

State Nuclear Safety Inspector Office

December 2010 Monthly Report to the Legislature

Introduction

As part of the Department of Health and Human Services' responsibility under Title 22, Maine Revised Statutes Annotated (MRSA) §666 (2), as enacted under Public Law, Chapter 539 in the second regular session of the 123rd Legislature, the foregoing is the monthly report from the State Nuclear Safety Inspector.

The State Inspector's individual activities for the past month are highlighted under certain broad categories, as illustrated below. Since some activities are periodic and on-going, there may be some months when very little will be reported under that category. It is recommended for reviewers to examine previous reports to ensure connectivity with the information presented as it would be cumbersome to continuously repeat prior information in every report. Past reports are available from the Radiation Control Program's web site at the following link: www.maineradiationcontrol.org and by clicking on the nuclear safety link in the left hand margin.

Commencing with the January 2010 report the glossary and the historical perspective addendum were no longer included in the report. Instead, this information was available at the Radiation Control Program's website noted above. In some situations the footnotes may include some basic information and may redirect the reviewer to the website.

Independent Spent Fuel Storage Installation (ISFSI)

During December the general status of the ISFSI was normal. There were no spurious alarms due to environmental conditions that warranted further investigations.

There was no fire related impairment but there was one security-related impairment carried over from November into December. The fence project finally came to a close on December 7th.

There were 28 security events logged for the month. Twenty-two of those were for transient environmental issues that cleared themselves within a short time. Four of the events were due to computer error codes that had no impact on operations. The error codes were identified by the vendor and repaired as the computers had been recently replaced and the software upgraded. One event was associated with the fence project while the other documented the loss of the dedicated phone connection to the Nuclear Regulatory Commission which was restored later the same day.

Eight condition reports¹ (CR) were written for the month of December and are described below.

1st CR: Written to track findings from a self assessment that was performed.

2nd CR: Documented incorrect procedure being used to process a visitor into the administratively controlled area.

3rd CR: Written to document the laboratory data quality issues associated with the June radiological ground water analyses.

4th CR: Involved tracking findings from a review of the training program.

¹ A condition report is a report that promptly alerts management to potential conditions that may be adverse to quality or safety. For more information, refer to the glossary on the Radiation Program's website.

- 5th CR: Documented deficiencies in logging incoming licensing correspondence with the Nuclear Regulatory Commission.
- 6th CR: Involved tracking findings from a review of the Condition Report process.
- 7th CR: Documented observations from a Quality Assurance Surveillance.
- 8th CR: Noted problems with the Nuclear Regulatory Commission's (NRC) phone ringing on its own. The NRC was notified and the phone line repaired later that day.

Environmental

On December 28th the State performed an assessment of its Radiological Environmental Monitoring Program around the Maine Yankee site. The purpose of the assessment was to consolidate the number of thermoluminescent dosimeters² (TLD) monitoring the ambient radiation levels near the ISFSI. Four of the fourteen Bailey Cove TLDs were reassigned as ISFSI TLDs to ensure coverage for the sixteen points of the compass. The four new stations will be identified as N, O, P, and Q. Currently, only two stations remain as Bailey Cove stations. These stations are co-located with the State's solar powered environmental radiation monitors on the Maine Yankee site. A review of whether or not these solar powered units should continue to operate will be assessed in the fall of 2011.

Although the air sampling station at Maine Yankee was discontinued, the State still maintains an active air sampling station on the roof of the Health and Environmental Testing Laboratory that acted as a control for comparative purposes during Maine Yankee's operating and decommissioning years. The State air sampler is also available in radioactive fallout situations from national or global events.

Maine Yankee Decommissioning

The preliminary draft of the Confirmatory Summary Report detailing the State's involvement and independent findings is about 50% completed.

Groundwater Monitoring Program

On December 30th Maine Yankee's consultant forwarded to the State his review and assessment of the radiological groundwater results from the October re-sampling effort. The re-sampling was necessary to address the data quality issues that surfaced from the contractor's hasty effort to dismantle its laboratory facility. The State will review the groundwater data in January.

Other Newsworthy Items

1. On December 1st the Nuclear Waste Strategy Coalition (NWSC) held a conference call to update its members, of which Maine is a member, on the status of the Department of Energy's withdrawal of its Yucca Mountain license application before the Nuclear Regulatory Commission and the U.S. Court of Appeals for the District of Columbia Circuit, and the upcoming oral arguments on the National Association of Regulatory Utility Commissioners' litigation of the Nuclear Waste Fund fee established under the Nuclear Waste Policy Act. Further updates were provided on the Blue Ribbon Commission's Committee and Subcommittee hearings and the FY 2011 Appropriations' Continuing Resolution. The NWSC is an ad hoc group of state utility regulators, state attorneys general, electric

² Thermoluminescent Dosimeters (TLD) are very small, passive radiation monitors requiring laboratory analysis. For more information, refer to the glossary on the Radiation Program's website.

utilities and associate members representing 47 stakeholders in 31 states, committed to reforming and adequately funding the U.S. civilian high-level nuclear waste transportation, storage, and disposal program.

2. On December 2nd the Nuclear Regulatory Commission (NRC) Staff responded to the NRC's Atomic Safety and Licensing Board's Order to move on Nevada's legal issues which were raised during the Yucca Mountain proceedings. The Staff did not oppose Nevada's motion.
3. On December 3rd the State participated in the third conference call of the Department of Energy's (DOE) Prospective Shipment Report (PSR) Ad Hoc Working Group on nuclear shipments. The purpose of the Group is to enhance the information DOE supplies to states affected by DOE's shipments. The states use the summary information in the PSR to help them plan and prepare for shipments. Recommendations from the Group will be presented at the National Transportation Stakeholders Forum in May 2011.
4. On December 6th the Secretary of the Nuclear Regulatory Commission responded to Representative Doc Hastings' November 19th letter requesting a finality to the Nuclear Regulatory Commission's deliberations on the Atomic Safety and Licensing Board's ruling denying the Department of Energy's motion to withdraw its Yucca Mountain license application. The Secretary noted that the issue was still under deliberation with no date for its completion. A copy of the letter is attached.
5. On December 7th Senior Counsel for the State of Washington's Attorney General Office sent a letter to the Clerk of the D.C. Circuit Court of Appeals expressing concern that they had not received an order from the Court on their September 28th motion to lift the stay and set an expedited briefing schedule. A copy of the letter is attached.
6. On December 8th the quarterly conference call of the Federal Energy Regulatory Commission rate case settlement briefing took place with representatives from the states of Connecticut, Maine and Massachusetts. The briefing provided the status of the nuclear waste lawsuits against the federal government, national activities, such as the Blue Ribbon Commission, Congress, the Nuclear Regulatory Commission, the Decommissioning Plant Coalition, the Nuclear Waste Strategy Coalition efforts, the National Conference of State Legislatures, the Council of State Governments and the National Association of Regulatory Utility Commissioners, and regional activities, such as those of the New England Governor's Conference and the New England Council. The General Counsel for the three Yankee sites, Maine Yankee, Connecticut Yankee and Yankee Rowe, stated that the federal government appealed the Court's September 7th decision granting the three Yankee plants \$143.2 million, of which Maine Yankee was awarded \$81.7 million. The Counsel also mentioned that the Department of Justice's FY 2011 budget requested a doubling of the number of attorneys to fight the utilities spent nuclear fuel lawsuits.
7. On December 8th the Nuclear Regulatory Commission's (NRC) Atomic Safety and Licensing Board (ASLB) issued an Order directing the NRC staff to file an explanation of why it can not issue Volume 3 of the Safety Evaluation Report on Yucca Mountain. On the same day the ASLB also ruled that the parties involved in the Yucca Mountain proceedings need to move forward on the State of Nevada's motion to pursue a ruling on its legal contentions to the Yucca Mountain license application.
8. On December 10th the U.S. Court of Appeals for the District of Columbia Circuit lifted its stay that was pending while waiting for the Nuclear Regulatory Commission's decision of their Atomic Safety and Licensing Board's denial on the withdrawal of the Yucca Mountain license application.

