

**NUCLEAR REGULATORY COMMISSION**

**10 CFR Part 72**

**[Docket No. PRM-72-6; NRC-2008-0649]**

**Petition for Rulemaking Submitted by C-10 Research and Education Foundation, Inc.**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Petition for Rulemaking; partial consideration in the rulemaking process.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC or the Commission) received a petition for rulemaking (PRM) dated November 24, 2008, filed by Ms. Sandra Gavutis, Executive Director for C-10 Research and Education Foundation Inc. (the petitioner). The petition was docketed by the NRC and assigned Docket No. PRM-72-6. The petitioner requests that the NRC amend its regulations concerning dry cask safety, security, transferability, and longevity. The petitioner made 12 requests. The NRC is denying nine of the petitioner's requests, but will consider one request in the rulemaking process. Action on two requests is being reserved for future rulemaking determinations, as these requests are currently under consideration by the NRC. The NRC will publish another *Federal Register* notice to inform the public of the Commission's decision for these two requests. The docket for this PRM will remain open until action is taken on the two remaining requests.

**ADDRESSES:** Further NRC action on the issues raised by this petition can be found on the Federal rulemaking Web site at <http://www.regulations.gov> by searching on Docket ID NRC-2009-0558, which is the identification for the future rulemaking.

You can access publicly available documents related to the petition, which the NRC possesses and is publicly available, using the following methods:

- **Federal Rulemaking Web site:** Public comments and supporting materials related to this petition can be found at <http://www.regulations.gov> by searching on the petition Docket ID NRC-2008-0649 or the future rulemaking Docket ID NRC-2009-0558. Address questions about NRC dockets to Carol Gallagher; telephone: 301-492-3668; e-mail: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov).

- **NRC's Agencywide Documents Access and Management System (ADAMS):**

You may access publicly available documents online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[\*ADAMS Public Documents\*](#)" and then select "[\*Begin Web-based ADAMS Search\*](#)." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). The ADAMS accession number for each document referenced in this notice (if that document is available in ADAMS) is provided the first time that a document is referenced.

**NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

**FOR FURTHER INFORMATION CONTACT:** Jeffery Lynch, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-5041, e-mail: [Jeffery.Lynch@nrc.gov](mailto:Jeffery.Lynch@nrc.gov).

**SUPPLEMENTARY INFORMATION:**

**Background**

On November 24, 2008, C-10 Research and Education Foundation, Inc. filed a petition for rulemaking. The petition was docketed by the NRC and assigned Docket No. PRM-72-6.

On March 3, 2009 (74 FR 9178), the NRC published a notice of receipt and request for comment for PRM-72-6.

The petitioner requested that the NRC amend part 72 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," to revise the NRC requirements for interim dry cask storage of spent fuel. Specifically, the petitioner requested that the NRC's regulations be amended to:

1) Require that the NRC prohibit non-conforming pre-built full-scale casks, specifically built for NRC certification testing, from being put into production under industry pressure to "accept-as-is."

2) Require that the NRC base its certification of casks on upgraded code requirements, which include design criteria and technical specifications for a 100-year-minimum age-related degradation timeframe, upgraded from the current "inadequate" 20-year design specification. The NRC must also require an NRC regulatory and public review of an in-depth technical evaluation of the casks done at the 20-year certificate of compliance (CoC) reapproval interval to effectively catch and address cask deterioration.

3) Require that the NRC approve, as part of the original independent spent fuel storage installation (ISFSI) certification process and construction license, a method for dry cask transfer capacity that will allow for immediate and safe maintenance on a faulty or failing cask.

4) Require that dry casks are qualified for transport at the time of onsite storage approval certification.

5) Require the most current American Society of Mechanical Engineers (ASME) Codes and Standards be adopted for all spent fuel storage containers without exception.

6) Require ASME Code stamping for fabrication.

7) Require that all materials for fabrication be supplied by ASME-approved material suppliers who are certificate holders.

8) Require that current ASME Codes and Standards for conservative heat treatment and leak tightness are adopted and enforced.

9) Require a safe and secure hot cell transfer station coupled with an auxiliary pool to be built as part of an upgraded ISFSI design certification and licensing process.

10) Require real-time heat and radiation monitoring at ISFSIs at all nuclear power plant sites and away-from-reactor storage sites maintained by the utilities and that the monitoring data be transmitted in real-time to affected State health, safety, and environmental regulators.

11) Require “Hardened On-Site Storage” (HOSS) at all nuclear power plants as well as away-from-reactor dry cask storage sites, and that all nuclear industry interim on-site or off-site dry cask storage installations or ISFSIs be fortified against terrorist attack. In addition, all sites should be safeguarded against accident and age-related leakage.

12) Establish funding to conduct on-going studies to provide the data required to accurately define and monitor for age-related material degradation, assess the structural integrity of the casks and fuel cladding in “interim” waste storage.

