analysis' by Ralph Bradburd, Stephen Sheppard, Kelsey Peterson and Evan Miller
- 'Culture and Revitalization: The Economic Effects of MASS MoCA on its Community' by Stephen C. Sheppard, Kay Oehler, Blair Benjamin and Ari Kessler
- 'From Mill Town to Culture Cluster: the Context of Transformation in North Adams' by Stephen Sheppard, Kay Oehler and Blair Benjamin
- 'The Urban Growth Management Initiative: Confronting The Expected Doubling Of The Size Of Cities In The Developing Countries In The Next Thirty Years – Methods And Preliminary Results' by Daniel L. Civco, Anna Chabaeva, Shlomo Angel and Stephen Sheppard

'Urban Structure in a Climate of Terror' by Stephen Sheppard

'The Causes of Global Urban Expansion' by Stephen Sheppard, Shlomo Angel and Daniel L. Civco

- 'Buying into Bohemia: the impact of cultural amenities on property values' by Stephen Sheppard, Kay Ochler and Blair Benjamin.
- 'The Impacts of Terrorism on Urban Form' by S. Brock Blomberg and Stephen Sheppard

'Infill versus Outspill: the microstructure of urban expansion' by Stephen Sheppard

Honors and Awards:

Royal Economic Society Prize for 2004 (shared with Paul Cheshire)

- Herman H. Lehman Fellow at the Oakley Center for the Humanities and Social Sciences, Williams College, 2004-05
- Fellow, Weimer School of Advanced Studies in Real Estate and Land Economics, Homer Hoyt Advanced Studies Institute, 2006

Research Interests:

Theory of Spatial Economies and Land Markets Urban Economics Microeconomic Theory Public Finance Environmental and Natural Resource Economics

Teaching Interests:

Urban and Regional Economics Microeconomics Local Public Finance Microeconomic Theory Natural Resource Economics Environmental Economics

Research Experience:

Staff Economist, Olympus Research Corporation, Salt Lake City, Utah, 1976-1977.

Participant, Summer Program for Young Scientists, International Institute for Applied Systems Analysis, Laxenburg, Austria; research with the Human Settlements and Services Group, 1979.

Senior Research Officer, Department of Economics, University of Reading, Reading, England. Participated in ESRC funded project 'The Economic Consequences of the British Planning System: A Pilot Study', 1984-85.

Consultant, International Bank for Reconstruction and Development: The World Bank. Prepared research report concerning the effects of stochastic regulatory behavior of planners on land use and housing with emphasis on the experience of Thailand, Korea, and Malaysia, 1989-90.

Consultant, International Bank for Reconstruction and Development: The World Bank. Preparing analysis for Policy Research Division on the Effects of Fiscal Constraints and the Endogenous Determination of Public Servant Quality, 1994-95.

Visiting Scholar, International Monetary Fund Research Department, Spring 1995, January 1996.

Academic Visitor, London School of Economics, Houghton Street, London, 1996-97

Consultant for the World Bank, collaborated on study and preparation of a report on the causes, consequences and management of urban growth in developing countries, focusing on San Salvador, El Salvador, (2002).

Consultant for the Inter-American Development Bank, investigated and prepared report on policy alternatives for support of social rental housing in Sao Paulo, Brazil, (2002-2003).

Consultant for CHF International, coordinated preparation of survey and analysis of data to investigate the economic benefits of emergency shelter provision, (2004).

Director and Founder, Center for Creative Community Development, North Adams, Massachusetts, a research center focused on understanding the role of the cultural sector in promoting economic development and community revitalization, (2004 – 2006).

Research Funding:

The Development of a Microsimulation model for Analysing the Impact of Planning on Housing Choices, Co-Principal Researcher, grant from the U.K. Department of Environment, Transport, and the Regions, 1997-98.

Recipient of curriculum development grant as part of Award for the Integration of Research and Education (AIRE) from the National Science Foundation (NSF) to Oberlin College, for development of curricular modules to train and assist students in undertaking hedonic analysis of property markets, 1998-99.

Lincoln Institute of Land Policy, Visiting Fellowship. To collaborate with Paul Cheshire on research project 'The Mediating Role of Land and Housing Markets In Urban Areas', \$5000, Autumn 2000.

A Center for the Study of Arts and Culture-Based Community Development: A Planning Grant Proposal, in collaboration with Joe Thompson, MASS MoCA, submitted to the Ford Foundation, funded for \$28,000, 2003.

The Urban Growth Management Initiative: Confronting the Expected Doubling of the Size of Cities in the Developing Countries in the Next Thirty Years, in collaboration with Shlomo Angel, NYU, submitted to the Research Committee of The World Bank on behalf of The Urban Development Division, funded for \$230,000, 2003-04.

The Center for Creative Community Development: Implementation Proposal, in collaboration with Joe Thompson, MASS MoCA, submitted to the Ford Foundation, funded for \$435,000, 2004-2007.

The Causes and Consequences of Urban Expansion, National Science Foundation Award SES-0433278, \$425,000, 2004-2007.

Museums and Community: evaluating the economic and social impact of museums, Institute for Museum and Library Services, \$334,384, 2006-2009.

Teaching Experience:

Adjunct faculty, MA program, Webster University, Webster Groves, Missouri; 1979-1981

Instructor in Economics, Washington University; 1980

Senior Teaching Associate in Economics, Washington University; 1980-1981

Assistant Professor of Economics, Virginia Polytechnic Institute and State University; September 1982 - December 1983, and April 1985 to June 1990.

Visiting Assistant Professor of Economics, Washington University in St. Louis; July 1989 to June 1990

Assistant Professor of Economics, Oberlin College; July 1990 to May 1993 Associate Professor of Economics, Oberlin College; June 1993 to 1998 Professor of Economics, Oberlin College; June 1998 to July 2000

Professor of Economics, Williams College, July 2000 to present James Phinney Baxter III Professor of Public Affairs, Williams College, July 2002 to present

Courses taught:

Advanced Microeconomic Theory Current Issues in Economics: Fiscal Federalism Current Issues in Economics: Land Markets Economics of Business Decisions Economics of Land, Location, and the Environment **Environmental Economics** History of Economic Thought and Policy Managerial Economics Microeconomic Theory I, II (graduate level) Price Theory (undergraduate level) Principles of Economics Public Economics Seminar in Environmental and Natural Resource Theory of Exchange and Production **Transportation Economics** Urban Economics

Other Professional Activities:

1986 - 2005Proposal Referee, National Science Foundation1987-89, 1993-94, 1996-97Referee, Urban Affairs Review1987 - 1990Referee and Committee Member,
Transportation and Economic Analysis Subcommittee,

	National Academy of Science
1990	Referee, Contemporary Policy Issues
1990, 1992, 1994, 2000	Referee, Journal of Economic Education
1991	Reviewer, Harper Collins Publishers
1991	Reviewer, Wadsworth Publishers
1993 - 2006	Referee, Journal of Urban Economics
1993, 1999, 2003 - 2005	Referee, Regional Science and Urban Economics
1994, 1996, 1997	Referee, The Economic Journal
1998	Referee, The American Sociological Review
1998	Referee and Consultant, The Oxford University Press
2000	Referee and Panelist, National Science Foundation ITR/SOC program
2004	Referee, Journal of Health and Social Behavior
2000	Referee, Australian Economic Papers
2001	Referee, Regional Studies
2006	Referee, Environment and Planning
2002 – 2006	Referee, Urban Studies
1990 - 2000	Environmental Studies Program Committee, Oberlin College
1997 – 1999	Educational Technology Committee, Oberlin College
1998 – 2000	Research and Development Committee, Oberlin College
2001 – 02	Ad hoc Committee on the role of athletics, Williams College
2002 - 04	Center for Environmental Studies Advisory Committee, Williams College
2002 - 03	Information Technology Committee, Williams College
1994 - 95	Consultant and Expert Witness for plaintiff's counsel in case of Marie DeSario, et al., v.
••••	Industrial Excess Landfill, Inc., et al.
1995	Consultant and Expert Witness for plaintiff's counsel in case of Friendly's Ice Cream
	Corporation v. L.S. Piping & Mechanical Services
1996-1998	Consultant and Expert Witness for plaintiff's counsel in case of Sherrill et al. v. Hess, et
	al
1996-2001	Consultant and Expert Witness for plaintiff's counsel in case of Clara M. White v. Aztec
	Catalyst Co., et al.
1998-2001	Consultant and Expert Witness for plaintiff's counsel in case of Randal O. Lowe, et al. v.
	Sun Refining and Marketing Co., et al.
1999-2000	Consultant and Expert Witness for plaintiff's counsel in case of Dalespring Corporation
	v. Bullington*Gleason, et al.
1999-2001	Consultant and Expert Witness for plaintiff's counsel in case of William Rehoreg, et al.
	v. Stoneco, Inc.
2002-2003	Interamerican Development Bank, consultant providing report on "Social Rental Housing
	in Sao Paulo, Brazil: the present situation contrasted with the European and North
	American Experience"
2003-2004	CHF International, coordinated preparation of survey and analysis of data to investigate
	the economic benefits of emergency shelter provision

Presentations and Invited Seminars:

1982 Midwest Mathematical Economics meetings, St. Louis, Missouri

1983 Winter meetings of Econometric Society, San Francisco, California

1984 Theory workshop, Warwick University, Coventry, England

- 1985 World Congress of the Regional Science Association, Rotterdam, Netherlands
- 1988 Economics workshop, Northern Illinois University, Dekalb, Illinois

1988 Economic theory workshop, University of Reading, Reading, England

1989 European meetings of Econometric Society, Munich, West Germany

1990 Western Regional Science Association, Molokai, Hawaii

- 1990 Public Finance and Resource Economics workshop, University of Illinois, Urbana, Illinois
- 1990 North American Meetings, Regional Science Association, Boston, Massachusetts

Presentations and Invited Seminars, continued:

European Meetings, Regional Science Association, Lisbon, Portugal 1991. Microeconomics workshop, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 1992 Tenth World Congress of the International Economics Association, Moscow, Russian Republic 1992 AREUEA/USC International Conference on Real Estate and Urban Economics, Los Angeles, California 1992 North American Meetings of the Regional Science Association International, Chicago, Illinois 1992 Southern Economics Association, New Orleans, Louisiana 19**93** Participant in Roundtable on Educational Technology in Economics, sponsored by Addison Wesley at Allied 1994 Social Science Meetings, Washington, D.C. American Real Estate and Urban Economics Association, International Housing Markets, Orlando, FL. 1996 Graduate seminar, London School of Economics. 1996 European Real Estate Society, Berlin, Germany. 1997 The Northeast Universities Development Consortium Conference 1997. Lincoln Institute of Land Policy 1997 American Real Estate and Urban Economics Association, at Allied Social Sciences Meetings, Chicago, IL. 1998 University of Glasgow, Urban Economics seminar 1998 North American Meetings, Regional Science Association, Santa Fe, New Mexico 1998 Departmental Workshop, U.S. Air Force Academy 1999. European Regional Science Association, Dublin, Ireland 1999 North American Meetings, Regional Science Association, Montreal, Canada 1999 Department seminar, Case Western Reserve University 1999 Department seminar, Williams College 2000 World Congress of the Regional Science Association, International, Lugano, Switzerland. 2000 Lincoln Institute of Land Policy, internal staff seminar 2000 North American Meetings, Regional Science Association, Chicago, Illinois 2000 Pacific Regional Science Organization (PRSCO) Meetings, Portland, Oregon 2001 Lincoln Institute of Land Policy, Director's Conference, Scottsdale, Arizona 2002 Lincoln Institute of Land Policy, Conference on the Analysis of Urban Land Markets and the Impact of Land 2002 Market Regulation North American Meetings of the Regional Science Association, San Juan, Puerto Rico 2002 World Bank Inaugural Urban Research Symposium, Washington, DC 2002 North American Meetings, Regional Science Association, Philadelphia, PA 2003 Centre for Economic Policy Research/European Science Foundation/Centre for Economic Performance 2003 Conference Topics in Economic Geography: A Dialogue Between Economists and Geographers Inter-American Development Bank Conference on Housing Policy, Sao Paulo, Brazil 2003 North Atlantic Regional Council, Society for College and University Planners, Williamstown, MA 2004 North American Meetings of the Regional Science Association, Seattle, WA 2004 Allied Social Sciences Associations annual meetings, AREUEA Session San Diego, CA 2004 Americans for the Arts National Conference, Austin, TX 2005 Summer Institute of Arts Management, Amherst and North Adams, MA 2005 · Social Theory, Politics and the Arts National Conference, Eugene, OR 2005 Grantmakers in the Arts National Conference, Pasadena, CA 2005 University of Reading, Economics Department Workshop, Reading, England 2005 CESifo Conference on "Guns and Butter: The Economic Causes and Consequences of Conflict", Munich. 2005 Germany Allied Social Sciences Associations, AREUEA Session, The Causes and Consequences of Urban Expansion. 2006 Boston, MA Homer Hoyt Advanced Studies Institute, The Causes of Global Urban Expansion and the Consequences for 2006 Commercial Property, Palm Beach, Florida The Earth Institute at Columbia University, workshop on "Rethinking the Estimation and Projection of Urban and 2006 City Populations", What Can We Learn From Remotely-Sensed Data?, New York, NY World Bank Policy Research and Economic Modeling Conference (PREM), Panel Discussion on Global Urban 2006 Expansion, Washington, DC.