The Court also set an expedited briefing schedule in preparation for oral arguments. A copy of the Court Order is attached.

9. On December 13th the U.S. Court of Appeals for the District of Columbia Circuit issued its judgment dismissing the National Association of Regulatory Utility Commissioners' (NARUC) litigation claim for the Department of Energy (DOE) to conduct an annual assessment of and suspend the Nuclear Waste Fund fee established under the Nuclear Waste Policy Act. The Court considered the claims moot since the DOE had just issued the assessment, but noted that NARUC could now challenge DOE's assessment. A copy of the Court's judgment is attached.
10. In December the U.S. Nuclear Waste Technical Review Board (NWTRB) issued a document, entitled "Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel." The report listed nine areas where information was lacking, such as in corrosion and degradation mechanisms in the sleeves containing the used fuel. Based on this review the Board recommended six areas for further research and development. The report is timely in light of the Administration's termination of the Yucca Mountain Project, the Nuclear Regulatory Commission's (NRC) final Waste Confidence Rule allowing storage of used nuclear fuel at reactor sites up to 120 years, and the NRC's directive to its staff to evaluate on-site storage for periods upwards of 300 years. The NWTRB was created in 1987 by amendments to the Nuclear Waste Policy Act of 1982 and was charged to independently assess the Department of Energy's technical activities relative to the spent nuclear fuel and high level radioactive wastes. A copy of the executive summary is attached.
11. On December 14th the Nevada Commission on Nuclear Projects released its annual report and recommendations to the Governor and Legislature. The report details the developments that took place in 2010, such as the Yucca Mountain Project, the Department of Energy's High-Level Waste Program, the key lessons learned from the Yucca Mountain Project and the failed federal program. The report also speculated on what the future holds and provided its recommendations. The Commission recommended that the Governor and Legislature continue rejecting the site as a geologic used fuel repository, as a reprocessing facility and as a centralized interim storage facility.
12. On December 14th the Nuclear Regulatory Commission's Atomic Safety and Licensing Board issued its 37 page ruling essentially denying all eleven of Nevada's legal challenges to the Yucca Mountain license application. However, it did acknowledge that even though the legal issues were denied Nevada could still raise the safety implications of some of those legal issues.
13. On December 15th the Governor-Elect from Nevada issued a statement on the Nuclear Regulatory Commission's Atomic Safety and Licensing Board Ruling rejecting Nevada's eleven legal contentions raised in the initial filing with the Board. The Governor-Elect renewed Nevada's opposition to the storage of high level nuclear waste at Yucca Mountain, but was willing to consider other non-nuclear options. A copy of his press release is attached.
14. On December 15th the Nuclear Waste Strategy Coalition (NWSC) held its second monthly conference call to update its members on the status of the Department of Energy's withdrawal of its Yucca Mountain license application before the Nuclear Regulatory Commission (NRC) and the U.S. Court of Appeals for the District of Columbia Circuit, the recent Court ruling on the National Association of Regulatory Utility Commissioners' litigation of the Nuclear Waste Fund fee established under the Nuclear Waste Policy Act, and the recent order from the NRC's Atomic Safety and Licensing Board to resume hearings on Nevada's legal contentions on the Yucca Mountain proceedings. Further updates were provided on the Blue Ribbon Commission's Committee and Subcommittee hearings and the FY 2011 Appropriations' Continuing Resolution.

15. On December 16th the Executive Director of the Agency for Nuclear Projects issued a response to the recent Nuclear Regulatory Commission's Atomic Safety and Licensing Board's judicial order rejecting Nevada's legal contentions. A copy of the Director's open letter is attached.
16. In December the Massachusetts Institute of Technology's Center for Advanced Nuclear Energy Systems issued a report entitled "Key Issues Associated with Interim Storage of Used Nuclear Fuel". The report identifies and examines in more detail six key factors that may impact future decisions for interim storage facilities. They are:
 - a) Whether the Yucca Mountain Project continues or is terminated,
 - b) Will the U.S. change its policy to allow reprocessing or recycling,
 - c) How long will it really take to site one or a few interim storage sites,
 - d) Political implications of letting used fuel mount up at operating plants and how that affects current operations and future construction of new plants,
 - e) Technically, how long can used fuel be stored wet or dry to ensure future shipments to a disposal, reprocessing or storage site occur without damaging the fuel,
 - f) Costs comparisons between shipping used fuel to interim storage sites and eventually to a disposal site versus leaving the used fuel on-site until policy decisions are made.
17. On December 20th the State of Nevada filed its fourth update with the Nuclear Regulatory Commission's Atomic Safety and Licensing Board that it had no other witnesses in the pending licensing application for the Yucca Mountain Project.
18. On December 22nd the Chairman of the Nuclear Regulatory Commission responded to Representative John Spratt's October 11th letter expressing deep concerns over the NRC's Yucca Mountain license application cessation. In the letter Chairman Jaczko assured Representative Spratt that the actions he initiated were in conformance with appropriations law. On the same day he sent a similar letter to Representative Michael Simpson also reassuring him of his actions while providing additional insight on his justification to close the Yucca Mountain Project. Identical letters were sent to five other Representatives. Copies of both letters are attached.
19. On December 22nd the State of Nevada filed its fifth update with the Nuclear Regulatory Commission's Atomic Safety and Licensing Board (ASLB) that it had no additional witnesses in the pending licensing application for the Yucca Mountain Project for Phase I discovery.
20. On December 22nd the Nuclear Regulatory Commission (NRC) Staff filed with the NRC's Atomic Safety and Licensing Board its response to the ASLB's December 8th Order on the issuance of the staff's Safety Evaluation Report (SER) Volume 4 on Yucca Mountain. With the halting of the Yucca Mountain Project review, the Staff related it would not issue Volume 4 of the SER in December 2010 as originally planned and the schedule for issuing Volume 4 is indeterminate.
21. On December 23rd the Nuclear Regulatory Commission (NRC) Staff filed with the NRC's Atomic Safety and Licensing Board that it had no additional witnesses in the Phase I National Environmental Policy Act contentions pending licensing application for the Yucca Mountain Project.
22. On December 23rd the Nuclear Regulatory Commission published its final revision to its Waste Confidence decision allowing for the storage of used nuclear fuel at reactor sites up to 120 years. In arriving at that conclusion the Commission deemed there was reasonable assurance that a mined geologic disposal would be available in the future when necessary.