While the NRC was considering the C-10 petition for rulemaking, it issued a draft technical basis for a future security rulemaking for ISFSIs and a final rule on terms and conditions for both ISFSI licenses and certificates of compliance. As described in the following paragraphs, some aspects of both these actions are pertinent to the petitioner’s requests

On December 16, 2009 (74 FR 66589), the NRC published a notice of availability and solicitation of public comments for Draft Technical Basis for Rulemaking Revising Security Requirements for Facilities Storing Spent Nuclear Fuel and High-Level Waste. In this draft technical basis, the NRC describes the objectives, conceptual approaches, and potential solutions. The NRC staff expects that the rulemaking, if approved by the Commission, will

result in risk-informed, performance-based regulations, with both site-specific and generally licensed ISFSIs having consistent regulations. The NRC staff received comments on the draft regulatory basis from several stakeholders who were opposed, for different reasons, to the draft technical basis. For this reason, the NRC staff, in SECY-10-0114 (ADAMS Accession No. ML101880013) recommended that the schedule for the rulemaking effort be extended to allow the staff to further evaluate these comments and their implications. The Commission approved the NRC staff's recommendation in its staff requirements memorandum, SRM-SECY-10-0114 (ADAMS Accession No. ML103210025), and reaffirmed the previous Commission direction for the ISFSI security rulemaking provided in SRM-SECY-07-0148 (ADAMS Accession No. ML073530119).

On February 16, 2011 (76 FR 8872), the NRC issued the Final Rulemaking "License and CoC Terms." This rulemaking extended the duration of ISFSI licenses and storage cask CoCs to 40 years, clarified the difference between "renewal" versus "reapproval" terminology in 10 CFR Part 72, and codified the requirements for an aging management plan for both general and specific licensees.

In addition, since the petition was filed, in response to direction provided by the Commission in SRM-COMDEK-09-0001, the staff has initiated a thorough review of whether regulatory changes will be needed to support the safe and secure storage of spent nuclear fuel (SNF) for multiple renewal periods.

### **Public Comments on the Petition**

The notice of receipt for PRM-72-6 invited interested persons to submit comments. The comment period closed on May 18, 2009. The NRC received over nine thousand comments. Comments were received from industry, various non-governmental organizations, and members

of the public. The majority of the comments were identical (form) e-mails. The Nuclear Energy Institute (NEI) and the Strategic Teaming and Resource Sharing (STARS) organization opposed the petition. All other commenters, including the ASME and Berkeley Fellowship of Unitarian Universalists Social Justice Committee, supported the petition.

#### **NEI Comments:**

In its letter dated May 18, 2009 (ADAMS Accession No. ML091400073), the NEI stated that the current NRC regulations contained in 10 CFR Part 72 are sufficient to provide for the safe storage of spent nuclear fuel and that the NRC should deny the petition. The NEI made the following assertions:

1) Industry has safely maintained spent fuel storage pools for over 40 years and has successfully loaded and emplaced at ISFSIs over 1,000 dry cask storage systems at 47 locations over the past 25 years.

2) The additional requirements requested by the petitioner “go far beyond” the necessary regulation of existing dry-cask design technology and extend to dictating design changes that go beyond the NRC’s purview. The petitioner’s request that the NRC require a hot cell transfer station coupled with an auxiliary pool requirement is unnecessary for safety and costly for both the NRC and its regulated entities.

3) The petitioner’s request that the NRC specify design criteria and technical specifications for a 100-year minimum age-related degradation timeframe for dry cask storage certification is not appropriate, given that any renewals by the NRC would be based upon conditions that would require licensees to undertake an aging management program subject to NRC inspection.

4) There is no need for rulemaking regarding ASME Code requirements, because the NRC acknowledges in its “*Standard Review Plan for Dry Cask Storage Systems*,”

NUREG-1536 (ADAMS Accession No. ML010040237), that ASME Boiler and Pressure Vessel (B&PV) Code, Section III is an acceptable standard for the design and fabrication of spent fuel dry-storage casks. The NRC recognized in Spent Fuel Storage and Transportation Interim Staff Guidance 10, "Alternatives to the ASME Code," Revision 1 (ADAMS Accession No. ML003770459), that dry storage casks are not pressure vessels, and as such, ASME Code Section III cannot be implemented without allowing some exceptions to its requirements. The NRC, in NUREG-1567 (ADAMS Accession No. ML003686776), "Standard Review Plan for Spent Fuel Dry Storage Facilities," Section 16.4.1, has provisions for ISFSI licensees and applicants for a CoC to request exceptions from the ASME Code.

5) The petitioner's request that the NRC require real-time heat and radiation monitoring should be denied, because the current NRC regulations (i.e., 10 CFR 72.44) already contain requirements for the technical specifications to include monitoring instruments, surveillance requirements, and administrative controls.