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,	2006	Lincoln Institute of Land Policy, Conference on Land Policies for Urban Development, Comments on: Community Land Trusts and Affordable Housing, Cambridge, MA.
	2006	The World Bank Seminar, Modeling the Causes of Urban Expansion, Washington, DC.
	2006	Boston University Arts Research Initiative Symposium on Research, Policy and Practice: Building Capacity in
		Creative Communities, Panel Discussion on Research and Theory, Boston, MA
	2006	Lincoln Institute of Land Policy, The Causes and Consequences of Urban Expansion, Cambridge, MA.
	2006	Keynote Address at NAREA 2006 Post-Conference Workshop, "Opportunities and Challenges Facing the Rural
		Creative Economy", The Creative Economy and Quality of Life in Small Cities, Mystic, CT.
	2006	19th Advanced Summer School in Regional Economics, European Regional Science Association Summer
		Institute, Four Lectures on GIS and Spatial Econometrics, Groningen, Netherlands
	2006	The Association for Cultural Economics International (ACEI) meetings, Buying into Bohemia: the impact of
		cultural amenities on property values, Vienna, Austria.
	2006	Keynote Address at New York State Economics Association, The Causes and Consequences of Global Urban
		Expansion, Albany, NY
• .	2006	Brookings-Wharton Conference on Urban Affairs, The Impacts of Terrorism on Urban Form, Washington, DC.
	2006	Grantmakers in the Arts "Research at Eye Level" pre-conference, co-organized and hosted conference, co-
	· · ·	presented two papers: North Adams and Mass MOCA: evaluating the impact of creative community development
	•	and Measuring New England's Creative Economy – New England Cultural Database and Counting on Culture
		Tool, North Adams, MA.
ť	2006	North American Meetings of the Regional Science Association, Infill versus Outspuil: the microstructure of urban expansion Toronto, Canada.
	2006	MTT Urban/Real Estate Seminar. Infill versus Outspill: the microstructure of urban expansion. Cambridge, MA
	2000	Lincoln Institute of Land Policy, Symposium on Valuation Techniques and Land Value Assessment, Panel
	2000	Discussion Participant, Cambridge, MA
	2007	Innovations for an Urban World: a Global Urban Summit, Measuring and Modeling Global Urban Expansion.
		Bellagio, Italy.
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Personal: Date of Birth: January 16, 1955 Marital Status: married, two children

Potential Impacts of Indian Point Relicensing on Property Values

Summary of finding

I have been asked to report on the extent to which it is valid to regard the impact on off site land use of the continued operation of Indian Point 2 and Indian Point 3 as small in the sense of being undetectable or so minor as to not noticeably alter any important attribute of local resources, and in particular local land use. It is well established that, within regulatory bounds, land uses are determined by property values and the uses that tend to generate the highest values. In my examination of the existing research and evidence, I find that there are sound scientific reasons to expect that these impacts will not be small, and in fact may be substantial. The impacts can be expected to arise because of changes in property values that are associated with the presence of the power plant. The report below presents the basis for this finding.

Introduction

There have been several scientific studies of the impacts of power generating plants, in general and nuclear fission power plants, in particular. The most useful of these, for present considerations, are those that have determined the impacts, if any, on property values. These studies are the most useful because it is the market value of property that is the most significant determinant of its use and maintenance. To assert that the changes in land use in the area around the Indian Point nuclear power plants will be small is equivalent to asserting that the impacts on property values of extending the operating license will be negligible. If the presence of the nuclear power generating plant has a significant impact on property values, then it logically follows that extending the license will have a significant impact on property values which in turn will affect land use by affecting the decisions made by thousands of property owners and developers. Whether this significant impact exists is a scientifically testable question.

Blomquist¹ was one of the first to present a scientifically sound estimate of the impact of power plants generally on property values, and to publish the result in a peer-reviewed journal. It is plausible that such land uses will be the source of modest to severe levels of nuisance and disamenity that could depress the market value of nearby properties. His analysis found that, after adjusting for other factors (property size, demographic composition of neighborhood, etc.), there was a clear and statistically significant impact of power plants on property values. The impact was most

¹ Glenn Blomquist, "The Effect of Electric Utility Power Plant Location on Area Property Value" Land Economics, Vol. 50, No. 1. (Feb., 1974), pp. 97-100.

clearly detectable up to a distance of 11,500 feet from the power plant. Within this zone, increasing the distance from the power plant by 10% was associated with an increase in market value of 0.9 percent. This level of impact was evaluated for sample mean properties, meaning that it could be expected to hold for typical properties in the area around the power plant. It did not cover the impacts on commercial properties.

Do these results hold for the particular case of nuclear power plants? The careful analysis across several urban areas undertaken by Clark and Nieves² suggests that if anything the impact of nuclear power plants is larger. Their analysis uses data covering the entire United States and includes the impacts of 21 nuclear power plants as well as 39 coalfired and 53 gas or oil-fired generating facilities. They find impacts to a reasonable and professionally accepted degree of scientific certainty from all types of power plant. Their analysis further indicates that the impact of nuclear generating plants is more than 3 times the impact of coal fired plants and more than 4 times the impact of gas and oil fired generating facilities. Their analysis is particularly valuable because they have been careful to separate the impacts of the plants themselves from the employment or income-generating impacts of power plants. This must be done to isolate the pure impact of the power plant that would be observed if the facility is completely replaced with an alternative use that is also capable of generating employment and income.

Not all published studies suggest clear negative impacts, but those that suggest zero impacts or ambiguous impacts generally have flaws in their scientific design. For example, Clark, Michelbrink, Allison and Metz³ estimate a hedonic model for residential property values around two nuclear power plants located in California. They find small increases in property value associated with proximity to the power plants.

The analysis of Clark *et al.* openly combines both the impact of job accessibility with the impact of disamenity and nuisance associated with proximity to the nuclear power plants. Combining these two impacts would be an appropriate technique for estimating the impact of the nuclear power plant ONLY in the case where the counter-factual being evaluated was complete removal of the plant **and abandonment of the land**. For most cases, and certainly in the case of decommissioning of the plant contemplated in the Indian Point case, this is not the appropriate question to ask. Decommissioning of the plant entails removal of all radioactive materials from the site and making the site available for alternative use. In the Indian Point case, the highest and best alternative use of the site where the nuclear power plant is located would certainly NOT be abandonment, but rather a combination of attractive riverfront development that would be likely to include employment and other attractive locations. It is therefore not scientifically valid to assert that the results of Clark *et al.* could be applied to the Indian Point site.

² David Clark and Leslie Nieves, "An Interregional Hedonic Analysis of Noxious Facility Impacts on Local Wages and Property Values" Journal of Environmental Economics and Management, Vol. 27 (1994), pp 235-253.

³ David Clark, Lisa Michelbrink, Tim Allison and William Metz, "Nuclear Power Plants and Residential Housing Prices" Growth and Change, Vol. 28, (1997) pp 496-519.

The study by Folland and Hough⁴ does a somewhat better job of adjusting for the local employment effects, but unlike the Clark and Neives study discussed above does not fully account for the labor market impacts. They look at the impacts on the value of commercial or potentially commercial land in 494 market areas around the United States in years ranging from 1945 to 1992. They confirm that there is a statistically significant negative impact on property values that results from installation of a nuclear power plant.

In conclusion, there is clear scientific evidence that the presence of nuclear generating plants can reduce the value of property in the area around the plant. There are differences between the studies about how far the impact might extend, and about the magnitude of the impact. All properly done studies, however, indicate the potential for a significant, not a small, impact. In the next section I will present some estimates of how large that impact might be in the Indian Point case.

Analysis

In order to obtain a general estimate of the magnitude of property value impacts, I have made use of data available from the 2000 Census for the region around the Indian Point generating facility, making appropriate adjustments as described below.

A conservative estimate of property value impacts can be obtained by applying the impact estimated by Blomquist discussed above. His analysis suggested that there are no impacts on property values beyond 11,500 feet, and that up to that distance moving 10% further away from the power plant would increase the value of the property by 0.9%.

According to the 2000 Census, there are 32,427 persons living in Census Block Groups whose center is within 2 miles of the Indian Point facility. Within this area there are 12,933 housing units. The area around Indian Point and the associated census block groups are illustrated in Figure 1 below. The block groups are shaded blue with darker shades indicating more dwelling units. Of these dwellings, 6886 units are owner occupied units whose collective value in 2000 was \$1,425,552,500 (over \$1.4 billion). There were 5468 renter-occupied properties, whose average median contract monthly rent was about \$750 per month. I approximate the value of the rental properties by calculating the discounted present value of the stream of rents that can be earned, and this produces an estimated value of rental property in the area of \$816,613,800 (nearly \$817 million). Combining these indicates that as of the 2000 Census the total value of residential property within 2 miles of the Indian Point facility was about \$2,242,166,300 (\$2.2 billion).

⁴ Sherman Folland and Robin Hough, "Externalities of Nuclear Plants: Further Evidence" Journal of Regional Science Vol. 40, No. 4, (2000) pp 735-753.



Figure 1: Region around Indian Point Nuclear Power Plant

Property values have continued to increase with the overall market, and the Office of Federal Housing Enterprise Oversight (OFHEO) tracks the course of house prices in every state and many metropolitan areas in the US. Using the index for the state of New York indicates that on average house prices have increased 93% from the first quarter of 2000 to the first quarter of 2007. Therefore the current market value of residential property within 2 miles of the Indian Point plant is approximately equal to \$4,327,380,959 (over \$4.3 billion).

For each Census block group, I calculated the percentage increase in distance from the Indian Point plant that would be required to move the block group to be 11,500 feet away from the plant. This is a very conservative estimate, based on Blomquist's study, of how far away from the plant properties would have to be to be free of impact from the plant. To be particularly certain that I obtain a minimum estimate of the impact, I excluded those houses in the block group

that actually contain the plant, since these are not typical of the sample in a way that would make application of Blomquist's results scientifically valid in all circumstances.

The resulting calculations indicate that removal of the impacts of the Indian Point Nuclear plant would increase property values by \$576,026,601 (over \$500 million). This is clearly sufficient to alter the decisions about land use made by the owners of the most affected properties. The result indicates that the assertion that the impacts of extended licensing of the plant would be non-existent or undetectable cannot be accepted as scientifically valid.

Concluding remarks

The results presented in the report above provide a very cautious preliminary estimate. I have not considered the impact on commercial or agricultural property, although research suggests that these impacts can be significant as well. I have used a scientifically respected result based on analysis of power plants in general, while research suggests that the impact of nuclear power plants can be several times higher.