23. On December 27th White Pine County in Nevada notified the Nuclear Regulatory Commission's Atomic Safety and Licensing Board that it had no additional witnesses on the Yucca Mountain license application.
24. On December 28th the Joint Timbisha Shoshone Tribal Group notified the Nuclear Regulatory Commission's Atomic Safety and Licensing Board (ASLB) that it had no additional party witnesses on the Yucca Mountain license application. On the same day Inyo County also filed with the ASLB that it had no additional other witnesses in the license application proceedings.
25. On December 29th Inyo County in California filed with the Nuclear Regulatory Commission's Atomic Safety and Licensing Board that it had no additional party and other witnesses on the Yucca Mountain proceedings.
26. On December 30th the Nuclear Regulatory Commission's Staff filed with the Nuclear Regulatory Commission's Atomic Safety and Licensing Board (ASLB) that it had no additional witnesses relative to its Safety Evaluation Report for Volume 1.
27. On December 30th Clark County in Nevada filed with the Nuclear Regulatory Commission's Atomic Safety and Licensing Board that it had no additional party and other witnesses on the Yucca Mountain proceedings.



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

December 6, 2010

SECRETARY

The Honorable Doc Hastings
United States House of Representatives
Washington, D.C. 20515

Dear Congressman Hastings:

This responds to your letter of November 19, 2010, in which you expressed concerns regarding Commission action with respect to the Construction Authorization Board's decision denying the Department of Energy's motion to withdraw its application for the Yucca Mountain geologic repository. You request, in particular, that deliberations be concluded and a final order be affirmed, and request a date certain for issuance of a final order by the Commission in this matter.

Given that the adjudicatory process is ongoing, the Commission itself cannot discuss or comment on the issues involved. No specific date has been established for completion of the matter.

A copy of your letter and this response will be served on the participants in the *Yucca Mountain* proceeding. In addition, we will keep you informed of the Commission's decisions in this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Annette Vietti-Cook".

Annette L. Vietti-Cook

cc: Service List



Rob McKenna
ATTORNEY GENERAL OF WASHINGTON

Ecology Division
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PO Box 40117 • Olympia WA 98504-0117 • (360) 586-6770

December 7, 2010

Mark Langer, Clerk
D.C. Circuit Court of Appeals
333 Constitution Avenue NW
Room 5523
Washington DC 20001

RE: *In re Alken County*
DC Circuit Court of Appeals No. 10-1050 consolidated

Dear Mr. Langer:

On September 28, 2010, the consolidated Petitioners in the above matter (Petitioners) filed a corrected motion to lift stay and re-establish an expedited briefing schedule in this case. The Respondents filed joint response briefing on October 12, 2010. The Petitioners filed reply briefing on October 18, 2010, followed by a supplement to their reply on October 25, 2010. The federal Respondents supplemented their response on October 27, 2010, and intervenor State of Nevada filed a separate response to the Petitioners' supplemental filing on October 28, 2010.

The Petitioners' September 28 motion requested that the stay be lifted and also sought expedited consideration by the Court. As of today's date, we have not yet received an order on our motion. I am writing on behalf of the Petitioners to bring this matter to your attention. While we do not wish to intrude on the Court's prerogative to carefully consider our motion, we also want to make sure that our motion has not been inadvertently overlooked. Therefore, we would appreciate your help in insuring that our motion has come to the attention of the Court.

Thank you for your attention to this matter.

Sincerely,

ANDREW A. FITZ
Senior Counsel
(360) 586-6752

AAF:dmm

cc: All Counsel of Record



United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 10-1050

September Term 2010

**DOE-Yucca Mtn
NRC-63-001**

Filed On: December 10, 2010

In re: Aiken County,

Petitioner

Consolidated with 10-1052, 10-1069, 10-1082

BEFORE: Henderson, Garland, and Brown, Circuit Judges

ORDER

Upon consideration of the motion to lift stay and set expedited briefing schedule and the supplement thereto, the response to the motion and the supplements thereto, and the reply, it is

ORDERED that the motion to lift stay and set expedited briefing schedule be granted. It is

FURTHER ORDERED that the following revised briefing schedule apply in these consolidated cases:

Joint Brief of Petitioners
and Intervenor NARUC

Already Filed

Brief of Amicus Curiae
in support of the Petitioners
Nuclear Energy Institute

Already Filed

Brief(s) of Respondents and
Intervenor State of Nevada
(not to exceed 23,000 words in the
aggregate, divided as the parties deem fit)

January 3, 2011

United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 10-1050

September Term 2010

Joint Reply Brief of Petitioners
and Intervenor NARUC
(not to exceed 7,000 words)

January 18, 2011

Deferred Appendix

February 1, 2011

Final Briefs

February 8, 2011

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

By: /s/
Amy Yacisin
Deputy Clerk

United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 10-1074

September Term, 2010

FILED ON: DECEMBER 13, 2010

NATIONAL ASSOCIATION OF REGULATORY UTILITY
COMMISSIONERS,

PETITIONER

v.

UNITED STATES DEPARTMENT OF ENERGY AND
UNITED STATES OF AMERICA,

RESPONDENTS

Consolidated with 10-1076

Petition for Review of a Decision of the
United States Department of Energy

Before: SENTELLE, *Chief Judge*; BROWN, *Circuit Judge*; and WILLIAMS, *Senior Circuit Judge*.

J U D G M E N T

This appeal was considered on the record and the briefs submitted by the parties. *See* FED. R. APP. P. 34(a)(2); D.C. CIR. R. 34(j). The court has accorded the issues full consideration and has determined they do not warrant a published opinion. *See* D.C. CIR. R.36(d). It is

ORDERED AND ADJUDGED that the petition for review is dismissed.