6) There is no need for rulemaking with regard to security issues. The NRC relies on security assessments to ensure that the industry meets the relevant regulations (e.g., 10 CFR 72.212 and 10 CFR 73.55). Compliance with these existing regulations ensures that dry cask storage modules will be appropriately designed to resist terrorist attack.

7) There is no need for rulemaking to include funding to conduct effectiveness studies of age-related material degradation because the ISFSI license renewal contains license conditions addressing an aging management review program.

**NRC Response:**

As described in the response to Petitioner Request 9, the NRC is still considering the request to require a hot cell transfer station for decommissioned reactor facilities as part of its review of potential regulatory changes to accommodate the storage of SNF for multiple renewal periods. Therefore, at this time, the NRC does not agree with NEI that this request should be

denied. Also as discussed below in the response to Petitioner Requests 5 through 8, the NRC agrees with NEI that there is no need for rulemaking regarding either ASME Code requirements or to include funding to conduct effectiveness studies of age-related material degradation.

The NRC also agrees that including design criteria and technical specifications for a 100-year minimum age-related degradation timeframe is not warranted. The updated ASME Code requirements do not include design criteria and technical specifications for a 100-year minimum age-related degradation timeframe. In addition, when renewing licenses to store SNF, the NRC requires that licensees implement an aging management program to ensure that storage casks will perform as designed under extended license terms. Furthermore, as discussed in response to Petitioner Request 2, the NRC is evaluating material degradation and other issues for extended storage and transportation that might last beyond 100 years. The NRC is evaluating this in the context of SECY-11-0029, "Plan for the Long Term Update to the Waste Confidence Rule and Integration with the Extended Storage and Transportation Initiative" (ADAMS Accession No. ML110330445).

The NRC disagrees with NEI that the security assessments, by themselves, are sufficient to preclude the need for any rulemaking to enhance security at ISFSIs. As such, the NRC is considering Request 11, as part of the ongoing ISFSI security rulemaking effort.

#### **STARS Comments:**

In its letter dated May 18, 2009 (ADAMS Accession No. ML091410360), the STARS organization opposed the petition. It made the following assertions:

- 1) The proposed changes would impose significant additional costs on the NRC and the industry with no safety benefit.
- 2) The NRC should continue to allow exceptions to the ASME Code requirements for dry storage casks. This is consistent with other similar existing regulations that recognize the need



for exceptions and alternatives to the ASME Code. Because dry storage casks are not pressure vessels, it is virtually impossible to implement the ASME Code without allowing exceptions to some of the requirements.

3) There is no need for rulemaking to include funding to conduct effectiveness studies of age-related material degradation. As part of an NRC research program, a dry storage cask from the ISFSI at the Surry Power Station was opened at the Idaho National Engineering Laboratory after the fuel had been stored approximately 15 years. The findings confirmed the condition of the fuel to be acceptable during the 15-year storage period (SECY-09-0069, Proposed Rule: 10 CFR Part 72 License and Certificate of Compliance Terms [RIN 3150-AI09], ADAMS Package Accession No. ML090610154).

**NRC Response:**

Regarding the STARS comments, the NRC agrees that ASME Code exceptions should continue to be allowed as discussed below in NRC response to Petitioner Requests 5 through 8. As stated in the response to Petitioner Request 12, rulemaking is not the appropriate mechanism for establishing funding for conducting research. With regard to materials aging studies, the NRC has initiated independent research on the impacts of long term storage for multiple renewal periods, has cooperated with other interested agencies, and is participating in the Electric Power Research Institute Extended Storage Collaboration Program.

**ASME Comments:**

In its letter dated May 5, 2009 (ADAMS Accession No. ML091260362), the ASME supported the NRC's full endorsement of the ASME B&PV Code, Section III, Division 3, "Containments for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Waste." The ASME stated that all five of the petitioner's requests that make

specific reference to the ASME Codes and Standards would be resolved by the NRC's full endorsement of the ASME Code because it includes the latest edition and addenda of the Code, code stamping, materials and fabrication and testing.

**NRC Response:**

The NRC staff is reviewing the ASME B&PV Code, Section III, Division 3 for endorsement. If endorsed, the staff intends to develop guidance for licensees and vendors to use in future design and fabrication of dry storage casks.

**Other Comments:**

In a comment dated May 4, 2009 (ADAMS Accession No. ML091250353), the Berkeley Fellowship of Unitarian Universalists Social Justice Committee supported rulemaking to strengthen the NRC quality assurance rules on the design and manufacture of dry casks. All other comments were submitted in a standard form letter. These comments requested: 1) HOSS requirements at all nuclear power plants, as well as away-from-reactor dry cask storage sites; and 2) that nuclear power facilities be required to promptly transfer spent fuel from the pools to dry casks. Approximately 100 comments included additional information that fell outside the scope of rulemaking and were not considered in this PRM.