Finally, I have made use of the Census data only because they are widely regarded as reliable. A more complete analysis of residential and commercial properties is possible using detailed data from property tax records and land use information obtainable from the individual communities in the region. This would also permit examination of the extent to which the impacts extend beyond the very localized area I consider in this report.

Attachment 12

February 26, 2009 Supplemental Declaration of Dr. Stephen C. Sheppard and accompanying report, Potential Impacts of Indian Point Relicensing with Delayed Site Reclamation

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:

License Renewal Application Submitted by

Docket Nos. 50-247-LR and 50-86-LR

ASLBP NO. 07-858-03-LR-BD01 t 2, LLC, t 3, LLC, and DPR-26; DPR-64

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.

SUPPLEMENTAL DECLARATION OF STEPHEN C. SHEPPARD

Stephen C. Sheppard, hereby declares under penalty of perjury that the following is true and correct:

1. I have been retained by the New York State Office of the Attorney General to provide expert services in connection with the application by Entergy Nuclear Operations, Inc. and its affiliates (collectively Entergy) for a renewal of the two separate operating licenses for the nuclear power generating facilities located at Indian Point.

2. I am a Professor of Economics at Williams College where I teach in the Economics Department. In addition to teaching, I also conduct research on issues that include environmental and natural resources economics, public finance, and

February 2009 Supplemental Declaration of Stephen Sheppard.

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land use economics. In 2006 I was a Fellow at the Weimer School of Advanced Studies in Real Estate and Land Economics. Before that, I was the Herman H. Lehman Fellow at the Oakley Center for the Humanities and Social Sciences at Williams. And in 2004 I shared with a colleague the Royal Economic Society Prize. My CV, which was attached to my original declaration submitted in this proceeding, includes a list of my published papers and other work.

3. I received a B.S. from the University of Utah in 1977, and received from Washington University (St. Louis) an A.M. in 1979 and a Ph.D. in 1984.

4. Attached to this Declaration is a Supplemental Report I prepared. This document was prepared by me and is true and correct to the best of my personal knowledge.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Dated: February 26, 2009 Williamstown, Massachusetts

February 2009 Supplemental Declaration of Stephen Sheppard

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Potential Impacts of Indian Point Relicensing with Delayed Site Reclamation

Summary of finding

If the "no action" option of ceasing operations at IP2 in 2013 and IP3 in 2015 permits more rapid site reclamation and restoration, while the option of relicensing operations to run through 2035 is associated with a delayed process of site restoration, there are significant additional burdens imposed on off-site property values if license renewal is approved. If the diminution in current property values is approximately \$500 million, then the burden caused by the additional delay in restoration due to the period of extended plant operation plus the longer period required for site reclamation is reasonably estimated as between \$300 and \$340 million.

Introduction

In my initial report submitted on November 29, 2007, I reviewed a variety of studies that had appeared in peer-reviewed journals concerning the potential impacts on off-site land use and property values resulting from continued operation of Indian Point 2 and Indian Point 3 nuclear power plants in the Village of Buchanan in Westchester County. Making use of census data and estimated impacts of large power plants on off-site property values I demonstrated that the effects resulting from relicensing could be over \$500 million, with a more exact measurement requiring detailed data from the local property markets. In that analysis I assumed that if license renewal were approved, the additional wastes generated by license renewal would be fully restored no later than 30 years after the renewed license expired - i.e. by 2065. However, as discussed below, I have now been advised that it is possible the wastes generated by license renewal may remain on the site for much longer and perhaps indefinitely. This substantial additional delay in restoring the site to unrestricted use will have a substantial additional impact on off-site land values.

Diminution of off-site property value can be expected to be associated with important and visible changes in land use, including delayed development of land, lower density of development on land that is developed, and deferred maintenance on affected parcels.

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A full analysis of the impacts naturally depends on the dynamic structure of the nuisance. In particular, I have been told to assume that the "no action" option (denying the request to relicense IP2 and IP3) involves operating the power plant at present levels until 2015, and then commencing a process of site reclamation so that by 2025 the site can be developed to its most efficient use, and the nuisance impact on off-site properties resulting from proximity to the power plant would be removed.

In comparison with this "no action" option I am asked to consider the impact resulting from relicensed operation of IP2 and IP3 until 2035. Following this period will commence a period of undetermined length during which of the nuclear waste products produced at the plant during extended license operation will continue to be stored at the site. The site would no longer be a significant source of employment and would possibly be a reduced source of property tax revenue for the community. The implication is that the relicensing option is likely to continue to impose a nuisance burden on off-site property values with a combined magnitude equal or greater to the magnitude imposed on property values at present. This impact is expected to continue for at least a period of 60 years (until 2095) and potentially much longer. What impact does the extended delay in full site reclamation associated with IP2 and IP3 have on the off-site costs?

Analysis

To answer the question posed at the end of the previous section with precision requires an estimate of the total impact on off-site property values. In order to illustrate the impact of delayed site reclamation and illustrate the range of possible impacts, I assume a present market impact of \$500 million on property values. To the extent that more detailed evaluation of these impacts suggests an amount more or less than this, the results discussed below would increase or decrease.

All options under consideration allow the continued operation of IP2 and IP3 until 2015. Following this, the "no action" option imposes a continued cost of \$500 million in reduced wealth on local property owners for a period of 10 years until site reclamation is complete. The relicensing option imposes this cost on local property owners through the period of continued operation (until 2035) followed by possibly larger costs imposed for an indefinite amount of time. For this example I assume the costs continue at the level of \$500 million, but a detailed evaluation may well suggest a substantial increase.

The difference between the two options depends critically on four variables:

- 1. The total diminution in off-site property values
- 2. The real rate of increase in local property values
- 3. The appropriate discount rate chosen to evaluate the dynamic flow of costs
- 4. The time required for complete site reclamation following the relicensed operation of IP2 and IP3

As indicated above, for this report I will assume that the diminution in values caused by the current plant operation is \$500 million, and that this lost value could be recovered in 2025 if relicensing were not allowed. I will also make the conservative assumption that there is no real increase in local property values (meaning that property values increase or decrease at exactly the same rate as the general price level).

The impact of the discount rate is shown below in Figure 1. This figure assumes a delay in site reclamation until 2105 (70 years after the plants cease operations). A range of possible discount rates is shown along the horizontal axis, and the additional burden on off-site property values arising from relicensing and delayed reclamation is shown on the vertical axis. As indicate, the impact ranges from about \$240 million to \$310 million, depending on the discount rate chosen.



Figure 1: Burden on off-site properties at various discount rates

While there can be debate about the appropriate discount rate to use for analysis, a reasonable starting point would be the real mortgage interest rate, or the mortgage interest rate less the rate of inflation. This would

suggest a discount rate of between 3 and 4 percent (.03 to .04). Figure 1 shows that over this range the burden on off-site property values from relicensing and delayed reclamation would be between \$300 and \$310 million.

What about the duration of the delay in site reclamation and restoration? It is clear that increasing the delay imposes greater burdens on off-site properties, because the penalty of reduced values and reduced wealth is being imposed for a longer time period. The exact magnitude depends on the discount rate used, but a range of possible impacts is shown in Figure 2 below. Figure 2 shows the burden on off-site property values at various durations of delay, assuming a discount rate of .0325, or 3.25 percent. As one might expect, the burden is increasing as the delay increases. The impact is particularly severe as we increase the delay from 60 or 70 years of delay (where the burden imposed is \$300 to \$310 million) to 140 years of delay (where the burden rises to \$350 million). Beyond that the additional delay imposes only modest increases in the cost to off-site property owners because the remedy (removal of the nuisance) is so far in the future as to be of little or no market value.



Figure 2: Burden on off-site properties at various years of delay

It should be noted that the calculations in Figure 2 are sensitive to the assumption of zero increase in real property values.

Conclusion

If the "no action" option permits complete site reclamation and restoration within ten years after the end of operations, while relicensing delays site reclamation by not only the additional time period of plant operations but also a significant delay during which nuclear waste is stored on site, there are important additional burdens imposed on off-site properties. Making reasonable assumptions about this delay, and using the potential property value impacts identified in my earlier report, the option that provides for relicensing of IP2 and IP3 would impose additional burdens of \$300 to \$340 million on these properties. This is not only a burden on the individuals involved but could have significant land use and development impacts.

Attachment 13

 February 9, 2010 Supplemental Comments of the State of New York submitted by the Office of the Attorney General in NRC rulemaking proceeding RIN 3150-AI47, NRC-2008-0482, NRC-2008-0404 – Waste Confidence Decision Update and Consideration of Environmental Impacts of Temporary Storage of Spent of Spent Fuel After Cessation of Reactor Operation

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

In the Matter of:

Waste Confidence Decision Update

RIN 3150-AI47

NRC-2008-0482

and

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation NRC-2008-0404

SUPPLEMENTAL COMMENTS BY THE OFFICE OF THE ATTORNEY GENERAL OF THE STATE OF NEW YORK CONCERNING THE NUCLEAR REGULATORY COMMISSION'S PROPOSED WASTE CONFIDENCE DECISION UPDATE AND CONSIDERATION OF ENVIRONMENTAL IMPACTS OF TEMPORARY STORAGE OF SPENT FUEL AFTER CESSATION OF REACTOR OPERATION

This rulemaking proceeding concerns NRC's review of its previous "waste confidence" determinations. In October 2008, NRC invited public comment on this issue, and a number of States provided written statements. Since those public comments were submitted a year ago, various events have occurred that are relevant to these ongoing rulemaking proceedings. These recent events confirm the State of New York's concern about the continued storage of radioactive waste at the Indian Point reactors, which are located in Westchester County just 24 miles north of New York City. Accordingly, the State of New York respectfully submits the following comments to supplement its previous statement.

I. Introduction and Summary of Comments

It is undisputed that questions involving the storage and disposal of nuclear waste pose significant health and environment concerns that require analysis under the National Environmental Policy Act (NEPA) and the Atomic Energy Act (AEA). In a 1979 case involving placement of additional nuclear waste in the spent fuel pools at Vermont Yankee and Prairie Island, the Court of Appeals for the District of Columbia Circuit instructed NRC to determine whether there was reasonable assurance that an off-site storage solution will be available by 2007-2009. *Minnesota v. NRC*, 602 F.2d 412, 418, 420 (D.C. Cir. 1979). Following that court

order, NRC embarked on a NEPA rulemaking process to determine whether or not NRC had confidence to predict that a permanent disposal facility would be available by 2007. The result was the "waste confidence" determination in which NRC predicted a permanent national waste disposal facility would be permitted and operational by a specific date. However, each of NRC's predictive dates has come to naught, and thirty years later, the high-level radioactive waste at Indian Point is no closer to a final disposal site. During the same time, the "leak tight" spent fuel pools at Indian Point released radionuclides into the environment.

Because of markedly changed circumstances that have occurred during the past year and have been acknowledged by NRC, the Commission should now address the issue of nuclear waste disposal in a different manner than its past decisions. For the first time since the initial promulgation of the waste confidence rule (10 C.F.R. § 51.23(a) & (b)) several key facts have been revealed and accepted, directly or indirectly, by the Commission:

- 1. As evidenced by the September 2009 Notation Votes, a majority of the Commissioners have acknowledged that they are not able to predict a date certain by which a permanent nuclear waste mined geologic repository or solution will be in place.
- 2. Thus, spent fuel generated from this point forward, and particularly spent fuel generated during the term of any extended operating license, will likely have to remain at the reactor site indefinitely following shutdown of the reactor.
- 3. The Commission has not made a generic determination regarding environmental and safety issues presented by indefinite storage of spent fuel at the site of nuclear reactors following shutdown.
- 4. Recent actions by the Commission, particularly since 2001, have demonstrated that a significant number of substantial environmental and safety issues related to indefinite storage of spent fuel at the site of shutdown nuclear reactors are specific to the particular reactor and site and cannot be addressed on a generic basis.