The Nuclear Waste Policy Act (the "Act"), 42 U.S.C. § 10101 *et seq.*, authorizes the Secretary of Energy to enter into contracts with generators of high-level radioactive waste and spent nuclear fuel (together, "nuclear waste"). 42 U.S.C. § 10222(a)(1). The contracts must require the Secretary to dispose of the nuclear waste and, in exchange, require payment from the producers of the waste according to the terms of the Act. § 10222(a)(1), (5). For nuclear waste sold on or after 90 days after the enactment of the Act, the Secretary must charge a fee of 1 mil per kilowatt-hour, § 10222(a)(2), which is to be deposited into the Nuclear Waste Fund ("NWF"), § 10222(c). Thereafter, the Secretary must conduct an annual assessment of the NWF fee to determine whether it is adequate to offset the costs of its statutorily enumerated waste

No. 10-1074

Page Two

disposal activities. § 10222(a)(4). If the Secretary determines that “insufficient or excess revenues” are being collected, he shall propose to Congress an adjustment of the fee. *Id.*

Petitioners ask us to order the Secretary to conduct an annual assessment under the Act and to suspend the NWF fee pending completion of his annual assessment. Because the Secretary has since conducted his annual assessment, these two claims are moot and we lack jurisdiction to address them. *See Powell v. McCormack*, 395 U.S. 486, 496 (1969) (“[A] case is moot when the issues presented are no longer ‘live’ or the parties lack a legally cognizable interest in the outcome.”). Petitioners also request that we order the Secretary to suspend the NWF fee in light of the current status of Department of Energy’s waste disposal program. This request is unripe. *See Eagle-Picher Indus., Inc. v. EPA*, 759 F.2d 905, 917 (D.C. Cir. 1985) (“[T]he interest in postponing review is strong if the agency position whose validity is in issue is not in fact the agency’s final position.” (quoting *Continental Air Lines, Inc. v. Civil Aeronautics Bd.*, 522 F.2d 107, 125 (D.C. Cir. 1975) (en banc))). Given the Secretary’s recent completion of his annual assessment, petitioners may now be able to properly raise this claim through a challenge to that assessment.

Pursuant to Rule 36 of this Court, this disposition will not be published. The Clerk is directed to withhold issuance of the mandate herein until seven days after resolution of any timely petition for rehearing or petition for rehearing *en banc*. *See* FED. R. APP. P. 41(b); D.C. CIR. R. 41.

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

BY: /s/
Michael C. McGrail
Deputy Clerk



**United States Nuclear Waste Technical
Review Board**

**Evaluation of the Technical Basis for
Extended Dry Storage and Transportation of
Used Nuclear Fuel – Executive Summary**

December 2010

Introduction

The U.S. Nuclear Waste Technical Review Board (Board) is tasked by the amendments to the Nuclear Waste Policy Act of 1982 to independently evaluate U. S. Department of Energy (DOE) technical activities for managing and disposing of used nuclear fuel and high-level radioactive waste. This report was prepared to inform DOE and Congress about the current state of the technical basis for extended dry storage¹ of used fuel and its transportation following storage. The Board expects that the report also will be valuable in informing the Blue Ribbon Commission on America's Nuclear Future and other interested parties on these issues.

When the used nuclear fuel that is currently stored at commercial nuclear power plant sites will be transported to other locations is not known. Understanding the length of time that used fuel can be stored without the fuel or the storage system components degrading to the extent that the ability to meet the regulatory requirements for continued storage is affected is a primary concern. In addition, understanding how the condition of the used fuel changes with time is important to determining when this may affect the ability to transport the fuel without significant risk of damage or release of radioactive materials. Finally, being able to predict confidently how used fuel will behave when handled after transportation to a repository or a processing facility also is necessary.

This report presents the results of a review of publicly available literature and published information on research completed to date related to extended storage and transportation of used fuel. The Board reports these results without challenging the technical findings of researchers but believes that they form a suitable basis for the evaluation presented here. In addition, regulatory authority, National Laboratory, and industry experts have been consulted to confirm the current state of knowledge and the research and development recommendations to enhance confidence in extended storage included in this report.

Background

Figure 1 shows graphics of typical pressurized and boiling-water reactor-fuel assemblies consisting of fuel rods arranged in assemblies. After irradiation these constitute the “used fuel” that is stored at reactor sites in pools and in dry-storage systems.

¹ U.S. nuclear utilities are operating dry-storage facilities for used fuel that are licensed for operating periods of up to 60 years. The fuel in these facilities and the used fuel that will be discharged in the foreseeable future may need to remain in storage for much longer periods. Some have suggested that this period could extend to as long as 300 years. This report evaluates the technical basis for dry storage of used fuel during such extended periods but does not encompass extended wet storage of fuel. In this report, the term “fuel” refers to both the uranium pellets and the metal cladding.

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

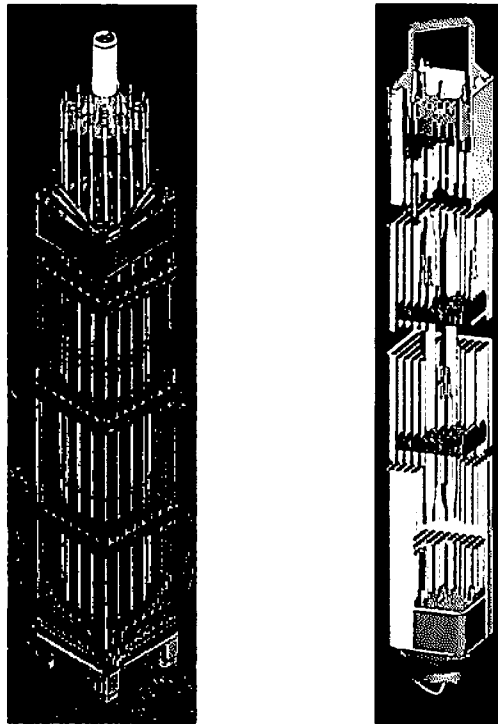


Figure 1. Typical Pressurized-Water Reactor (left) and Boiling-Water Reactor Fuel Assemblies

Courtesy Westinghouse (left)

http://gepower.com/prod_serv/products/nuclear_energy/en/downloads/gnf2_adv_poster.pdf (right)

Following discharge from the reactor, used fuel is initially stored in racks under water in pools up to 40 feet deep (see Figure 2). During this period of wet storage, some degradation may be detectable, although it is typically minimal.