**NRC Response:**

Regarding comments about HOSS requirements at nuclear power plant ISFSIs and away-from-reactor dry storage sites, in the response to Petitioner Request 11, the NRC notes that it has conducted considerable analyses regarding the safety of dry storage casks in use in the United States. The agency has, consistently, found that the robust nature of dry storage systems approved by the NRC under 10 CFR Part 72 assures the protection of public health, safety, and security and therefore has not mandated HOSS. Nevertheless, the NRC is in the process of reviewing a potential rulemaking regarding enhancements to the security of spent

fuel dry storage facilities. As the substance of Request 11 is relevant to this rulemaking, the NRC will examine this item in the context of this rulemaking process.”

With regard to comments regarding a requirement that nuclear power facilities promptly transfer spent fuel from pools to dry casks, the NRC remains confident that both wet and dry storage systems are fully protective of public safety and security. However, as an element of the NRC’s post-Fukushima review, the agency is conducting a detailed assessment of the safety benefits and challenges that could result from the expedited transfer of spent fuel from pools to dry casks.

### **Petition Resolution**

For the reasons discussed in this section, the NRC is considering this petition in part, denying it in part, and reserving it in part for a future rulemaking determination. The NRC is denying Petitioner Requests 1, 2, 3, 5 through 8, 10, and 12, as listed in the Background section of this document, because the petitioner has not provided new and significant information that would warrant the NRC revising its regulations. Petitioner Request 11 will be considered, as part of the ongoing ISFSI security rulemaking effort (Docket ID NRC-2009-0558). In this section, the description of each request being denied, reserved for future rulemaking determination, and considered in future rulemaking is summarized immediately before the NRC response.

Action on Petitioner Requests 4 and 9 are reserved for future rulemaking determinations. Petitioner Request 4, which requested that the NRC require that dry casks are qualified for transport at the time of onsite storage approval certification, is being evaluated as part of COMSECY-10-0007, “Project Plan for the Regulatory Program Review to Support Extended Storage and Transportation of Spent Nuclear Fuel” (ADAMS Accession No. ML101390413). The staff identified storage and transportation compatibility as a potential policy issue in

COMSECY-10-0007, Enclosure 1, Appendix A, “Project Plan for the Extended Storage and Transportation Regulatory Program Review,” (ADAMS Accession No. ML101390426).

Petitioner Request 9, which requested that the NRC require a safe and secure hot cell transfer station coupled with an auxiliary pool as part of an upgraded ISFSI design certification and licensing process, is still being evaluated by staff as part of its review of the regulatory changes that might be necessary to safely store fuel for multiple renewal periods. Additionally, as discussed in Section 3.1 of Enclosure 1 of COMSECY-10-0007, research is needed to develop the safety basis for the behavior of high burnup fuel during extended storage periods. Whether the fuel retains sufficient structural integrity for extended storage and eventual transportation may affect whether the NRC would require dry transfer capability at decommissioned reactors storing high burnup fuel.

The docket for PRM-72-6 will remain open and consist of Petitioner Requests 4 and 9. Once the Commission takes action on the two remaining requests, the NRC will publish another document in the *Federal Register* to give notice of the Commission’s decision.

*Petitioner Request 1:* Prohibit non-conforming pre-built full-scale casks, specifically built for NRC certification testing, from being put into production under industry pressure to “accept-as-is.”

*NRC Response:* The NRC is denying Petitioner Request 1. The NRC’s regulations provide that only those casks that have been approved under the procedures of Subpart L, 10 CFR Part 72 and subsequently listed in § 72.214, “List of Approved Spent Fuel Storage Casks,” may be used under a 10 CFR Part 72 general license.<sup>1</sup> The NRC is not aware of, nor did the petition state where any non-conforming, pre-built, full-scale casks were placed into service.

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<sup>1</sup> The CoC holder or its contractor fabricates dry storage casks in accordance with the CoC and sells them to 10 CFR Part 72 general licensees, who are nuclear power plant operators.

The NRC requires in 10 CFR 72.170, “Nonconforming materials, parts, or components,” that storage cask vendors/fabricators establish measures to control materials, parts, or components that do not conform to their requirements in order to prevent their inadvertent use or installation, that includes procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Non-conforming items must be reviewed and accepted, rejected or reworked in accordance with documented procedures. Prior to nonconforming parts being used in a storage cask that is placed into service, the certificate holder/fabricator must perform a review under 10 CFR 72.48 to ensure that its use will not affect the ability of the storage cask to safely store spent fuel. The NRC will perform a safety review of any non-conformances in response to requests for a certificate or license amendment. In addition, 10 CFR 72.122 requires both general and specific licensees to design, fabricate, test and erect structures, systems and components that are important to safety to quality standards that are commensurate with its importance to safety.

