

August 15, 2014

MEMORANDUM TO: Anthony Hsia, Deputy Director  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety  
and Safeguards

FROM: Kristina L. Banovac, Project Manager **/RA/**  
Licensing Branch  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: SUMMARY OF JULY 14-15, 2014, PUBLIC MEETING TO OBTAIN  
STAKEHOLDER INPUT ON POTENTIAL CHANGES TO GUIDANCE  
FOR RENEWAL OF SPENT FUEL DRY CASK STORAGE SYSTEM  
LICENSES AND CERTIFICATES OF COMPLIANCE

#### Background

The U.S. Nuclear Regulatory Commission (NRC) staff held a public meeting on July 14-15, 2014, to solicit stakeholder input on the staff's current considerations for revisions to the guidance in NUREG-1927, "Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance" (ML111020115).

The meeting was noticed on June 20, 2014 (ML14171A175). The meeting notice offered an opportunity for stakeholders to give a formal presentation at the meeting on selected topics. In response, there were several stakeholder presentations provided at the public meeting.

#### Discussion

Meeting attendees included public citizens and interest groups, the media, industry representatives, and representatives from national laboratories and the Nuclear Waste Technical Review Board. The meeting attendance list is provided in Enclosure 1.

The meeting discussion followed the meeting agenda, which is included in Enclosure 2. The NRC staff gave presentations on each meeting topic, followed by stakeholder presentations and stakeholder feedback. Enclosure 3 contains the presentations given by NRC staff and stakeholders as meeting handouts.

The staff received useful input from stakeholders on the meeting topics, and the staff will consider this input as it develops a draft revision to NUREG-1927 for public comment. Stakeholder feedback on each topic is summarized below, along with NRC staff responses to stakeholder questions.

### Operations-Focused Approach to Aging Management

- NRC's planned development of inspection guidance for inspection of licensees' aging management activities in the period of extended operation should be made a high priority.
- If the revised guidance includes reporting of either age-related independent spent fuel storage installation (ISFSI) or dry cask storage system (DCSS) operating experience obtained in the period of extended operation or reporting of periodic evaluations of Aging Management Program (AMP) effectiveness, there needs to be clear criteria for when such reporting would occur.
- The guidance shouldn't include any further reporting other than what's already included in the Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72 regulations.
- Only achievable operational methodologies should be required in the period of extended operation. If methodologies or techniques don't exist yet, they cannot be required of licensees.
- The NRC staff should use lessons learned from reactor renewals where applicable to spent fuel storage.
- As the Nuclear Energy Institute (NEI) develops its draft guidance for Operations-Based Aging Management for Dry Cask Storage (NEI 14-03), it should make clear how the tollgate results will either be made available to the NRC or reported to the NRC.
- A public commenter recognized that degradation of the ISFSI may occur slowly and be manageable but cautioned that a terrorist attack would happen quickly. NRC staff noted that NRC has evaluated security at ISFSIs and is conducting further evaluations as part of the ISFSI security rulemaking.
- General licensees would provide results of ISFSI/DCSS inspections to the certificate of compliance (CoC) holder. The CoC holder is responsible for informing other general licensees who use the DCSS and for reporting any issues under 10 CFR Part 21.
- The NRC should rely on the existing 10 CFR Part 50 programs that general licensees already have in place and not require new actions.
- The cask users groups have open and continuous communication, so there is an adequate framework for sharing of operating experience related to use of the DCSS.
- Regarding the framework for collecting and sharing DCSS/ISFSI operating experience (OE) (including with the NRC), NEI 14-03 should make clear what the process will be. Industry is still exploring this area. It is considering the use of an OE coordinator for each cask users group, as a way to share OE across the users groups.

### Elements of Aging Management Programs

- The guidance should clearly define what is meant by "loss of intended function" and be clear in its use of the terms "degradation mechanisms" and "aging effects."

- The tollgate (periodic future assessments) concept should be the 11<sup>th</sup> element of the AMP, as it is outside of, and in addition to, the current scope of an AMP.
- To successfully have a “learning” AMP and provide flexibility for updating the AMP in response to OE, there needs to be an appropriate balance of what aging management aspects are included in the license or CoC (that would need NRC approval to change) vs. what is included in the final safety analysis report (FSAR) (and is subject to change by CoC holders or licensees using the change control process in 10 CFR 72.48). NRC staff noted that it understands the need for flexibility in revising the AMPs to respond to OE, but it may be appropriate for NRC to review if the aging management activities were lessened.
- It was suggested that a “reduction in commitments or effectiveness” criteria or process could be used to determine what changes a CoC holder or licensee could make on its own vs. what changes require NRC approval, similar to some of the processes for changing some plans and programs in 10 CFR 50.54.
- Regarding reliance on 10 CFR Part 50 Corrective Action Programs (CAPs) for capturing aging effects associated with ISFSI/DCSS, it was noted that the current guidance or criteria, for what things are considered to be conditions adverse to quality that should be added to the CAP, may need to be updated to add examples specific to DCSS/ISFSI aging to make sure the CAP responds to the AMP acceptance criteria.
- NRC staff identified that a detailed and structured AMP clearly providing information for all ten elements would provide a more efficient, timely, and effective review.