These facts demonstrate that NRC, in order to comply with its obligations under the National Environmental Policy Act and the Atomic Energy Act, as well as the mandates of the United States Court of Appeals in *Minnesota v. NRC*, 602 F.2d 412 (D.C. Cir. 1979), and *Potomac Alliance v. NRC*, 682 F.2d 1030 (D.C. Cir. 1982), will have to reformulate its approach to the issues raised in the pending waste confidence rule making. In particular, the Commission should now recognize as

result of the prospect of indefinite storage of spent fuel at reactor sites after the plants have been shut down, that there are issues – such as what site-specific measures are required to make spent fuel pools safe from fires, seismic hazards, or leaks – that must be resolved on a plant-by-plant basis and these issues, if properly raised in a license renewal proceeding, are appropriate for resolution by an Atomic Safety and License Board.

In its February 6, 2009 comments on the proposed modifications to the waste confidence findings, the State of New York, along with the State of Vermont and the Commonwealth of Massachusetts, provided extensive evidence that:

- Past and current events have substantially undermined all the bases upon which the Commission had previously concluded that a permanent, offsite spent fuel waste disposal site would exist by a date certain (see States' February 6, 2009 Waste Confidence Comments at 11-28);
- 2. Recent actions and studies, including a wide-ranging NRC Staff report on spent fuel storage in pools demonstrated that there is no longer any basis to conclude, on a generic basis, that spent fuel can be stored in pools at reactor sites without any substantial adverse environmental or safety concerns arising from routine plant operations and that site-specific analyses would be required to determine, in light of site-specific characteristics, including geology, seismology, demography, spent fuel pool design, configuration of the spent fuel in the pool, and vulnerability to malevolent acts, whether mitigation measures proposed to address these conditions at each site are adequate (see, e.g., NUREG-1738, SECY-01-0100, Sandia Letter Report, Revision 2 (Nov. 2006), February 2002 Interim Compensatory Measure Order (or "ICM or B.5.b Order"), Alvarez, et al., Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States, 11 Science and Global Security, 1-51 (2003));
- 3. Past events, including a report by the National Academy of Sciences, demonstrate that intentional acts by malevolent persons or groups pose a credible threat to spent fuel stored at certain reactor sites (see National Research Council of the National Academies of Science, Safety and Security of Commercial Spent Nuclear Fuel Storage, Public Report (2005));
- 4. Past events, including a report by scientists at the Lamont Doherty Earth Observatory of Columbia University, identified the existence of a new seismic fault line that could increase the probability of an earthquake in the New York metropolitan area (see Lynn R. Sykes, John G. Armbruster, Won-Young Kim, and Leonardo Seeber, Observations and Tectonic Setting

of Historic and Instrumentally Located Earthquakes in the Greater New York City-Philadelphia Area, Bulletin of the Seismological Society of America, Vol. 98, No. 4., pp. 1696-1719 (Aug. 2008)). The report also found that the Indian Point facilities and their spent fuel pools sit at the previously-unidentified intersection of seismic fault lines. *Id.* Such seismic features could contribute to accidental or external events, outside the control of the plant operator, which could create a previouslyunexamined risk to spent fuel stored at the site.

The States of Connecticut and California made similar points in their rulemaking comments.

These well-documented factual conclusions are, in and of themselves, sufficient basis for the Commission to abandon its proposal to make new generic findings regarding the safety and environmental acceptability of indefinite storage of spent fuel at reactor sites. To these conclusions, the State now adds the following:

1. Subsequent to 2001, the Commission has abandoned any attempt to treat safety and environmental issues associated with spent fuel storage at reactor sites on a generic basis. Rather, the Commission, operating through its regulatory staff, has ordered implementation of site-specific mitigation measures for each reactor to address concerns with spent fuel storage. NRC has acknowledged that there are differences in spent fuel pool designs and capabilities. NRC has also required the implementation of site-specific mitigation measures in response to Congressional directives to NRC to develop site-specific analyses and measures for each spent fuel pool. Moreover, while these mitigation measures have been the subject of extensive discussion between NRC and industry, their details have not been disclosed to the States. and there has not been any opportunity for public input regarding the adequacy of the measures being taken or even whether measures are being taken to address all the potential environmental and safety issues associated with spent fuel storage at reactor sites or whether more effective. alternatives are available;

 Previous indications that the Yucca Mountain waste repository proposal would never come to fruition have now become more certain as the funding for the program has been removed from the proposed federal budget and DOE staff have publicly stated that the project will not go forward. See Terminations, Reductions, and Savings: Budget of the U.S. Government, Fiscal Year 2010, p. 68 (quoted in SECY-09-0900); see also U.S. Dep't of Energy, Motion to Stay the Proceeding, filed in In re U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001 (Feb. 1, 2010); Terminations, Reductions, and Savings: Budget of the U.S. Government, Fiscal Year 2011, p. 62.

These new factual conclusions provided substantial additional support for the positions taken in the initial comments filed by the State of New York, the State of Vermont, and the Commonwealth of Massachusetts. Thus, the State again urges the Commission to accept the positions stated in the State's original comments, to abandon: (1) reliance on the now-discredited waste confidence findings and schedule; (2) generic environmental and safety findings regarding spent fuel storage at reactor sites, including the expected duration of that storage; and (3) the generic findings on long-term waste disposal imbedded in Table S-3. Instead, the State urges NRC to require and perform a site-specific evaluation of environmental impacts of spent fuel pool storage at each reactor location, taking into account environmental factors including surrounding population density, water resources, seismicity, subsurface geology, and topography along with the design, construction, and operating experience of the spent fuel pool in question and the layout of the fuel assemblies in that pool.

These new factual conclusions also provide compelling evidence to support, at a minimum, modification of the now obsolete and superseded 10 C.F.R. § 51.23(a) & (b) to allow for consideration in relicensing proceedings, such as the ongoing proceeding for the Indian Point power reactors, of any properly presented environmental and safety contention focused on the adequacy of mitigation measures taken or to be taken at that site to address the safety and environmental impacts flowing from the 20 additional years of spent fuel storage at the reactor site, the increased volume of spent fuel created during those 20 years, and the indefinite storage at that reactor site of all the waste generated by that reactor.

As currently written, the Commission's regulations segment the issues of the environmental and safety implications of spent fuel storage at reactor sites into several separate "bins" or proceedings, with varying levels of public participation (or exclusion). First, issues related to storage of spent fuel at the reactor during power

reactor operations may be considered during an operating license proceeding under 10 C.F.R. § 51.23(c). Second, issues related to spent fuel storage at reactor sites for the first 30 years following the end of reactor operations at the site are foreclosed under 10 C.F.R. § 51.23(b). Third, issues related to spent fuel storage at reactor sites for any period beyond 30 years following the end of reactor operations at the site, including indefinite storage at the site, is not addressed in any regulation because it has been assumed, erroneously, that all spent fuel would be gone from the reactor site within 30 years after operations cease. Not only is this assumption no longer valid for plants currently seeking license extensions, it is invalid for those plants that were shutdown decades ago and at which sites no reactor operations continue.

There is not, and cannot be, a rational explanation for the regulatory distinctions that provide different levels of public participation (in some cases, no participation is allowed) for consideration of the environmental and safety issues related to spent fuel storage depending on whether the storage takes place during the 20 years of extended reactor operation, the 30 years after cessation of reactor operations, or the infinite number of years beyond that 30-year "out of bounds" period. Equally inexplicable is the distinction between spent fuel stored at the site of a reactor which has ceased operations but where other reactors continue to operate (such as Indian Point Unit 1, whose operations ceased in 1974 and whose spent fuel remained in the Unit 1 spent fuel pool until December 2008 when longrunning leaks of radionuclides from that pool forced its closure) and sites where no further reactor operations are continuing (such as: Zion Units 1 & 2 whose operations ceased in 1998 and whose spent fuel remains in its spent fuel storage pools; Rancho Seco whose operations ceased in 1989 and whose spent fuel has been transferred to an on-site dry cask storage facility; and Humboldt Bay whose operations ceased in 1976 and whose spent fuel has remained in a spent fuel pool more than 30 years after reactor operations ceased and is now proposing a unique form of dry cask storage to address seismic concerns at the site). See generally http://www.nrc.gov/info-finder/decommissioning/; see also Hydrogeologic Site Investigation Report for the Indian Point Energy Center, GZA GeoEnvironmental, Inc., Figures 9.4, 9.3, 9.2, 9.1 (Jan. 7, 2008) (depicting subsurface radionuclide plumes flowing from Indian Point's spent fuel pools).

It is apparent that the central issues which need to be addressed at the time of consideration of authorization of the right to create spent fuel, are whether measures are being taken, or will be taken, to (1) provide adequate protection for public health and safety and (2) eliminate the environmental impact from the likely indefinite storage of the spent fuel at the reactor site. As discussed in more detail below and in the February 6, 2009 submittal, there are numerous issues which are specific to certain sites and certain nuclear facilities that make it impossible to

resolve these issues on a generic basis for all reactors and all sites.

The Commission should create a new paradigm for addressing the issue of indefinite storage of spent fuel at Indian Point and other sites. It should acknowledge to host communities and States that NRC accepts the proposition that radioactive waste will remain at reactor sites after reactors cease commercial operations. It should adopt a regulatory scheme that allows the site and facilityspecific issues related to indefinite storage of spent fuel to be resolved in a licensing proceeding at the time of deciding whether to authorize the creation of spent fuel. The time has come for the Commission to provide a meaningful role for stakeholders that have been previously excluded from the process – the States, their localities, and their citizens.

II. Some Spent Fuel Storage Safety and Environmental Issues Are Site- and Facility-Specific And Cannot Be Generically Resolved

Since 2001 NRC, based on guidance from various reports and based on its own considerations, has begun the process to implement site-specific measures to mitigate the consequences of accidental or intentional events that impact spent fuel storage at nuclear reactor sites. The reports demonstrate clearly that those doing the analysis not only saw substantial safety and environmental issues associated with spent fuel storage at reactor sites but also that many of the measures needed to address those issues were inherently site-specific. The following NRC or federal documents confirm that such concerns implicate site-specific analyses:

 NUREG-1738, Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (January 2001)("Fuel assembly geometry and rack configuration are plant specific" * * * "Heat removal is very sensitive to . . . fuel assembly geometry . . . [and] rack configuration . . . [and is] subject to unpredictable changes after an earthquake or cask drop that drains the pool * * * [I]t was not feasible, without numerous constraints, to establish a generic decay heat level (and therefore a decay time) beyond which a zirconium fire is physically impossible * * * [S]ince a nonnegligible decay heat source lasts many years and since configurations ensuring sufficient air flow for cooling cannot be assured, the possibility of reaching the zirconium ignition temperature cannot be precluded on a generic basis");

- SECY-01-0100, Policy Issue Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools (WITS 200000126) and attachments (June 2001) (discussing NUREG-1738);
- 3. National Academy of Sciences Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage, Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report (2005)(recognizing that there are a "variety of designs" of spent fuel pools and "The potential vulnerabilities of spent fuel pools to terrorist attacks are plant-design specific. Therefore, specific vulnerabilities can be understood only by examining the characteristics of spent fuel storage at each plant"); and
- 4. Sandia National Laboratories, Letter Report, Rev. 2, Mitigation of Spent Fuel Loss of Coolant Inventory Accident and Extension of Reference Plant Analyses to Other Spent Fuel Pools (November 2006) (identifying site-specific mitigation options and alternatives and confirming that many plant-specific variables are at play such as the density or dispersion of the fuel rods in the pool, the decay heat level, fuel burn up rate, power production rate, time since discharge, assembly inlet temperature, convective and conductive heat removal rates, and heat transfer rate to and from adjacent assemblies).