Also, the NRC inspection program confirms that non-conforming casks and materials are not placed into service. This inspection program is designed to confirm that fabrication activities are performed in accordance with the requirements in 10 CFR Part 72, the applicable CoC, the Safety Analysis Report, and the CoC holder’s NRC-approved Quality Assurance program. Both CoC holders and general licensees are periodically inspected in accordance with the NRC’s inspection program. The petitioner did not provide any new or significant information indicating that any storage casks have been loaded and placed on a storage pad that does not conform to the design approved by the NRC. Accordingly, for the reasons previously discussed, the NRC is denying this request.

*Petitioner Request 2* – Require that NRC certification of casks be based on upgraded code requirements, which include design criteria and technical specifications for a

100-year-minimum age-related degradation timeframe, upgraded from the current inadequate 20-year design specification. Also, require an NRC regulatory and public review of an in-depth technical evaluation of the casks done at the 20-year CoC reapproval interval to effectively catch and address cask deterioration.

The petitioner asserted that the federal government has not created a permanent high-level radioactive waste repository and therefore, States will inherit the responsibility of high-level, on-site nuclear waste storage for an indefinite period of time. In addition, the petitioner asserted that in proposing to revise the Waste Confidence Decision (73 FR 59551; November 9, 2008), the NRC has effectively stated that there is no deadline for the Federal Government to take title to the spent fuel and remove it from its point of origin at the nuclear power facilities. The petitioner stated that casks are designed to meet criteria and technical specifications for certification for a 20-year interval while onsite storage is for an indeterminable timeframe.

The petitioner noted that the NRC has not upgraded design specifications to the current ASME Code. The petitioner requested that NRC require all storage casks be designed and built to the latest version of the ASME B&PV Code which, according to the petitioner, includes a requirement that storage cask designs be designed for a minimum of 100-years, as opposed to the 20-year interval for licenses and CoCs. Note that since the petitioner submitted its request, the NRC extended the 20-year duration for licenses and CoCs to 40 years in the Final Rulemaking entitled "License and Certificate of Compliance Terms" (76 FR 8872; February 16, 2011) and issued a Waste Confidence Decision Update (75 FR 81037; December 23, 2010).

Additionally, the petitioner stated that the regulations for storage of spent fuel are unclear on the specific NRC requirements to "renew" or "reapprove" storage CoCs. The petitioner stated that an application for "reapproval," as used in 10 CFR 72.240, "Conditions for Spent Fuel Storage Cask Reapproval," implies that the NRC would reevaluate the original cask

design basis using current review standards and regulatory requirements prior to extending the 20-year CoC expiration date. The petitioner also asserted that under Section 72.42, “Duration of License; Renewal,” use of the word “renewal” implies that the design requirements remain the same as the original cask design basis, and the expiration date is extended. Additionally, the petitioner contends that the NRC has not addressed the regulatory requirements needed to extend a license for multiple cask designs with different expiration dates at the same ISFSI.

The petitioner asserted that the NRC must require an in-depth technical review of the cask design basis at the 20-year reapproval period to catch and address cask deterioration. The petitioner stated that there is a lack of regulatory requirements to address the extension of CoCs from 20 years to 60 years and that CoCs are being extended without the technical data, regulatory evaluation, or scrutiny to protect the public health and safety. Specifically, there is limited data to determine the extent of degradation of storage casks and the spent fuel it contains. The petitioner cited “The Dry Cask Storage Characterization Project,” a study jointly funded by the NRC, the Electric Power Research Institute, and the U.S. Department of Energy that is detailed in NUREG/CR-6831 (ADAMS Accession No. ML032731021), “Examination of Spent PWR Fuel Rods after 15 Years in Dry Storage” and NUREG/CR-6745, “Dry Cask Storage Characterization Project—Phase 1: Castor V/21 Cask Examination and Opening” (ADAMS Accession No. ML013020363). The petitioner also refers to the opening of, subsequent to this study, several storage casks at the Surry ISFSI due to inner seal failures. These casks were opened after a shorter storage duration than the cask opened in the study. The petitioner stated that although the spent fuel in these cases was found acceptable, there were signs of degradation, and therefore, there is no conclusive data for integrity of casks or the condition of the nuclear fuel.