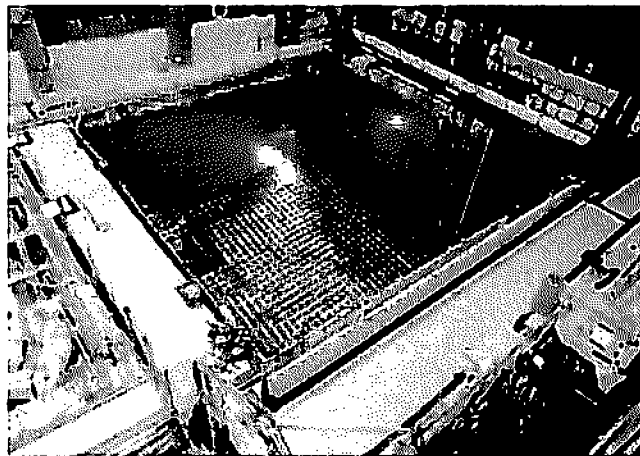


Figure 2. Typical Used-Fuel Storage Pool

(from <http://www.nrc.gov/waste/spent-fuel-storage/pools.html>)

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

Before the pools at a nuclear power plant are filled to their licensed capacity, the operator needs to provide additional storage capacity so that the power plant can continue operating. Thus, many utilities have built dry-storage facilities (referred to as Independent Spent Fuel Storage Installations, or ISFSIs) on their sites. These installations are large parking-lot-type concrete pads with protective fencing and continuous security surveillance. The fuel may be stored vertically in metal or concrete casks or horizontally in modular concrete storage facilities. The fuel inside concrete dry-storage casks is in bolted or welded canisters that are loaded in the spent-fuel pool and transferred to the ISFSI in an on-site transfer cask. Similar canisters are used for fuel that is stored in horizontal storage modules and may be used to contain fuel in metal storage casks, although some metal casks contain the fuel in open baskets without an inner canister.

Figure 3 shows concrete casks storing used fuel at the Connecticut Yankee Nuclear Power Plant site. Figure 4 shows typical components that constitute a concrete storage-cask system, including the multipurpose canister (MPC) and the vents that provide the airflow to cool the canister. Metal casks that contain the fuel in open baskets do not have the same ventilation arrangement but typically have external heat-transfer fins to assist with the cooling.

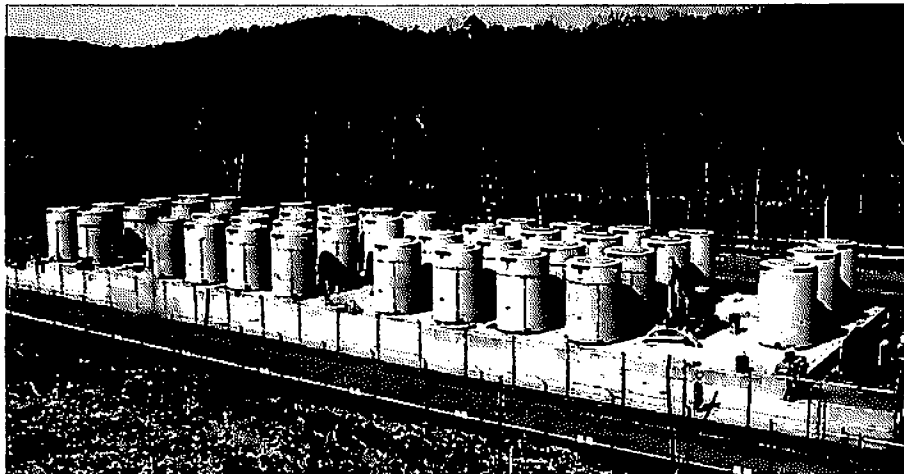


Figure 3. Independent Spent-Fuel Storage Installation

Photo from NAC International, Inc. with permission

Before used fuel is loaded from a pool into a canister, the canister is lowered into the storage pool inside a shielded transfer cask. If the fuel is to be loaded into a metal cask with an open basket, the cask is lowered into the pool with the basket installed. Following loading of the fuel, a lid is installed and the cask is removed from the pool. The water is drained from the cask, and if a canister is being used, the water also is drained from the canister. The lid then is bolted or welded in place, and operations to dry the fuel are started. This process typically involves several cycles of alternately applying a vacuum and backfilling the canister, or the cask, with helium. During the periods when the vacuum is applied, the fuel rods are not cooled and the temperature of the fuel rises. The temperature rise enhances drying, but the temperature has to be controlled below predetermined limits to prevent thermal stresses that could result in cladding damage. Once the

drying process is completed, the canister or cask is pressurized with helium, both to provide improved heat transfer and to minimize the potential for fuel degradation during subsequent storage.

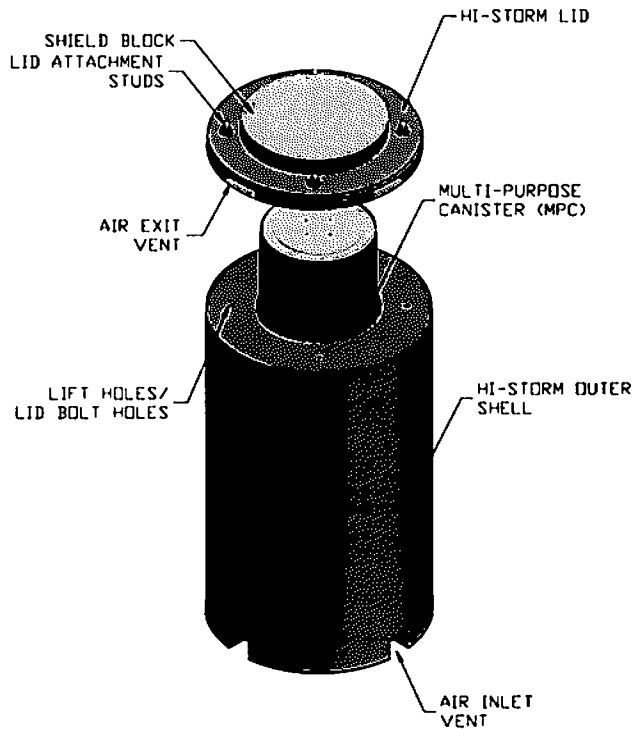


Figure 4. Typical Vertical Dry Cask-Storage System

Graphic Courtesy of Holtec International, Inc.

Findings

This review finds that fuel rods discharged from nuclear power plants are typically in good condition with only a very small percentage of rods having cladding defects. Early references reported that less than 0.04 percent of fuel rods failed, and later plant records indicate that the failure rate has decreased to less than 0.0005 percent for more recently discharged fuel. During preparation for transfer to dry-storage facilities, failed fuel assemblies are loaded into specifically designed compartments of the canisters or metal casks, separate from intact fuel assemblies.

The fuel-drying process is not perfect. After drying, residual water remains in unknown amounts that can affect subsequent internal degradation processes. The vacuum-drying heat cycles can change the nature of the hydrogen in the cladding and stress the fuel.

According to the literature review, the fuel, the dry-storage system components (canister, cask, etc.), and the concrete foundation pad may all degrade during dry storage. Some degradation mechanisms may be active during the early years of dry storage, while different mechanisms may be active at the lower temperatures that would be expected during extended storage.

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

The most significant potential degradation mechanisms affecting the fuel cladding during extended storage are expected to be those related to hydriding, creep, and stress corrosion cracking. These mechanisms and their interactions are not well understood. New research suggests that the effects of hydrogen absorption and migration, hydride precipitation and reorientation, and delayed hydride cracking may degrade the fuel cladding over long periods at low temperatures, affecting its ductility, strength, and fracture toughness. High-burnup fuels tend to swell and close the pellet-cladding gap, which increases the cladding stresses and can lead to creep and stress corrosion cracking of cladding in extended storage. Fuel temperatures will decrease in extended storage, and cladding can become brittle at low temperatures.