In an effort to implement the recommendations of these and other reports and to address the concerns raised, NRC Staff proceeded to develop a series of mitigation measures that were tailored to each reactor site. Staff described these steps in a Safety Evaluation Report appended to a letter sent to the licensee for Indian Point Units 2 & 3 (Entergy), on July 7, 2007, in which it gave approval to site-specific mitigation measures proposed to be taken, or already taken, by Entergy at the Indian Point site to address concerns raised by NRC Staff:

> The February 25, 2002, ICM Order that imposed interim compensatory measures on power reactor licensees required in Section B.5.b, Mitigative Measures, the development of "specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily

available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of plant due to explosions or fire." These actions were to be implemented by the end of August 2002. Inspections of the implementation of the Section B.5.b requirements were conducted in 2002 and 2003 (Temporary Instruction (TI) 2515/148). The inspections identified large variabilities in scope and depth of the enhancements made by licensees. As a result, the NRC determined that additional guidance and clarification was needed for nuclear power plant licensees.

Section B.5.b of the ICM Order required licensees to develop specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily-available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of the plant due to explosions or fire. Determination of the specific strategies required to satisfy the Order, elaborated on in the Phase 1 guidance document, was termed Phase 1.

In order to assure adequate protection of public health and safety and common defense and security, the NRC determined that differences in plant design and configuration warranted independent assessments to verify that the likelihood of damage to the reactor core, containment, and spent fuel pools and the release of radioactivity is low at each nuclear power plant. The Commission directed the NRC staff to conduct site-specific security and safety assessments to further identify enhanced mitigation capabilities. Site-specific assessments of spent fuel pools was deemed Phase 2 and site-specific assessments of reactor core and containments was deemed Phase 3.

During 2005, the NRC staff performed inspections (TI 2515/164) to determine licensees' compliance with Section B.5.b of the ICM Order (Phase 1). Subsequent meetings were held with licensees to resolve identified open issues.

Confirmatory B.5.b Phase 1 inspections (TI 2515/168) were conducted during the period of June to December 2006. The NRC staff conducted site visits as part of the Phase 2 assessments during 2005. In 2006, the NRC staff observed licensee Phase 3 studies and conducted independent Phase 3 assessments.

The industry proposed high level functional mitigating strategies for a spectrum of potential scenarios involving spent fuel pools. In a letter to all Holders of Licenses for Operating Power Reactors dated June 21, 2006 (ADAMS Accession No. ML061670146), the NRC accepted the Phase 2 proposal *pending review of site-specific details of its application and implementation*.

The implementing details of mitigation strategies included in the proposal, including those that utilize beyond-readily available resources, will be treated as commitments, which will become part of the licensing basis of the plant. Additional strategies identified during site-specific assessments which licensees deem acceptable and valuable to promote diversification and survivability, will be incorporated into licensees' Severe Accident Management Guidelines, Extreme Damage Mitigation Guidelines, or appended to other site implementation guidance. To verify compliance, the NRC staff evaluated the site-specific implementation and documentation of the proposed Phases 2 and 3 mitigating strategies for each U.S. nuclear power plant.

As part of the NRC staff's Phase 2 assessment, it was determined that *mitigating strategies for the Indian Point Nuclear Generating Unit No. 2 spent fuel were not required due to being screened out.* Therefore, the license condition for Unit 2 does not include Item b.7, "Spent fuel pool mitigation measures."

Safety Evaluation by The Office of Nuclear Reactor Regulation Related to Order No. Ea-02-026 Entergy Nuclear Operations, Inc. Indian Point Nuclear Generating Unit Nos. 2 and 3 Docket Nos. 50-247 and 50-286 (July 7, 2007) at pp. 1-4 (emphasis added) appended to a letter from NRC Staff to Entergy of the same date (ML071920020). It is indisputable that the measures proposed and taken were

specific to individual sites, like Indian Point, even though the details of the actions taken have not been released and the public has not been allowed to provide comments on, much less raise contentions in a licensing hearing to challenge, the adequacy of measures adopted by NRC Staff.¹

There is considerable evidence from well-respected experts that substantial mitigation measures are required to address issues raised by the presence of spent fuel at nuclear reactor sites for extended periods of time:

<u>Dr. Gordon Thompson.</u> Already part of the record in this rulemaking is the Report by Dr. Gordon Thompson entitled Environmental Impacts of Storing Spent Nuclear Fuel and High-Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination (Feb. 6, 2009) along with Dr. Thompson's CV establishing his distinguished qualifications in the field of spent fuel storage safety and environmental concerns. Dr. Thompson provides examples of site-specific mitigation measures that are needed to fully address the environmental and safety risks created by long term storage of spent nuclear fuel at reactor sites. *See, e.g.*, Report at Table 8-2 identifying a number of mitigation measures that would have to be configured and implemented on a site-by-site basis to reduce the risk of spent fuel fires.²

<u>Dr. Richard T. Lahey.</u> In addition, the State calls the Commissioners' attention to the Declaration prepared by Dr. Richard T. Lahey, Jr. in support of the State of New York's Notice of Intention to Participate and Petition to Intervene in In re: License Renewal Application Submitted by Entergy Nuclear Operations, Inc. (Indian Point Units 2 & 3) Docket Nos. 50-247-LR and 50-286-LR dated November

² The Commission has also acknowledged, in responding to a Congressional directive to address the threat of air-based sabotage directed at a nuclear facility, that the measures being proposed are directed at the individual sites and involve measures that are to be taken *after* the attack has occurred, not as a means to prevent the attack. As a spokesman for NRC clarified to Congress, mitigation measures to address terrorist threats "will be at the back end once the attack occurs." Homeland Security: Monitoring Nuclear Power Plant Security: Hearing Before the Subcomm. on Natl. Security, Emerging Threats and Int'l Relations, House Comm. on Govt Reform, 108th Cong. 61 (2004) (testimony of Luis Reyes, Executive Dir. of Operations, NRC), *available at*: http://frwebgate.access.gpo.gov/cgibin/getdo~.cgi?dbname=10-8house-hearings&docid=f:98358.pdf.

¹ NRC Staff developed these new mitigation measures in close cooperation with a trade group, the Nuclear Energy Institute (NEI), whose website describes its mission as the promotion of nuclear power (www.NEI.org).

30, 2007 ("Lahey Declaration"). The Lahey Declaration is contained within NRC ADAMS Accession No. ML073400193.

Dr. Lahey is the Edward E. Hood Professor Emeritus of Engineering at Rensselaer Polytechnic Institute (RPI). He has served as the Dean of Engineering and Chairman of the Department of Nuclear Engineering & Science at RPI. He belongs to and has actively participated in a number of professional organizations including the American Nuclear Society, the American Society of Mechanical Engineers, the American Institute of Chemical Engineering and the American Society of Engineering Educators. He was the editor of the Journal of Nuclear Engineering & Design. He has served on numerous panels and committees for the NRC, Idaho National Engineering Laboratory, Oak Ridge National Laboratory, the Electric Power Research Institute and the National Research Council of the National Academies. Dr. Lahey was a member of the Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage which co-authored the National Research Council Report Safety and Security of Commercial Spent Nuclear Fuel Storage (Public Report 2006).³ See Lahey Declaration at ¶ 33.

In his November 2007 Declaration, Dr. Lahey identifies site-specific mitigation measures, recommended in the Safety and Security of Commercial Spent Nuclear Fuel Storage Report that should be, but have not been, adopted for the Indian Point spent fuel pools to mitigate against the consequences of an external attack on the spent fuel pools. See Lahey Declaration at ¶ 36. Dr. Lahey also notes the existence of unique characteristics of the Indian Point plant configuration and location that require special measures to mitigate against the consequences of an external attack on the Indian Point spent fuel pools. Id., at ¶¶ 32, 34, 35, 37 & 38.

<u>Dr. Stephen Sheppard.</u> The State also calls the Commissioners' attention to the declarations and reports prepared by Dr. Stephen Sheppard. Dr. Sheppard is a Professor of Economics at Williams College and conducts research on environmental and natural resources economics. Dr. Sheppard's statements are contained within NRC ADAMS Accession Nos. ML073400193 and ML090690303.

Dr. Sheppard has identified site-specific environmental issues which are relevant to the indefinite storage of spent fuel at reactor sites. In reports prepared by him in support of the New York State Notice of Intention to Participate and Petition to Intervene in In re: License Renewal Application Submitted by Entergy Nuclear Operations, Inc. (Indian Point Units 2 & 3) Docket Nos. 50-247-LR and 50-286-LR dated November 30, 2007 and New York State's Contentions Concerning NRC Staffs Draft Supplemental Environmental Impact Statement dated February

³ Dr. Lahey's full curriculum vitae is available at http://www.rpi.edu/~laheyr/.

27, 2009, Dr. Sheppard identified substantial impacts on the land use and land values surrounding the Indian Point site in the event that license renewal is not allowed and the plant is promptly decommissioned and the spent fuel removed to a waste disposal site by 2025 (land values will increase) and in the event that spent fuel is stored indefinitely at the site (land values will remain depressed for the indefinite future).

The fact that addressing the issue of the integrity of spent fuel pools from external events, facility accidents, or external malevolent acts requires site-specific mitigation measures and evaluations should be no surprise. As early as 1983 then-Commissioner Victor Gilinsky filed a separate statement of dissent when the Commission proposed adoption of what is now the Waste Confidence Rule in which he observed "[w]hile I agree that there is no obstacle in principle to extended on-site storage, I think it is clear that each power reactor site will have to be examined in detail." 48 Fed. Reg. 22730, 22733 (May 20, 1983). The Commission itself recognized at that time the site-specific nature of the measures needed to deal with spent fuel storage following reactor shutdown by proposing, what is now 10 C.F.R. § 50.54(bb), a provision that requires each licensee to submit, no later than 5 years before expiration of the operating license, a site-specific plan for how the spent fuel will be managed on the site following reactor shutdown and until such time as the fuel is sent for reprocessing or off-site disposal. *Id.* at 22732.

The State's comments identify a group of additional site-specific factors that will impact on the nature of the risks to which stored spent fuel is subjected and the mitigation measures needed to address those risks including site-specific seismic dangers such as those which are now requiring the Humboldt Bay reactor to implement special procedures for dry cask storage.

III. Recent Events Confirm that No Reasonable Assurance Now Exists to Conclude That A Permanent Waste Disposal Facility Will Be Available By Any Specific Future Date

The majority of Commissioners have now recognized that certain underpinnings supporting the waste confidence findings no longer exist – namely, when a central disposal repository will accept spent fuel or even if such a repository will ever be constructed. As fully developed in the States' initial comments, evidence has been growing for years that the Commission's efforts to set a date by which time a permanent waste disposal facility will be available to receive the wastes from nuclear power plants have been a failure. NRC has missed every deadline it has predicted regarding the achievement of that goal by a date certain. Meanwhile, at Indian Point, high-level radioactive spent fuel remains on site and it has leaked into the soil and bedrock under the facilities and the Hudson River.

13.

On June 15, 2009, NRC General Counsel Burns stated that:

Although the licensing proceeding for the Yucca Mountain repository is ongoing, DOE and the Administration have made it clear that they do not support construction of Yucca Mountain. The President's 2010 budget proposal states that the "Administration proposes to eliminate the Yucca Mountain repository program." *Terminations, Reductions, and Savings: Budget of the U.S. Government, Fiscal Year 2010*, p. 68.

SECY 09-0900, Final Update of the Commission's Waste Confidence Decision (June 15, 2009) at 3. General Counsel Burns also suggested the Commission might defer action on the draft final update and draft final rule to incorporate "more precise information on near-term federal actions relevant to the development of the federal [High Level Waste] disposal program." *Id.* at 4.

The September 2009 Notation Votes reflect that the Commissioners rejected the General Counsel's recommendation to approve an amended Waste Confidence Rule that included a new date certain for a permanent repository.⁴ Commissioner Svinicki separated the issue of whether a technologically feasible permanent waste disposal solution exists and whether, if it does exist, it can be reasonably expected to be available in the future, from the entirely different question of whether a date by which that solution will be implemented can be predicted. See Commissioner Svinicki Notation Vote at pp. 1-2. The latter she considers to be impossible in the current environment, concluding that "this is a particularly difficult time to be in the prediction business." Id. at 2.