*NRC Response:* The NRC is denying Petitioner Request 2. With respect to the request that the NRC incorporate the latest version of the ASME B&PV Code in its regulations, the NRC

has determined that amending its regulations to incorporate the latest versions of the ASME B&PV Code is not necessary to ensure that adequate codes and standards are applied for the material selection, fabrication, design, examination, and testing of dry cask storage systems. As stated in the NRC's standard review plans for spent fuel storage, NUREG-1536 and NUREG-1567, the NRC staff reviews ISFSI and storage cask designs to verify that they incorporate appropriate national codes and standards, in order to comply with NRC regulations. Storage casks approved by the NRC are designed and fabricated to the ASME B&PV Code, Section III, Division 1 for steel confinements and Division 2 for concrete containments. While Section III, Division 3 of the ASME B&PV Code has been specifically written by ASME for containment systems for spent fuel transportation packages and storage casks, it has not been endorsed by the NRC. The NRC staff is reviewing ASME Code Section III, Division 3 and if endorsed, the NRC staff intends to develop guidance for its use in future fabrication of dry storage casks. In addition, with regard to the ASME Code, the petitioner stated that the code includes a requirement that storage cask designs be designed for a minimum of 100-years. A 100-year minimum age-related degradation requirement, however, is not in the ASME B&PV Code.

With respect to the petitioner's request that the NRC perform a complete review of the design basis for a storage cask prior to extending the expiration date of a storage cask's certificate of compliance, the NRC addressed some of the petitioners concerns regarding aging management in the February 2011 Final Rulemaking, "License and Certificate of Compliance Terms" (76 FR 8872).

With respect to the petitioner's assertions regarding "reapproval" and "renewal," the NRC determined in the February 2011 Final Rulemaking (76 FR 8872) that the 40-year duration, with renewals that include aging management plans, is the appropriate duration for licenses and CoCs for spent fuel storage casks. In addition, the NRC clarified the difference between



“renewal” versus “reapproval” terminology and codified the requirements for an aging management plan for both general and specific licensees. Additionally, the NRC stated in the July 18, 1999, Final Rulemaking, “Storage of Spent Fuel in NRC-Approved Storage Casks at Power Reactor Sites” (55 FR 29184), that it did not intend to use the term reapproval to mean that all the initial design bases were reviewed and reapproved prior to extending a CoC expiration date. Additionally, this rulemaking included requirements for an aging management plan for both general and specific licensees. Along with the rulemaking, the NRC issued NUREG-1927, (ADAMS Accession No. ML100350309) “Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance,” to provide staff guidance on reviewing renewal requests for ISFSI licenses and spent fuel storage cask certificates of compliance.

With respect to the petitioner’s assertions regarding degradation of the storage cask and fuel, the NRC addressed aging and potential degradation mechanisms of spent fuel in storage casks in the February 2011 rulemaking (76 FR 8872). In that rulemaking, the NRC stated that, based on the research performed at Idaho National Laboratory and described in NUREG/CR-6381, the NRC expects very little, to no, degradation of the spent fuel or cask internals at the end of an extended storage period up to 60 years. Finally, in SECY-11-0029, “Plan for the Long Term Update to the Waste Confidence Rule and Integration with the Extended Storage and Transportation Initiative” (ADAMS Package Accession No. ML110330445), the NRC staff described the work that will be done to identify and resolve any regulatory and/or technical gaps that may exist for application of current regulations to longer periods of extended storage. The NRC staff will provide the public with an opportunity to comment on the draft gap assessment report, and will treat the current petition request as a public comment on this activity. As described in SECY-11-0029, the NRC staff will evaluate the

need for rulemaking to address any gaps that are identified for extended storage and transportation.

*Petitioner Request 3:* Require that the NRC approve, as part of the original ISFSI certification process and construction license, a method for dry cask transfer capacity that will allow for immediate and safe maintenance on a faulty or failing cask. The temperature of the fuel inside a dry storage cask may reach 400 degrees Fahrenheit, while irradiated waste storage pool water is kept at 100 degrees Fahrenheit. Reinsertion of the canister into the pool and resultant steam flash is a risk to workers, and would thermally shock the fuel rods, potentially damaging the fuel assemblies.

*NRC Response:* The NRC is denying Petitioner Request 3. Dry cask storage systems are designed to be robust, and operating experience indicates that they have been safely used to store fuel for over 20 years. Additionally, pursuant to 10 CFR 72.236(h), "Specific Requirements for Spent Fuel Storage Cask Approval and Fabrication," the applicant must ensure that the spent fuel storage cask is compatible with wet or dry spent fuel loading and unloading facilities. As described in NUREG-1536, a reflood analysis can be used to show that the thermally induced stresses on fuel rods are not sufficient to damage the rods. The typical operating procedure introduces water into the canister at a very low flow rate. This flow rate allows the steam that forms at the bottom of the canister, well below the active fuel length, to cool the fuel as a vapor to reduce the thermal-induced stresses on the fuel. When the bottom portion of the canister is sufficiently cool for the water level to rise to the active fuel, the rate at which the water level rises is sufficient to cool the fuel rods without causing thermal stresses that would damage the fuel. These operating procedures allow maintenance to be performed safely without undue risk to workers or the public. The petitioner did not provide any new or

significant information to indicate that spent fuel assemblies would be damaged if placed back into the spent fuel pool or that existing requirements do not adequately address worker safety.