#### Generic Concrete Aging Management Program

- Some aspects of American Concrete Institute (ACI) 349.3R may not be applicable to a DCSS (e.g., the inlet/outlet vent temperature measurements).
- A question was asked whether licensees would have to meet the ACI 349 temperature limits in the period of extended operation, which may be more restrictive than the concrete temperature limits in NUREG-1567, “Standard Review Plan for Spent Fuel Dry Storage Facilities,” for initial licensing/certification. NRC staff responded that it would depend on the licensing basis for the particular CoC or license, and the license/CoC and technical specifications (TS) would continue to apply in the period of extended operation.
- If there are existing TS for shielding effectiveness, then there should not be a need to do anything new in the period of extended operation but continue to meet the TS. The renewal application should just reference the TS.
- Radiation surveys to measure gamma radiation are easier than neutron monitoring.
- This generic AMP shouldn't be too prescriptive, as certain aspects (e.g., use of petrographic examination) may put them in an unanalyzed condition.

NRC staff noted that if the concrete structures, systems, or components (SSCs) had been manufactured to ACI 349.3R, there would not be a need for any additional licensee actions. NRC staff also noted that the industry can petition the American Society of Mechanical Engineers (ASME), ACI, etc. to develop standards that are more applicable to

DCSSs, and NRC would support development of those standards or codes. However, until a time that such codes and standards exist, we need to use what exists today.

- OE outside the nuclear industry should also be considered for development of AMPs and for determining whether any changes are needed to AMPs.
- The NRC staff should consider risk, and the safety function of each SSC, as it develops the generic AMPs.
- There was a question about how concrete quality is ensured. NRC staff noted that quality is ensured by the use of rigorous consensus codes and standards for building and nuclear safety-related structures, and NRC inspects to ensure those codes and standards are met for design and fabrication.

#### Aging Management Program for Stress Corrosion Cracking

- There was a question about aging of DCSSs that use carbon steel, cast iron, or other materials that are not stainless steel. NRC staff noted that we will develop generic AMPs applicable to those systems also, and these will be included in NRC's planned storage aging management report.
- There was a question about the basis for the proposal to inspect a minimum of one canister at each site vs. referencing inspections at other sites.

NRC staff noted that the licensee would need to make a case for using an inspection at another site. However, it may be difficult to make this case based on the variety of environmental conditions or any changes or deviations in the fabrication of the systems. The staff noted referencing inspections at other sites once sufficient OE is available may be considered, but sufficient data or information is not available at this time.

- NRC staff should consider the disadvantages of conducting inspections at each ISFSI site (e.g., occupational dose or the potential damage caused by removing a canister for inspection).
- There should be a more applicable standard to use instead of ASME Boiler and Pressure Vessel Code Section XI. NRC staff reiterated that the agency encourages the use of consensus codes and standards. Development of codes and standards specific to DCSSs would be beneficial.
- NRC should consider the use of inspection results of other stainless steel structures, systems, and components at the site that are exposed to the elements, if they happen to be under the same conditions as the stainless steel canister.
- There was a question on whether there was any latitude in the proposed 5-year frequency for inspection. The NRC staff noted that the basis for the 5-year frequency is that this would provide for at least two inspections to detect any cracking, before the time that a crack is calculated to go through-wall. If future OE shows otherwise, the staff would be open to consideration of alternate inspection intervals.

- There was a question regarding NUREG/CR-7030 ("Atmospheric Stress Corrosion Cracking Susceptibility of Welded and Unwelded 304, 304L, and 316L Austenitic Stainless Steels Commonly Used for Dry Cask Storage Containers Exposed to Marine Environments") and NUREG/CR-7170 ("Assessment of Stress Corrosion Cracking Susceptibility for Austenitic Stainless Steels Exposed to Atmospheric Chloride and Non-Chloride Salts"). NRC staff noted that the tests reflected in these NUREGs were initiation tests to see if we could get cracking on the specimens, rather than testing to determine crack growth rates. The crack growth rate (that led to the proposed 5-year intervals for inspection) was based on measured growth rates in a natural environment and operating reactor data.