Only limited references were found on the inspection and characterization of fuel in dry storage, and they all were performed on low-burnup fuel after only 15 years or less of dry storage. Insufficient information is available on high-burnup fuels to allow reliable predictions of degradation processes during extended dry storage, and no information was found on inspections conducted on high-burnup fuels to confirm the predictions that have been made. The introduction of new cladding materials for use with high-burnup fuels has been studied primarily with respect to their reactor performance, and little information is available on the degradation of these materials that will occur during extended dry storage. Consequently, without any data for predicting how aging affects the fuel condition over longer storage periods, vendors model the condition of high-burnup used fuel in storage on the basis of a limited series of examinations of fuel that also form the basis for predicting the behavior of used fuel during extended dry storage and normal handling and transport of used fuel and in the event of transportation accidents.

As noted above, one of the main deterrents to corrosion of the fuel cladding and the canister or metal cask internals during extended dry storage is the presence of helium. If the helium leaks and air is allowed to enter the canister or cask, this, together with the moisture in the air, can result in corrosion of the fuel cladding, the canister, and the cask. However, although provision is made to monitor the pressure of the helium during extended storage in bolted canisters, there is currently no means of confirming the presence of helium in welded containers or casks, nor is there a requirement for periodically inspecting the integrity of the closure welds for defects. If these storage systems were inspected for weld defects and/or tested for helium periodically, this would allow welded containers and casks with leaks to be repaired and refilled with helium.

During extended dry storage, degradation mechanisms also act on the outside of canisters, on storage casks (concrete or steel), and on modular concrete facilities as well as on the storage pads. The effect of these degradation mechanisms will depend on the environmental conditions at the specific location, on diurnal and seasonal temperature variations, and on the presence of corrosive agents and moisture in the air. The review identified references to general metal and concrete deterioration mechanisms and modeling, but none included the information necessary to predict the degradation of dry-storage canisters, casks, or concrete structures during extended storage.

Given the temperature dependence of many of the degradation mechanisms described above, accurately predicting how the used fuel and canister temperatures will change over extended dry storage is important. During this review, however, little information was found on detailed thermal modeling during the period of extended dry storage.

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

Regardless of the length of storage, used fuel eventually will have to be moved from the reactor sites either to off-site interim storage facilities or to used-fuel processing facilities for recycling or for waste management. Transportation regulations are largely focused on the integrity of the transportation casks, which contain the used fuel, and maintaining subcriticality of the fuel. The primary goal is to ensure that the cask does not fail in the event of a transportation accident, with the potential for release of radioactive materials. The regulations require that under both normal and accident conditions, the transportation cask and its contents are capable of meeting stringent performance specifications that include maintaining geometric configuration of the fuel to certain limits largely for criticality and to address concerns about external radiation levels.

If the fuel degrades during extended storage, it could be susceptible to damage from the vibration and shocks encountered during transport operations. The consequences may include release of fission-product gases into the canister or the cask interior, which must be contained during a transportation accident. Used-fuel transportation casks are designed to withstand a series of transportation accidents without release of radioactive materials. Figure 5 shows a full-scale crash test performed by Sandia National Laboratory in 1977 in which a locomotive traveling at approximately 80 miles per hour was crashed broadside into a used-fuel transportation cask. In this test, the cask and the dummy fuel inside it performed in accordance with the regulatory requirements.

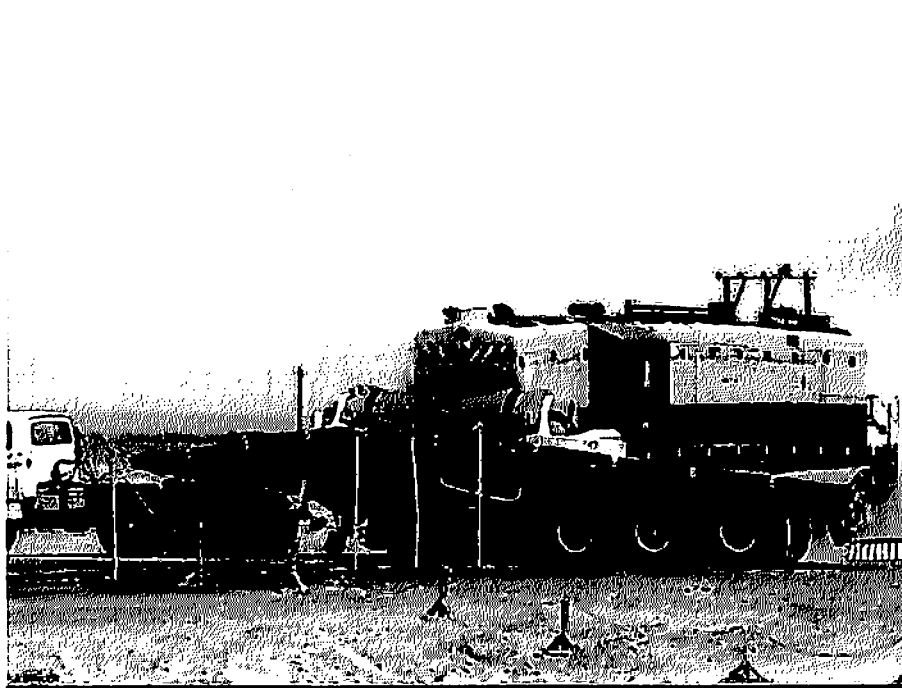


Figure 5. Spent-Fuel Crash Test

<http://www.sandia.gov/recordsmgmt/ctb1.html>

Upon reaching the interim storage location, the repository site, or other processing facility, the used fuel will have to be handled, and the integrity of the fuel following the transportation and

handling operations may not be known with confidence. If the fuel is to be processed instead of being placed in a repository after transportation, the casks and used-fuel canisters will need to be opened and the fuel removed. Before this is done, consideration should be given to the condition of the fuel, and a means needs to be available for determining whether the fuel has failed, which may require opening the cask in a hot cell as opposed to the more traditional spent-fuel pool. For extended storage, the integrity of the used fuel after transportation cannot be ensured because some long-term degradation processes are uncertain and transportation-accident loading predictions for aged fuels have not been fully validated.