In his Notation Vote, Commissioner Klein, like Commissioner Svinicki, recognized that there will not be a waste disposal facility at Yucca Mountain -- the administration has announced that the Yucca project will be cancelled -- and recognizes that the current record available to the Commission is insufficient to determine a specific date by which a permanent facility will be available. *See* Commissioner Klein Notation Vote at 1 (recognizing "the Administration's proposed budget plan to eliminate the Yucca Mountain project"). Commissioner Klein

⁴ The Notation Vote Response Sheets reflect the views of the three sitting commissioners: Chairman Jaczko (dated Sept. 17, 2009), Commissioner Klein (dated September 16, 2009), and Commissioner Svinicki (dated Sept. 24, 2009). The Notation Votes are available at http://www.nrc.gov/reading-rm/doc-collections/ commission/cvr/2009/.

emphasizes that new waste disposal options, other than a mined repository, are now possible and urges the Commission to broaden any statement about the future to include more than just mined repositories (*id.* at 2), thus making prediction of when a permanent repository will be available even less possible.

Chairman Jaczko's Notation Vote acknowledged the termination of the Yucca project referenced in the Staff's SECY paper. Based on his view of the administrative record before the Commission in the rulemaking proceeding, he proposed additional revisions that deleted reliance on the existence of "one mined geologic repository" and "repository" in Finding 2 and Finding 3. While he suggested that some high-level waste disposal "capacity" might be available in 50 years or perhaps 60 years beyond the licensed life a reactor, he also stated that he would support the extending the public comment period to solicit additional public input on this issue.

Thus, the formal Notation Votes reveal that a majority of the current Commissioners do not now have a basis to make a finding of "reasonable assurance" that a mined repository for the permanent disposal of high-level radioactive waste will be available to receive waste from Indian Point or other reactors at a specific future date. Nonetheless, like a ghost ship long since abandoned by its crew, the Waste Confidence Rule sails on, without heed to the interests of States, the right to public participation and review, concerns of communities being told to host the waste, and the credibility of the NRC licensing process.

Black's Law Dictionary describes a "legal fiction" as an "assumption that something is true even though it may be untrue," or "a device by which a legal rule or institution is diverted from its original purpose to accomplish indirectly some other object."⁵ For the last 45 years, NRC has sought to preclude inquiry into the consequences of continued on-site storage of spent nuclear fuel at Indian Point after cessation of reactor operations because it has assumed the waste would be removed from the site. The passage of time has demonstrated that the initial assumption, which then became promulgated regulatory confidence in 1984 with the appearance of § 51.23, was mistaken. Early on, West Valley did not re-process Indian Point's waste. Nor did a mined geologic repository accept Indian Point's waste in 2007 (the 1984 assumption). And now it is clear that a mined geologic repository will not take Indian Point's waste by 2025 (the 1990 and 1999 assumption). Indian Point's experience over the last 48 years shows that the retention of obsolete, discredited, and superseded § 51.23 continues a legal fiction.

⁵ Black's Law Dictionary 913 (8th ed.2004); *see also* Merriam-Webster's Collegiate Dictionary 465 (11th ed.2006) (defining "fiction," in sense of "legal fiction" as: "an assumption of a possibility as a fact irrespective of the question of its truth").

Whatever the basis for the assertion in the past, the declaration today that all spent fuel will be removed from reactors within 30 years after operations cease and that, on a generic basis, it can be determined that there will be no significant environmental or safety issues as a result of spent fuel storage on site during that 30-year period is a fiction. It is a fiction that is perpetuated by the continued presence of the obsolete and superseded 10 C.F.R. § 51.23 in its current form. That language has been used by NRC Staff and licensees as a basis to prohibit public participation and meaningful dialogue regarding the adequacy of site-specific mitigation measures being proposed and/or taken at nuclear reactor facilities to address environmental and safety concerns associated with the on-site storage of spent fuel. Various states, local governments, and citizens groups sought to raise these concerns in the Indian Point license renewal proceeding. In response to these proffered contentions, NRC Staff opposed any consideration of the safety and environmental problems associated with storage of spent fuel at Indian Point by pointing to language in 10 C.F.R. §§ 51.23(a) and (b) that asserts that the wastes will be gone from those sites within 30 years after operations cease and because NRC previously decreed that during those 30 years there can be no significant safety or environmental problems.

As the previous comments make clear, the measures now being proposed and implemented to address the issues of safety and environmental concerns associated with spent fuel storage at reactor sites are anything but generic. In addition, although the actual measures being taken to mitigate the consequences of damage to the spent fuel storage facility have not been revealed, it is evident from the previously cited Sandia Report and from the statements by Dr. Lahey and Dr. Thompson that alternative measures could to be taken at each reactor site to mitigate spent fuel safety and environmental impacts. However, despite the existence of such alternative site-specific mitigation measures, NRC continues to resist allowing these issues to be fully aired in a context in which the active participants, with full access to the decision-making process, include anyone other than NRC Staff, nuclear reactor licensees, and their trade association, the Nuclear Energy Institute.⁶

⁶ While a number of the mitigation measures may be security sensitive (there is no evidence that all the mitigation measures are security sensitive) that is no barrier to public participation on, and hearing board evaluation of, the adequacy those measures. The provisions of 10 C.F.R. Part 2, Subpart I provide the procedures to be used to permit consideration of such matters in a licensing hearing. The purpose of Subpart I is "to provide such procedures in proceedings subject to this part as will effectively safeguard and prevent disclosure of Restricted Data and National Security Information to unauthorized persons, with minimum

IV. An Alternative Approach: Permitting States to Raise Site-Specific Concerns Is Consistent With and Required By NEPA and CEQ Regulations.

The State's previous comments present the legal basis for its conclusion that the Commission by continuing to prevent public participation on environmental and safety issues associated with indefinite storage of spent fuel at reactor sites is in violation of the NEPA, AEA, and CEQ regulations. As the previous discussion and the States' prior comments make clear, there are a number of issues that are not appropriate for generic resolution and must be resolved on a site-by-site basis. Of course, even those issues, may not end up in a licensing proceeding since the public participant will be required to overcome the considerable barriers imposed by 10 C.F.R. Part 2 in order to present an admissible contention. Nonetheless, some issues will have to be reviewed in Part 2 proceedings and/or facility-specific environmental impact statements and, rather than run from that consequence, the Commission should embrace it. There is considerable evidence that public participation in a licensing proceeding improves the final outcome on both environmental and safety issues.⁷ For public participants there is no conflicting economic self-interest that may compromise an effort to provide full and adequate

impairment of procedural rights." 10 C.F.R. § 2.900. States and their governmental officials should readily qualify under this provision. Given that State and local governments may have to deal with the consequences of a spent fuel pool fire or other incidents involving off-site releases, and given that many States are part of NRC's "Agreement State" program, they should be allowed to request a hearing on this important issue pursuant to Part 2.

⁷ NRC Hearing Panels, which are composed of impartial administrative judges who are closely involved with the AEA hearing process, have confirmed the important role played by public participants. See, e.g., In the Matter of Gulf States Utilities Company (River Bend Station, Units 1 and 2), ALAB-183, Docket Nos. 50-458 and 50-459, 7 A.E.C. 222, 227-28 (Mar. 12, 1974); In the Matter of Shaw Areva Mox Services (Mixed Oxide Fuel Fabrication Facility), LB-08-11, Docket No. 70-3098-MLA, at 49 (June 27, 2008) (Farrar, J., concurring). NRC Commissioners have also recognized the useful role the public can play in NRC proceedings. See, e.g., Dale E. Klein, Chairman, U.S. Nuclear Regulatory Comm'n, Presentation to the Convention on Nuclear Safety: The U.S. National Report, at Slides 3 and 11 (Apr. 15, 2008), http://www.nrc.gov/ reading-rm/doc-collections /commission/; Gregory B. Jaczko, Comm'r, U.S. Nuclear Regulatory Comm'n, Remarks to the OECD's Nuclear Energy Agency Workshop on the Transparency of Nuclear Regulatory Activities: Openness and Transparency-The Road to Public Confidence (May 22, 2007), http://www.nrc.gov/readingrm/doc-collections/commission/.

safety and environmental protection and develop a comprehensive analysis of the environmental impacts and their alternatives. Such a review of site-specific impacts and alternatives is entirely consistent with, and indeed required by, NEPA, AEA, and CEQ regulations.

V. Conclusion

The time has come for the Commission to formally abandon the outdated, discredited, and superseded portions of the Waste Confidence Rule and to reestablish the public's right to participate in those site-specific safety and environmental issues related to the indefinite storage of spent fuel at reactor sites in their neighborhoods. The promise that nuclear waste would be gone when the reactors shut down or shortly thereafter, or even by a time certain after shutdown, cannot be kept. That realization has profound implications for the safety and environmental protection of the community where the nuclear reactors are located. The Commission should immediately cancel the portions of 10 C.F.R. § 51.23 that prohibit consideration of properly presented site-specific contentions related to the adequacy of measures to mitigate the safety and environmental consequences of indefinite storage of spent fuel at reactor sites following shutdown of the reactors. The Commission's actions should apply to pending proceedings, such as the Indian Point license renewal proceeding, where parties sought to raise concerns about indefinite spent fuel storage at the reactor site. The parties should be given a reasonable time, not less than 60 days, to formulate new proposed contentions that are site-specific and address the environmental and safety consequences of indefinite storage of spent fuel at the site and the adequacy of mitigation measures to address those consequences.

Dated: February 9, 2010

Respectfully submitted

s/

John Sipos

Janice A. Dean Assistant Attorneys General Office of the New York State Attorney General State Capitol Albany, New York 12224

Attachment 14

March 15, 2010 Supplemental Declaration of Dr. Stephen C. Sheppard and accompanying report, Determinants of Property Values)

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:

License Renewal Application Submitted by

Docket Nos. 50-247-LR and 50-86-LR

ASLBP NO. 07-858-03-LR-BD01

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.

DPR-26; DPR-64

SUPPLEMENTAL DECLARATION OF STEPHEN C. SHEPPARD

Stephen C. Sheppard, hereby declares under penalty of perjury that the following is true and correct:

1. I have been retained by the New York State Office of the Attorney General to provide expert services in connection with the application by Entergy Nuclear Operations, Inc. and its affiliates (collectively Entergy) for a renewal of the two separate operating licenses for the nuclear power generating facilities located at Indian Point.

2. I am a Professor of Economics at Williams College where I teach in the Economics Department. In addition to teaching, I also conduct research on issues that include environmental and natural resources economics, public finance, and

March 2010 Supplemental Declaration of Stephen Sheppard

land use economics. In 2006 I was a Fellow at the Weimer School of Advanced Studies in Real Estate and Land Economics. Before that, I was the Herman H. Lehman Fellow at the Oakley Center for the Humanities and Social Sciences at Williams. In 2004 I shared with a colleague the Royal Economic Society Prize. My CV, which is attached and was also included with my original declaration submitted in this proceeding, includes a list of my published papers and other work.

3. I received a B.S. from the University of Utah in 1977, and received from Washington University (St. Louis) an A.M. in 1979 and a Ph.D. in 1984.

4. Attached to this Declaration is a Supplemental Report I have prepared. This document was prepared by me and is true and correct to the best of my personal knowledge.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Dated: March 15, 2010 Williamstown, Massachusetts

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March 2010 Supplemental Declaration of Stephen Sheppard

Determinants of Property Values

Overview

Professional property appraisers and economists sometimes use differing terms of art to refer to similar concepts, and this can lead to confusion or misinterpretation by others in reading and understanding their opinions. In this document I will survey the scientifically accepted perspectives on the determinants of the value of real property, and discuss how these values can be estimated to a reasonable degree of scientific certainty.

The economic approach to determining the value of a property or object rests on three distinct perspectives or sources of information. These are the *value in exchange* of the property, the *cost of production* of the property, and the *value in use* of the property. Each of these ideas can be employed in understanding the value of a property, and each has a substantial pedigree in the history of economic ideas.