*Petitioner Requests 5 through 8:* Require the most current ASME Codes and Standards be adopted for all spent fuel storage containers without exception; require ASME Code stamping for fabrication; require that all fabrication materials be supplied by ASME-approved material suppliers who are certificate holders; and require that the current ASME Codes and Standards for conservative heat treatment and leak tightness be adopted and enforced.

The petitioner asserted that design criteria in material dedication cannot meet the quality assurance requirements in 10 CFR Part 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” without full adherence to ASME B&PV Code and NCA 3800 of the ASME Code, which includes ASME Code stamping.

Additionally the petitioner stated that 10 CFR 72.122(a) and 10 CFR 72.234(b) require that structures, systems and components important to safety be designed, fabricated, and tested to quality standards commensurate with the importance of the function performed. However, the petitioner asserted that the NRC has not updated its use of the ASME B&PV Code and grants the utilities and their vendors numerous exemptions. The petitioner stated that while the NRC allows exemptions to vendors by justifying vendor compliance to “merely the maximum extent possible,” the NRC simultaneously cites vendors and manufacturers with numerous violations and then approves repeated corrective actions, which has resulted in dry cask design, fabrication and performance issues remaining unresolved. The petitioner stated that the NRC should not issue “justifications and compensatory measures” for ASME codes or allow conformance with safety regulations “to the extent practical.” The petitioner asserted that the ASME codes should be enforced unconditionally, without exception or exemption.

The petitioner cited an example request from a dry cask storage vendor seeking exemptions to certain portions of the ASME Code and a set of technical specifications that the NRC issued for a storage cask that states “The 32PTH DSC is designed, fabricated and inspected to the maximum practical extent in accordance with ASME B&PV, Code Section III, Division 1, 1998 Edition with Addenda through 2000, Subsections NB, NF, and NG for Class 1 components and supports. Code alternatives are discussed in 4.4.4.” Although the petitioner referenced Section 4.3 of the technical specifications, the NRC believes the petitioner meant Section 4.4, which provides the codes and standards that apply to this particular storage cask.

*NRC Response:* The NRC is denying Petitioner Requests 5 through 8, because the NRC has determined that revising the regulations is not the most effective or efficient method to adopt the ASME Code for the design and fabrication of spent fuel dry storage casks. As stated in NUREG-1567, the industry has adopted, and the NRC has accepted, ASME Code Section III, Division 1 and Division 2 as acceptable standards for the design and fabrication of dry storage casks. It is expressly understood, by the NRC and industry, however, that dry storage casks are not pressure vessels and, as such, ASME Code Section III could not be implemented without allowing some exceptions to its requirements. Therefore, the NRC allows specific exceptions to the code for those requirements that are not applicable or practical to implement for spent fuel dry cask storage systems. Further, the petitioner asserted that adherence to ASME B&PV Code and NCA 3800 of the ASME Code is required to meet the quality assurance requirements in 10 CFR Part 50, Appendix B. Storage casks are not, however, required by the NRC’s regulations to meet the requirements of 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities.”

The NRC staff is reviewing ASME Section III, Division 3, “Containments for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Waste” for

endorsement. If endorsed, the staff intends to develop guidance for use in future fabrication of dry storage casks.

*Petitioner Request 10:* Require real-time heat and radiation monitoring at ISFSIs at all nuclear power plant sites and away-from-reactor storage sites maintained by the utilities and that the monitoring data be transmitted in real-time to affected State health, safety, and environmental regulators.

The petitioner referenced a paper from PATRAM '98: 12<sup>th</sup> International Conference on the Packaging and Transportation of Radioactive Materials, written by a non-NRC employee asserting that the NRC has declared that a storage cask shares the same class of importance to safety (Class 1 in ASME Code Section III terminology) as a reactor vessel, yet an NRC proposed rule regarding miscellaneous changes to 10 CFR Part 72 (63 FR 31364; June 9, 1998) states that the NRC distinguishes between wet and dry storage requirements. The petitioner notes that in that Part 72 rulemaking, the NRC chose not to require control systems for dry cask storage systems at ISFSIs.

The petitioner also stated that another example showing the differentiation between wet and dry storage is that the NRC does not require a method for licensees to provide positive means to verify that solid neutron absorbing materials have continued efficacy after being placed in an inert environment in dry storage. The petitioner stated that the NRC regulations in 10 CFR 72.124(b) provide that for dry storage, in lieu of a positive means to test for continued efficacy, a demonstration that solid neutron absorbing materials do not undergo significant degradation during storage is sufficient. The petitioner further asserted that the Point Beach incident in May 1996, the evidence provided from the Surry reactor's inner seal failures, and the NRC reports of salt-water air corrosiveness at seacoast reactors are proof that the assumption

that the corrosive environment that is present in wet storage is not present during dry storage is invalid.