Review of the relevant technical sources used as the basis for this report has shown the following:

- Little data are publicly available on the behavior of high-burnup fuel during dry storage and on its subsequent handling and transportation. No information is available on the behavior during dry storage of the more advanced materials now being used for fuel cladding and fabrication of fuel-assembly structural components.
- The physical state of the cladding when fuel is placed into dry storage is not currently well characterized. There may be zones of physical weakness and, in some cases, the cladding may be close to failure. Normal handling of fuel assemblies, off-normal occurrences, and accident events would then be more likely to result in additional damage to fuel rods.
- Cladding-degradation mechanisms, their interactions with each other, and the expected behavior of cladding after aging in extended dry storage are not well understood. Also not well understood are some of the conditions that affect these degradation mechanisms, such as predictions of the fuel temperatures over time and the amount of residual water present after drying.
- At the low temperatures expected to be reached during extended dry storage, and even in the presence of air, used-fuel-pellet material oxidizes at a very slow rate. Even if a gross breach occurs and fuel-pellet material is released from the fuel cladding, it will not oxidize to powder easily or quickly. Consequently, if fuel material is released inside the canister or cask, containing and repackaging it safely once the canister or cask is opened should not present any undue problem. Fission-product gases also would be released inside the canister or the cask, and they would need to be dealt with by the ventilation system in the fuel-handling facility.
- Corrosion mechanisms will cause degradation of the metal components of dry-storage systems during extended dry-storage periods: for example, the outer surfaces of fuel canisters. Consequently, establishing an effective regular inspection and maintenance program is important.
- Also important is establishing a program for inspecting and characterizing the physical condition of used fuel and dry-storage systems in order to understand how their condition changes over time. The program will reduce the uncertainty in predicting the future state and behavior of the used fuel and the storage-system components during subsequent operations.

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

- Several concrete deterioration and rebar-corrosion mechanisms are known to cause degradation of reinforced concrete in dry-storage systems, including the storage pad. Consequently, establishing a regular inspection and maintenance program for these systems is important.
- Some plausible off-normal and accident scenarios for the handling and transport of used-fuel casks have not been fully evaluated. Performing full-scale testing of transport packages to demonstrate the behavior of both the package and the fuel may be beneficial. At a minimum, validation of computer models using scaled tests should be carried out. However, the performance of some components, such as bolts and welds, are particularly difficult to scale. Consequently, if scaled tests are performed, additional testing of full-scale components may be needed to verify that the performance of these components is being modeled correctly.
- There are security risks associated with the dry storage of used fuel, and the risks will likely change with time. These risks and how they change need to be addressed using a risk-informed process that considers the probability of the risks and the potential consequences. This process then should be used as the basis for determining what action, if any, is needed to provide the necessary level of security during extended dry-storage periods.

Research and Development Recommendations

On the basis of this review, we recommend that a number of research and development programs be implemented. They are focused primarily on improving the understanding of key fuel-degradation mechanisms and increasing confidence in the projection of the behavior of the used fuel and storage systems during extended dry-storage periods and subsequent transportation of the fuel. The intention is to prevent problems that may otherwise be encountered during later fuel-handling operations following transportation of used fuel to disposal or processing facilities. The recommended research programs investigate the following issues:

- Understanding the ultimate mechanical cladding behavior and fuel-cladding degradation mechanisms potentially active during extended dry storage, including those that will act on the materials introduced in the last few years for fabrication of high-burnup fuels
- Understanding and modeling the time-dependent conditions that affect aging and degradation processes, such as temperature profiles, in situ material stresses, quantity of residual water, and quantity of helium gas
- Modeling of age-related degradation of metal canisters, casks, and internal components during extended dry storage
- Inspection and monitoring of fuel and dry-storage systems to verify the actual conditions and degradation behavior over time, including techniques for ensuring the presence of helium cover gas

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

- Verification of the predicted mechanical performance of fuel after extended dry storage during cask and container handling, normal transportation operations, fuel removal from casks and containers, off-normal occurrences, and accident events
- Design and demonstration of dry-transfer fuel systems for removing fuel from casks and canisters following extended dry storage

Conclusions

The technical information currently available, together with the experience gained to date in the dry storage of spent fuel, demonstrates that used fuel can be safely stored in the short term and then transported for additional storage, processing, or repository disposal without concern. However, additional information is required to demonstrate with similarly high confidence that used fuel can be stored in dry-storage facilities for extended periods without the fuel degrading to the extent that it may not perform satisfactorily during continued storage and subsequent transportation.

However, the Board recommends that a number of research and development programs be implemented to demonstrate that used fuel can be stored safely in dry-storage facilities for extended periods. Research alone will not be sufficient. Because the experience base for extended dry storage of used fuel is short and the credible degradation phenomena are several and not robustly predictable in a quantitative sense, an in-service inspection and maintenance program appears to be the only way of implementing long-term dry storage of used nuclear fuel. The technical details of such an in-service inspection program obviously will depend on the desired safety objectives of extended dry storage. Consequently, a practical engineering approach that is based on the observational method and periodic assessments will likely be required to provide an adequate safety basis in addition to what can be learned from targeted scientific investigations.

The regulations concerning dry storage of used fuel do not currently address storage for extended periods. There also is some inconsistency between the regulations that apply to dry storage and those that apply to transportation, and how to meet both sets of regulations is unclear. It would be helpful in managing extended dry storage of used fuel if the regulations were revised as an integrated set and based on a risk assessment for safety significance and consequence. In addition, the Board thinks that the regulatory requirements related to physical security and terrorist threats also should be reviewed on a risk-informed basis using potential consequence analysis and integrated with the storage and transportation regulations.

At this point, the nuclear waste management policy of the United States is unclear, and the result is that used fuel will be stored at reactor sites for longer than originally foreseen. It is thus essential that the appropriate research and development programs and monitoring and inspection programs are implemented as a matter of priority to demonstrate that used fuel can be stored safely for extended periods and then transported and handled as part of a future waste management program.

A detailed report that is summarized by this white paper is available on the NWTRB Web site at http://www.nwtrb.gov/facts/eds_rpt.pdf.



Nevada Governor Brian Sandoval

Wednesday, December 15, 2010

Sandoval Statement On Judicial Order From The Yucca Mountain Licensing Board

"As Governor-elect, I remain opposed and I will not consider accepting high-level nuclear waste in our state."

RENO, NV -- Governor-elect Brian Sandoval made the following statement today after learning of the judicial order from the Yucca Mountain Licensing Board rejecting the eleven legal questions:

"As Nevada's Attorney General and as a candidate for the highest office in this state, I opposed Yucca Mountain. I made a pledge to do all I could to protect the health, safety and welfare of the citizens of this great state. As Governor-elect, I remain opposed and I will not consider accepting high-level nuclear waste in our state. Period.

"When I visited with President Obama in Washington, D.C. earlier this month, I was pleased and encouraged to hear the president say he would not reconsider his decision to shut down the Yucca Mountain nuclear waste site. Our conversation reaffirmed to me the president will not be supporting the long-term storage of high-level nuclear waste in Nevada.

"I am disappointed by the Licensing's Board order. As the Executive Director of the Nevada Agency for Nuclear Projects has pointed out, the judges made special note of Nevada's scientific claim that erosion could cause the surface of Yucca Mountain to completely erode during the regulatory period as prescribed by the Environmental Protection Agency, leaving the waste unprotected by the mountain's geology in the future. EPA requires that nuclear waste must be kept away from public and environmental exposure for a million years. I will support the state's petition to the Nuclear Regulatory Commission to open a rulemaking docket addressing this erosion science that was not previously available when the NRC addressed the issue.