From both a practical and scientific view, the most appropriate concept of the economic value of an object or piece of property is the *fair market value* or the amount that a willing buyer would give to a willing seller in exchange for the object or piece of property. In order to be considered fair market value, this exchange should be an "arms-length" transaction (meaning that the welfare and interests of the buyer are distinct from those of the seller so that the economic wellbeing of the seller is not a significant factor influencing the price the buyer is willing to pay, and the price the seller is willing to accept is also independent of the economic welfare of the buyer). The exchange should also have taken place after a "proper period" of marketing to ensure that the seller has located the buyer with the highest willingness-to-pay, and that they buyer and seller have acted "knowledgeably, prudently, and without compulsion." This concept of fair market value was and in some circumstances still is known to economists as *value in exchange*.

In addition to this source or representation of the value of an object or property, economists also recognize the cost of production as a source of information about property value. Economists often refer to the *marginal cost of production*, denoting the cost of producing an additional unit of the good or property. Any buyer who is contemplating the amount he or she would be willing to offer in exchange for a property, and for any seller who is making a decision about the amount that must be paid in order for them to willingly part with the property, the cost of reproducing or replacing the property is a material consideration. The cost of acquiring vacant land that is similarly situated to the property under consideration, and constructing an identical building on the property would provide a reasonable upper bound on the amount a buyer is willing to pay for an existing property. It also provides a reasonable starting point for negotiating from the seller's perspective, although many circumstances may arise in which a property owner has difficulty obtaining the full replacement costs of a property even if fair market value is obtained. Further difficulties in using the production cost may arise in connection with finding a vacant or usable

March 2010 Supplemental Declaration of Stephen Sheppard

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parcel of land that is similarly situated. These land costs cannot be ignored because typically such costs account for at least 5 to 10 percent of the costs of a property, and in many circumstances this cost share can rise to 40 percent or even more.

There is a third source of information about the value of an object or property that relates to the value of the stream of benefits that the owner or possessor receives from the property. This relate to what economists call the value in use of an object or property, and this source of information can be of particular importance with land, real estate and other durable property. Again, the logic for considering this source of information arises from determination of the general principles that might determine the amount that a prospective buyer would be willing to pay for a property. If the owner of a property can rent it for a particular amount each year and thus receive a stream of income, then a reasonable buyer will realize that a choice exists between depositing funds in a bank (or making some suitable investment) and thus receiving a stream of interest payments as income, or giving the funds in exchange for the property and receiving the stream of rental payments. It seems reasonable for the buyer to determine the amount of funds that would need to be deposited at the bank to generate a stream of interest payments that is identical to the stream of rental payments that might be obtained through property ownership, and to regard this amount as a reasonable ceiling on the amount that should be paid for the property. Economists refer to this amount as the present value of the stream of benefits obtained from the property. Economists generally regard this source of information as useful even if the property is not actively rented to a third party, but is used directly by the owner. This use by the owner generates a stream of benefits over time whose monetary value could be calculated. For example, an owner of a home who occupies that home is realizing a benefit in the form of a residence for which they do NOT have to pay rent to a landlord. These values (which economists refer to as imputed rents) are the major source of benefits to the home owner.

As with the accurate determination of marginal costs of production of the property, there are some natural difficulties that arise in calculating the present value of the stream of benefits. What interest rate do we think the prospective buyer imagines will be paid by the bank? How durable will the property be (which will determine the time period over which the benefits are received). If we are considering a property like real estate that must be used at a fixed location, then the prospective buyer must envision the various possible conditions that might characterize the neighborhood in the future in order to have a well-informed value of the range of benefits that could be obtained through ownership of the property. This will necessarily involve some uncertainty on the part of the prospective buyer, and it underscores something economists have understood for literally hundreds of years: uncertainty about future events is a natural part of the process of determining the value of a durable property. This is to be distinguished from abstract factors that might in some circumstances affect property values such as a general climate of "fear" surrounding a property or a vague and difficult-to-measure psychological value of risk. Rather, the economic perspective is to consider the variability in future returns that is linked to real, measurable outcomes that will or will not occur in the future. The range in possible benefits that will be realized in the future is a natural and reasonable factor to consider in determining the

March 2010 Supplemental Declaration of Stephen Sheppard

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value of a property. It must be considered when determining the present value of the benefits received from a property and can be expected to influence the fair market value of a property.

Real Property

In valuing real estate, each of the economic ideas discussed above has a counterpart in an accepted methodology applied by professional property appraisers in the United States and elsewhere. For example, property appraisers in the US and the textbooks from which they learn their craft frequently identify three approaches to appraisal. The first is the *comparative market value approach*, also called the *sales comparison approach*, in which a number of "comparable" properties that have sold under contemporary market conditions in arm's length transactions are identified. Adjustments are made to the observed sales prices to account for differences between the properties whose prices are observed and the subject property, and the results are either averaged over the small number of properties to produce an estimated value or the group of properties is used to provide a range of possible values for the subject property. Since the approach is based on observed market transactions of similar properties, this comes close to an estimate of fair market value and is clearly motivated by the concept of *value in exchange*.

A second approach to property appraisal is often referred to as the *cost approach*, and is recommended in circumstances when values are required for unique properties for which no comparable sales exist. This approach requires use of engineering data and construction cost estimates to determine the replacement cost of any building on the property. To these values are added values for the land itself (which might be difficult to obtain with accuracy because of factors discussed above). Adjustments may be made to land costs and occasionally to building cost estimates to reflect local market conditions or other special circumstances. The result is an estimate of the cost of the property and this is put forward as its appraised market value. This approach is clearly motivated by considerations of the costs of production that would be familiar to any economist.

Finally, property appraisers sometimes employ the *income approach* when seeking to estimate the value of a property. They collect data on leases and rental rates, occupancy rates and local market conditions. Using an interest rate or rate of return selected to reflect the uncertainty in market outcomes and associate risks of property ownership, they calculate the present value of the income that could be generated from the property. This approach is based on the economic idea of value in use, modified (as it should be) by considerations of uncertainty regarding future property markets, neighborhood conditions and potential nuisances or amenities that may affect the property in times to come.

Estimating Values under Counterfactual Conditions

In considerations that arise under civil law, and arise frequently in policy making deliberations that must weigh costs and benefits, it is sometimes necessary to evaluate property values under

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counterfactual conditions. For example, decision makers may want to know what the value of a property would be if a bridge (that does not now exist) is built or if a building (that does exist now and has existed for some time) is removed, or even both of these things happening at the same time. These are sensible questions to ask. Changes in property values are part of the panoply of costs and benefits that reasonable and representative decision makers would want to evaluate before moving forward with bridge building, demolition or other significant changes to the community or the environment.

Estimating the value of real estate property under counter-factual conditions is possible to do to a reasonable degree of scientific certainty, but it poses a special challenge for many of the methods traditionally employed by property appraisers. These methods require obtaining samples of comparable properties being sold under comparable market conditions. If the appraiser is asked to evaluate properties under counter-factual conditions, then it may be impossible to find comparison sales even if modest adjustments are to be permitted.

While the appraiser in such circumstances might apply one of the other methods, these also run into difficulties. The cost approach provides an upper bound on value, but as mentioned above the contribution of land values must also be considered as a component of costs, and land values are heavily influenced by nuisances and environmental factors.

Similarly, application of the income approach is difficult because the counter factual case may present a different combination of nuisances and amenities in the community. This will affect both the value of the income stream and the variability of income. A property in an industrial community, for example, is affected by nuisance of heavy transportation, noise, and there is uncertainty in the income stream because of the potential for future accidental release of toxic elements into the environment. These cannot simply be valued by looking at a set of comparable properties.

Conclusion[•]

In summary the standard approaches of property appraisers are motivated by the central ideas of economics concerning the determinants of the value of property. These central ideas tell us that nuisances and amenities are important considerations in determining property values because affect the income that can be earned from the property and affect what a willing buyer would give a willing seller in an arm's length transaction. Finally, these ideas tell us that the range of possible nuisances that might occur in the future in the neighborhood of the property is a factor that must be considered. If a neighborhood contains activities that increase the range of possible use values, then that increases the uncertainty in the flow of benefits and diminishes the value of the property.

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Attachment 15

January 24, 2011 Report of Dr. Stephen C. Sheppard in connection with Contention 17B

WILLIAMS COLLEGE

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DEPARTMENT OF ECONOMICS 2013 South Academic Boarding (413) 500 STB4 BAX: 6113) 507-1045

January 24, 2011

Susan L. Taylor Assistant Attorney General Office of the Attorney General Environmental Protection Bureau The Capitol Albany, NY 12224

Dear Ms. Taylor:

In light of new information concerning the timing of power plant decommissioning at the Indian Point Energy Center (IPEC) and NRC findings on the permissible times during which spent fuel and other radioactive wastes can remain on site after the end of nuclear reactor operations, you have asked me to prepare a declaration on the potential economic impacts related to property value diminution in communities surrounding the IPEC. My report is attached below.

Sincerely,

Stephen Sheppard Professor of Economics

Summary of finding

I consider four different scenarios involving potential delay in removal of waste and reclamation of the IPEC site and the potential renewal of the operating license for the nuclear reactors at the plant. I compare these scenarios to a baseline scenario of "no action" (non-renewal of the reactor operating license) and relatively rapid waste removal and site reclamation. Compared with the baseline scenario, license renewal combined with the potential delay in waste removal and site reclamation imposes a severe burden on surrounding communities. This burden is equivalent to a present decrease in wealth in the communities of between \$169 million and \$237 million.

Introduction

In my initial report submitted on November 29, 2007 I provided a preliminary estimate of the impact of continued presence of the Indian Point Nuclear Power Plant on the combined value of nearby property. Based on evaluation of census data and results established in peer-reviewed publications I provide a preliminary estimate of this impact and find it to be at least \$576,026,601. This should be regarded as a preliminary estimate subject to revision upon completion of a more extensive analysis of local property markets. In my subsequent declarations I discussed the scientific basis for evaluating the impacts of facilities such as IPEC on property values, and also the potential effects of delay in site reclamation.

In this declaration I provide a more complete analysis of the potential economic impacts on the value of nearby property that specifically considers the dynamic scenarios in site reclamation that may arise in light of the revised NRC findings concerning the generic environmental impacts of storage of spent fuel at reactor sites after expiration of reactor operating licenses¹. The analysis I present is based on my preliminary estimate of the total impact on nearby property values. As such, this should be regarded as a preliminary analysis that is designed to provide a general idea of the scope of economic impacts that can be expected to arise in connection with property value diminution in light of the several possible scenarios regarding the timing of site reclamation and making specific comparisons of scenarios that arise with and without renewal of reactor operating licenses at IPEC.

¹ Federal Register, Vol: 75, No. 246, December 23, 2010, p. 81032.

Analysis

The essential facts that are the basis of my analysis are:

The presence and operation of the Indian Point Nuclear Power Plant causes a diminution in the value
of nearby residential and commercial real property². When the plant has closed and the site has been
reclaimed and made available for alternative use, new sources of economic activity and employment
can be expected to develop and the values of nearby properties can be expected to increase.

- 2. The increase in the values of nearby properties will, without any change in the property tax rate, provide (assuming reassessment to reflect market value of property) some increase in property tax revenues for local communities.
- 3. While the plant continues in operation, Entergy pays property taxes and/or payments in lieu of taxes to local communities³. These payments will cease once the plant has ceased operation or some time shortly thereafter.

Whether or not the IP2 or IP3 reactor operating licenses are renewed to permit operation at the site beyond 2015, eventually IPEC will close and the site will be reclaimed and made available for alternative use. From an economic perspective, the sequence of important events is expected to be:

- 1^{st} end of reactor operations
- 2nd reclamation of IPEC site including removal of all spent fuel, hazardous materials, buildings and equipment
- 3rd recovery of surrounding property values because of site reclamation
- 4^{th} recovery of property tax payments on surrounding properties

All scenarios involve this sequence of events, but differ between them in when exactly each event occurs. This difference in timing arises either because of regulatory and legal decisions (such as relicensing IP2 and IP3 for twenty years of continued operations) or because of physical and technical

² For further details, including the methodology for estimation, see November 29, 2007 Declaration of Stephen C. Sheppard with accompanying report *Potential Impacts of Indian Point Relicensing on Property Values* and March 18, 2010 Supplemental Declaration of Stephen C. Sheppard and accompanying report *Determinants of Property Values*.