The petitioner also stated that the NRC has determined that it is not practical to penetrate the integrity of storage casks to measure the efficacy of neutron absorbing materials. Finally, the petitioner states that NRC regulations do not require adequate technical radiation and heat monitoring data to protect nuclear workers, assure public safety and provide for future cask fabrication, material specifications and performance analysis.

*NRC Response:* The NRC is denying Petitioner Request 10, because regular monitoring for radiation at and near ISFSIs is currently required by § 72.44(d)(2) for specific licensees, with reporting required at 12-month intervals as specified in § 72.44(d)(3), and similarly for general licensees in 10 CFR 50.36(a)(2). There have not been any instances of measurable radiation doses from ISFSIs at the site boundaries. The storage cask technical specifications require that concrete storage casks with vents for natural convection provide cooling to the canister and have temperature-monitoring devices or periodic visual monitoring to ensure that the inlet and outlet vents are free of blockage that would inhibit convective airflow.

The applicant demonstrates performance of the thermal design and thermal limits through analyses during the certification and licensing process. The cask systems are also periodically examined by the licensee to verify there are no adverse conditions that would impede thermal performance. Given the surveillance, monitoring, and inspection programs, the risk of immediate failure or emergency is remote. The NRC staff has determined that the current regulatory requirements provide adequate protection of public health and safety and the environment.

While the petitioner referenced a proposed rule, the final rule (64 FR 33178; June 22, 1999), revised the regulations for continuous monitoring of the dry storage confinement system to allow periodic monitoring consistent with the storage cask design requirements and to require

that instrumentation systems for dry storage casks be provided in accordance with cask design requirements. In the rulemaking, the NRC determined that continuous, uninterrupted control systems and monitoring are required for wet storage systems that have active heat removal and other active systems, whose safety depends on the continued operation of these systems. Dry storage casks, whose safety solely relies on passive heat removal, do not require continuous, uninterrupted control systems and monitoring as wet storage does. The NRC revised the rules in §§ 72.122(h)(4) and (i) to require monitoring and instrumentation systems that are consistent with the storage cask design basis.

Finally, the examples that the petitioner cited, the Point Beach hydrogen gas ignition event, Surry seal failure, and potential degradation due to salt water environment, all occurred where air was present and not in an inert environment like the inside of a canister. The NRC is unaware of any degradation mechanism that would occur inside of an inert, sealed canister after being placed on the storage pad that would require licensees to open a storage canister and positively verify the neutron poison's efficacy.

*Petitioner Request 11:* Require HOSS at all nuclear power plants as well as away-from-reactor dry cask storage sites; and that all nuclear industry interim on-site or off-site dry cask storage installations or ISFSIs be fortified against terrorist attack. In addition, all sites should be safeguarded against accident and age-related leakage.

*NRC Response:* Regarding comments about HOSS requirements at nuclear power plant ISFSIs and away-from-reactor dry storage sites, in the response to Petitioner Request 11, the NRC notes that it has conducted considerable analyses regarding the safety of dry storage casks in use in the United States. The agency has, consistently, found that the robust nature of dry storage systems approved by the NRC under 10 CFR Part 72 assures the protection of public health, safety, and security and therefore has not mandated HOSS. Nevertheless, the

NRC is in the process of reviewing a potential rulemaking regarding enhancements to the security of spent fuel dry storage facilities (SRM-SECY-10-0114 and SRM-SECY-07-0148 – ADAMS Accession Nos. ML103210025 and ML073530119, respectively). Because Petitioner Request 11 raises issues that are relevant to this rulemaking, the NRC will address this item in the context of this proposed rule. Further information regarding NRC action on Petitioner Request 11 will be available at <http://www.regulations.gov> by searching Docket ID NRC-2009-0558.

*Petitioner Request 12:* Establish funding to conduct on-going studies to provide the data required to accurately define and monitor for age-related material degradation, assess the structural integrity of the casks and fuel cladding in “interim” waste storage.

*NRC Response:* The NRC is denying Petitioner Request 12 because rulemaking is not the appropriate mechanism for establishing funding for conducting research. The NRC has initiated independent research on the impacts of long term storage of SNF for multiple renewal periods, cooperated with other interested agencies to support materials aging studies, and is participating in an Electric Power Research Institute program that evaluates materials aging issues.



## **Conclusion**

For the reasons previously discussed, the NRC is denying nine of the petitioner's requests (Requests 1, 2, 3, 5 through 8, 10, and 12), will consider one request in the rulemaking process (Request 11), and is deferring action on two requests (Requests 4 and 9). The docket for PRM-72-6 will remain open until the Commission acts, at which time the NRC will publish another document in the *Federal Register* to notice the Commission's decision.

Dated at Rockville, Maryland, this 10<sup>th</sup> day of October 2012.

For the Nuclear Regulatory Commission.

***/RA/***

Annette L. Vietti-Cook,  
Secretary of the Commission.