"Due to the investment in infrastructure at Yucca Mountain, I am willing to consider Yucca Mountain for research or other non-nuclear purposes that might benefit economic development efforts. As Governor, I will not give up my fight against storing high-level nuclear waste at Yucca Mountain. Protecting the health, safety and welfare of our fellow citizens will be my highest priority."

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**OFFICE OF THE GOVERNOR
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December 16, 2010

The State of Nevada remains committed to protect the health, safety and welfare of its citizens which have been threatened for the past 23 years by the seriously flawed high level nuclear waste repository project proposed at Yucca Mountain. While we are encouraged by the commitment of the Obama administration to kill the ill-advised project, we remain steadfast in our opposition to the Department of Energy's License Application.

While DOE has filed a motion to withdraw its license, the process has been kept alive by the federal licensing board which opined that DOE did not have the legal right to withdraw its application. Both DOE and the State have challenged that ruling to the full Nuclear Regulatory Commission. In addition, other parties including the States of South Carolina and Washington, are suing in federal appeals court to make sure their states get to dump their nuclear waste in Nevada. Nevada will not receive any compensation in exchange for hosting this high risk project.

Nevada's legal team attempted to shorten the long 4-year licensing hearing with eleven legal challenges that could have stopped the project. Nevada challenged that the project was illegal because DOE's application is incomplete, did not include models showing what would happen if safety barriers failed, and depended on the safety of 11,500 titanium robot-installed drip shields that DOE does not plan to install until after the waste is emplaced in the mountain for approximately 100 years.

Today, the licensing board ruled against most of Nevada's legal challenges forcing the long drawn-out hearing to continue and kicking the safety issues down the road. However, the judges did allow Nevada to challenge the facts of each of these safety issues during the licensing hearing. In addition, the judges made special note of Nevada's scientific claim that erosion could cause the surface of Yucca Mountain to completely erode during the period prescribed by the Environmental Protection Agency, leaving the waste unprotected by the mountain's geology in the future. EPA requires that nuclear waste must be kept away from public and environmental exposure for a million

years. The State will petition the Nuclear Regulatory Commission to open a rulemaking docket addressing this erosion science that was not previously available when the NRC addressed the issue.

While the license application remains alive in the courts, Nevada believes the final matter will be decided by both the courts and the US Congress. We will continue to work with the President's Blue Ribbon Commission for America's Nuclear Future while it works on alternatives and sets a new path toward solving the nation's nuclear waste issues. The Commissions first draft report is due next summer.



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December 22, 2010

The Honorable John M. Spratt, Jr.
Chairman, Committee on the Budget
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter is in response to your letter of October 11, 2010, in which you expressed concern about the agency's high-level waste program execution during the period of the Continuing Resolution. I appreciate your interest in this issue.

I want to assure you that the approach the U.S. Nuclear Regulatory Commission (NRC) is taking is consistent with the terms of the Continuing Resolution, the Commission's Fiscal Year (FY) 2011 budget guidance, the general principles of appropriations law, and past NRC practice. When the NRC is operating under a Continuing Resolution, the Executive Director of Operations and the Chief Financial Officer issue guidance to staff on activities to be carried out until a full year appropriation is approved. Therefore this year's guidance issued on October 4, 2010, was consistent with the agency's FY 2011 budget that was approved by the Commission and provided to the Congress by the President in February.

Under the FY 2011 guidance, therefore, the staff is beginning to transition to an orderly close-out of the high-level waste program. This action was taken only after discussions with the Commission and senior staff, and after the NRC General Counsel reviewed the budget guidance and determined that the agency's approach was consistent with appropriations law. To provide you with further assurances about the specific actions we have taken, orderly closure of this program entails knowledge capture and management to ensure that the staff's technical work to date is preserved. This comprehensive effort is expected to take about a year and include documenting the staff's review and other knowledge concerning the program by means such as comprehensive technical reports and videotaped interviews of technical staff. By thoroughly documenting the staff's technical review and preserving it as appropriate for publication and public use, the agency will be able to respond to direction from the Congress or the Courts.

I appreciate your interest in our Nation's high-level waste program.

Sincerely,

/RA/

Gregory B. Jaczko



CHAIRMAN

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

December 22, 2010

The Honorable Michael K. Simpson
Member, Subcommittee on Energy
and Water Development
Committee on Appropriations
United States House of Representatives
Washington, D.C. 20515

Dear Congressman Simpson:

This letter is in response to your letter of October 20, 2010, in which you expressed concern about the agency's high-level waste program execution during the period of the Continuing Resolution. I appreciate your interest in this issue and respect the important constitutional role the U.S. House of Representative's Committee on Appropriations has in providing funding and oversight.

I want to assure you that the approach the U.S. Nuclear Regulatory Commission (NRC) is taking is consistent with the terms of the Continuing Resolution, the Commission's Fiscal Year (FY) 2011 budget guidance, the general principles of appropriations law, and past NRC practice. When the NRC is operating under a Continuing Resolution, the Executive Director of Operations and the Chief Financial Officer issue guidance to staff on activities to be carried out until a full year appropriation is approved. Therefore this year's guidance issued on October 4, 2010, was consistent with the agency's FY 2011 budget that was approved by the Commission and provided to the Congress by the President in February.

Neither the text of the FY 2010 Energy and Water Development and Related Agencies Appropriations Act and its underlying committee reports, nor the FY 2011 Continuing Resolution provide the Commission with direction on how it is to expend its appropriations from the Nuclear Waste Fund for Yucca Mountain activities. Rather, the President's budget requests \$10 million for the closeout of the high-level waste program. In the absence of direction from Congress and with the context outlined above, the agency was left to decide on the most appropriate path forward within the framework of the law and based on adherence to established Commission policy.

Under the FY 2011 guidance, therefore, the staff is beginning to transition to an orderly close-out of the high-level waste program. This action was taken only after discussions with the Commission and senior staff, and after the NRC General Counsel reviewed the budget guidance and determined that the agency's approach was consistent with appropriations law. To provide you with further assurances about the specific actions we have taken, orderly closure of this program entails knowledge capture and management to ensure that the staff's technical work to date is preserved. This comprehensive effort is expected to take about a

year and include documenting the staff's review and other knowledge concerning the program by means such as comprehensive technical reports and videotaped interviews of technical staff. By thoroughly documenting the staff's technical review and preserving it as appropriate for publication and public use, the agency will be able to respond to direction from the Congress or the Courts.

Thank you again for your correspondence. I would be happy to discuss this matter further with you or your staff and I will continue to keep you informed of NRC activities related to the high-level waste program.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregory B. Jaczko", with a long horizontal flourish extending to the right.

Gregory B. Jaczko