³ A report prepared in 2004 by the nuclear industry lobbying group Nuclear Energy Institute, *Economic Benefits of Indian Point Energy Center* indicated that annual property tax and payments in lieu of taxes by Entergy to local communities was \$25.3 million.

considerations (such as the greater time required to remove spent fuel from the site after operations cease if relicensing occurs).

Recent revisions and clarifications of NRC findings concerning storage of spent fuel and hazardous waste on site imply that there are several possible options available to Entergy concerning the timing of waste removal and site reclamation. There are limits to how quickly this can occur because of the time required to remove the spent nuclear fuel and other wastes from the site. I base my analysis on the potential schedule of plant decommissioning that is presented and discussed in Preliminary Decommissioning Cost Analysis report prepared by TLG Services, Inc.⁴

The Preliminary Decommissioning Cost Analysis report indicates that waste removal at the Indian Point Power Plant could begin 2 years after ending reactor operations. With the amount of waste that has been generated at the site during the operating period ending in 2015, removal of the waste was expected to require a 2 year preparation period followed by 30 years of work at removal, based on a rate of 3000 metric tons of uranium per year.

If the operating license is renewed the plant would be permitted to run for an additional 20 years. This could be expected to generate a 50% increase in total waste since it represents a 50% increase in the time of operation. For scenarios that consider plant relicensing, I will assume that the waste removal process, whenever it begins, will take 40 years after an initial 2 year preparation time. This assumes modest economies of scale in spent fuel and radioactive waste removal, and reflects the 2 years preparation time, the 30 years required time to remove the wastes that would be present without license renewal plus an additional ten years that reflects the time required to remove the additional wastes generated during the added 20 years of reactor operation.

I evaluate a baseline scenario for comparison with other possible outcomes involving IPEC reactor relicensing or delays in site reclamation. The baseline scenario assumes the most rapid practicable process of site reclamation, and assumes the "no action" alternative in which IP2 and IP3 operating

⁴ Document E11-1583-006, Preliminary Decommissioning Cost Analysis for the Indian Point Energy Center, Unit 3, prepared by TLG Services, Inc., December 2010, see page 9 of 40.
licenses are not renewed so that reactor operations end in 2015 and waste removal and site reclamation will be completed by the end of 2047.

The first alternative scenario will examine the costs associated with delay of site reclamation. This considers the "no action" alternative with end of reactor operations in 2015 but delays completion of the removal of wastes, plant and equipment from the site to 2077.

The second alternative scenario considers the impact of renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The most rapid practicable site reclamation would then require a period of 42 years so that the site is available for alternative use in 2077.

The third alternative scenario assumes renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The process of cleanup and site reclamation is assumed to be delayed by 30 years so that the site is available for alternative use in 2107.

The fourth alternative scenario assumes renewal of operating licenses for IP2 and IP3 so that reactor operations continue at IPEC until 2035. The process of cleanup and site reclamation is assumed to be delayed by 60 years so that the site is available for alternative use in 2137.

As noted above, IPEC generates property tax payments or payments in lieu of property taxes of approximately \$25.5 million dollars per year for communities surrounding the plant. These can be expected to continue during the period of plant operation and perhaps for some time afterwards, but once the plant has ceased operations and a process of site reclamation has been set upon (even if not fully commenced) Entergy is likely to argue that the value of its plant and equipment is essentially zero. Without detailed information on the payments in lieu or other agreements with communities, I assume that Entergy continues these payments through 2035 in all scenarios. This covers the extended time period of operation if the operating license is renewed. If Entergy is granted reduced tax liability prior to this the effect would be to increase the burden on surrounding communities.

There is some variation between communities in the area in the property tax rate applied to residential real estate. After reviewing the actual tax rates imposed on selected residential properties in the area, I

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assume a rate in the lower part of the observed range of tax rates: 2.36% of actual market value. Thus a \$200,000 house generates \$4719 in annual property tax revenues for the community in which it is located. If removing Indian Point Nuclear Power Plant increases its value by 5% then property tax revenues could potentially rise by \$236 per year. The loss of this \$236 is part of the burden on the communities of having the power plant remain. An alternative (and equivalent) way to think of this is to note that once IPEC is closed and the site is reclaimed, surrounding property values can be expected to recover and generate (after reassessment) higher property tax payments every year. The present value of this stream of higher tax payments is part of the benefit to the community of site reclamation.

The economic impacts of the different scenarios arise from delays in the timing of property value recovery and delays in the time during which property taxes receipts on nearby properties are decreased because of the presence of IPEC. Economic comparison of these scenarios requires computing the "discounted present value" of the future flows and receipts. Such computation requires use of some interest rate or "discount rate" and it is usual in such cases to use a rate that approximates the effective cost of capital for those parties affected. Since I am primarily concerned to calculate the impact on community residents whose property values will be affected, it seems most appropriate to use something close to the real mortgage interest rate. My calculations use a discount rate of 4% which is approximately equal to the current mortgage interest rate less the current rate of inflation – that is the current real mortgage interest rate.

The most essential fact that separates the alternative scenarios is when the site becomes available for alternative use. The first alternative scenario imposes a cost on the surrounding communities whose present value is \$169,429,649. This cost (and the costs associated with other scenarios) arises because of the delay in recovery of property tax receipts on surrounding property and delay in recovery of property values and wealth of the community.

The second alternative scenario considers license renewal but rapid site reclamation so that the site is available for other uses in the same year (2077) as the 1^{st} scenario. Consequently the cost associated with the second alternative is the same as the 1^{st} scenario: \$169,429.649.

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The third alternative scenario considers the impact of license renewal with moderate delay in site reclamation so that the site is available for alternative uses in 2107. This scenario imposes a cost on surrounding communities of \$221,667,973 relative to the baseline.

Finally, the fourth alternative scenario considers the impact of license renewal with extended delay in site reclamation making the site available for alternative uses in 2137. This scenario imposes a cost on surrounding communities of \$237,774,023 relative to the baseline. This cost is comprised of approximately \$147 million cost attributable to delay in recovery of property values, and \$90 million in costs associated with delay in recovery of property tax receipts on property surrounding the plant.

Conclusion

My calculations show clearly that both license renewal and a delay in site reclamation imposes a real economic cost on the surrounding communities. License renewal with delayed removal of waste and site reclamation imposes a burden on the communities that is equivalent to an immediate charge of between \$169 million and \$237 million. For these communities with limited resources, this can be considered a severe burden that would have consequences for the well-being of the community and the pattern of economic development and land use.

Attachment 16

December 28, 2009 Letter from John P. Boska to Entergy Nuclear Operations, Inc. regarding IP2 decommissioning funding status report, ML093450778



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

December 28, 2009

Vice President, Operations Entergy Nuclear Operations, Inc. Indian Point Energy Center 450 Broadway, GSB P.O. Box 249 Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 - DECOMMISSIONING FUNDING STATUS REPORT (TAC NO. ME0528)

Dear Sir or Madam:

By letter dated March 30, 2009, Agencywide Documents Access and Management System (ADAMS) Accession No. ML090920576, Entergy Nuclear Operations, Inc. (Entergy), submitted the Biennial Decommissioning Funding Report required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.75, "Reporting and recordkeeping for decommissioning planning" for the nuclear power plants operated by Entergy. Based on the Nuclear Regulatory Commission (NRC) staff's analysis of the report, the NRC staff estimated a projected shortfall in decommissioning funding assurance of \$38.6 million for Indian Point Nuclear Generating Unit No. 2 (IP2). See ADAMS Accession No. ML091940387 for details on that calculation. By letter dated June 18, 2009, ADAMS Accession No. ML091630533, the NRC informed Entergy that there may be a shortfall in the decommissioning trust fund (DTF) for IP2 and asked Entergy to provide more information on the DTF. On June 29, 2009, NRC staff held a conference call with Entergy to discuss the DTF. See ADAMS Accession No. ML091890807 for a summary of the call. On July 22, 2009, NRC staff held a second conference call with Entergy. See ADAMS Accession No. ML092100643 for a summary of that call.

By letter dated August 13, 2009, ADAMS Accession No. ML092260736, Entergy provided additional information on the decommissioning funding. The NRC staff has reviewed the submittal, which outlines Entergy's plan of action to cover shortfalls in providing decommissioning funding assurance and/or decommissioning funding realized in the report for IP2 that was submitted on March 30, 2009.

Based on the information provided by Entergy on August 13, 2009, the NRC staff finds that IP2, as of July 31, 2009, has a DTF balance of \$326.9 million. Entergy proposes the use of safe storage (SAFSTOR) from IP2's license termination in 2013 through 2063, with 10 additional years through to 2073 dedicated towards decommissioning activities. This allows the DTF to increase during the SAFSTOR years. The NRC staff has reviewed the licensee's plan and determined that the licensee, as of August 13, 2009, provides reasonable assurance of adequate decommissioning funding at the time of permanent termination of operations with the proposed use of SAFSTOR. Accordingly, the NRC staff concludes that no further action is required at this time to demonstrate adequate decommissioning funding assurance, according to NRC standards, for IP2.

Sincerely,

Boska

John P. Boska, Senior Project Manager Plant Licensing Branch I-1 Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-247

cc w/encl: Distribution via Listserv

Sincerely, /RA/

John P. Boska, Senior Project Manager Plant Licensing Branch I-1 **Division of Operating Reactor Licensing** Office of Nuclear Reactor Regulation

Docket No. 50-247

cc w/encl: Distribution via Listserv

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ADAMS ACCESSION NO.: ML093450778

Via email LPL1-1/PM OFFICE LPL1-1/LA PFPB/BC LPL1-1/BC NAME SLittle JBoska **RCarlson** NSalgado 12/11/09 DATE 12/11/09 12/14/09 12/28/09

OFFICIAL RECORD COPY

Certification pursuant to 10 C.F.R. § 2.323 and ASLB Scheduling Order

Pursuant to 10 C.F.R. § 2.323(b) and this Atomic Safety and Licensing Board's July 1, 2010 Scheduling Order \P G.6, I certify that I have made a sincere effort to contact . the other parties in this proceeding, to explain to them the factual and legal issues raised in the accompanying motion for leave and motion for determination, or exemption, or waiver, and to resolve those issues, and I certify that my efforts have been unsuccessful.

Janice A. Dean Assistant Attorney General State of New York

January 24, 2011

GOPY

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:

Docket Nos. 50-247-LR and 50-286-LR

License Renewal Application Submitted by

ASLBP No. 07-858-03-LR-BD01

Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. DPR-26, DPR-64

January 24, 2011

CERTIFICATE OF SERVICE

I hereby certify that on January 24, 2011, copies of the (1) State of New York's Motion for Leave to File Timely Amended Bases to Contention 17A (now to be designated Contention 17B), (2) State of New York's Request for a Determination that the Proposed Amended Bases for Contention 17A are not Barred by 10 C.F.R. § 51.23(b), or the Exemption from the Requirements of 10 C.F.R. § 51.23(b) Should be Granted, or that the State Has made a *Prima Facie* Case that § 51.23(b) Should Be Waived as Applied to Contention 17B, (3) Contention 17B, (4) Declaration of AAG John J. Sipos and attachments thereto, including the January 24, 2011 Report of Dr. Stephen Sheppard in support of Contention 17B, and (5) Certification of Consultation by AAG Janice A. Dean pursuant to 10 C.F.R. § 2.323 and ASLB Scheduling Order were served upon the following persons via U.S. Mail and e-mail at the following addresses:

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John Sipos

Dated at Albany, New York this 24th day of January 2011