#### Lead System Inspections

- NRC should consider prioritization of lead system inspections, either what sites should be inspected at first, and what degradation mechanisms are more likely to affect important to safety structures, systems, and components.
- NRC staff noted that some reactor AMPs are structured in a way where the results of the baseline inspection lead to specific decision paths or branches in the AMP. A similar approach may work for the DCSS/ISFSI AMPs.
- NRC staff noted that selection of "lead systems" to inspect should be based on existing conditions that create the best potential for aging effects, which will depend on the degradation mechanism of concern. Pre-application meetings could be a good vehicle for applicants to discuss with the NRC their considerations for selecting the lead system to inspect.
- There was discussion that conducting the lead system inspection before submittal of the renewal application would provide valuable operating experience and information to use in development of the AMPs.
- There was discussion that an inspection workshop to discuss development of inspection methods for DCSSs would be beneficial. If such a workshop is held, participation of the cask vendors should be maximized.
- There was discussion about a scenario where an aging issue was identified during a lead system inspection that was thought to affect casks that were still in the initial storage period. NRC staff noted that it would use its current processes to share and analyze this operating experience to determine whether licensees would need to take any actions to address the issue.

#### Format and Content of Certificate of Compliance Renewal Applications

- It was suggested that industry develop the detailed guidance for format of CoC renewal applications in NEI 14-03, rather than NRC developing separate guidance in this area.
- In some cases, there may be hundreds of 10 CFR 72.48 changes associated with a CoC, so it may be difficult for the applicant to consolidate and create one document that lays out all of the 10 CFR 72.48 changes made, as the general licensees may have also made 10 CFR 72.48 changes to the FSAR.

- In the case where an amendment may not be renewed, another option for general licensees (besides removing the DCSS from service) is to change to a later amendment.
- If there is not already a consolidated FSAR that encompasses all of the amendments for that CoC, it would be a burden for the CoC holder to create one and could introduce errors, if developed.
- There were some comments supporting development of an attachment or supplement to the FSAR that would contain all of the information related to the renewal and aging management. It was further suggested that the renewed CoC include a separate appendix or part that includes all of the information related to the renewal and aging management, so it applies to all amendments (if appropriate). It needs to be clear in the CoC what are the new terms, conditions, and specifications that apply only in the period of extended operation.
- NRC should consider whether time-limited aging analyses (TLAAs) and AMPs could be submitted later for post-renewal amendments (instead of at the time of amendment application), since aging management activities would not be needed for 20 years.
- There was a question of whether industry could develop a topical report with AMPs and TLAAAs to be used generically. NRC staff noted that this is the idea behind NRC's planned development of the storage aging management report that will contain generic AMPs and TLAAAs.

#### Considerations for Certificate of Compliance Renewals and General Licensee Implementation of Aging Management Programs

- The idea of flexibility for CoC holders and licensees to update the AMPs by including the aging management details in the FSAR instead of the CoC was brought up again in this session.
- There should be a general programmatic requirement in the CoC, with all of the AMP details in the cask FSAR supplement, and then the licensees would develop procedures to implement the details of the AMP that are laid out in the FSAR supplement.
- The requirement in the CoC should be an objective performance requirement, laying out what to do, and not how to do it.
- The reactor renewal process was discussed, where conditions are added to the license for the licensee to implement the AMP before the renewal period begins, and update the FSAR with a summary of the AMP. There is an expectation that, if the licensee was considering a modification to the AMP in the period of extended operation, the licensee would refer to the licensing documentation associated with the renewal, including NRC's safety evaluation report of the renewal application.
- As was mentioned earlier in the meeting, it may be worth exploring the idea of a "decrease in effectiveness or commitments" condition in the CoC, where aspects of AMPs could be changed by CoC holders or licensees without NRC approval, as long as the changes did not decrease the AMP requirements, expand inspection intervals, etc. NRC should also

consider the process for approving code alternative changes that is contained in some of the current CoCs, to see if there is anything we can use from this current process.

- The NRC should consider, and the revised guidance should discuss, what would be a reasonable time period to allow the general licensees to implement the AMPs after the NRC issues the CoC renewal, as the general licensees will need time to develop and revise procedures for AMP implementation.
- The guidance discussion on when aging management begins should also note that the AMP will contain the details on when specific aging management activities are needed, as those are based on the particular degradation mechanism and how it initiates and progresses.
- NRC staff noted that it will also explore the scenarios of storage terms and when aging management begins, for: (1) casks loaded in the timely renewal period (and whether these would be considered to be loaded in the original 20-year term vs. the renewed term); and (2) any amendments to the CoC issued during the timely renewal period.
- NRC staff noted that it will consider developing a Regulatory Issue Summary to better explain the general license storage terms, given the questions on that topic since the 2011 10 CFR Part 72 rulemaking that discussed them.
- A preference for NRC's simultaneous review of concurrent CoC amendment and renewal applications was communicated.
- There was a question on how renewals would consider climate change. NRC staff noted that a "learning AMP" should be able to respond to operating experience and changes in site conditions.

#### Fuel Performance and Cask Internals

- NRC staff noted that it looks at whether there are potential degradation mechanisms for the non-fuel cask internals (e.g., creep, slumping of baskets, blistering of neutron poisons, etc.) during initial storage licensing and certification. Applicants would need to discuss in their renewal application whether there were any active degradation processes for the non-fuel internals, like the basket material or neutron absorbers, although NRC hasn't identified any active degradation mechanisms at this time.
- Regarding vacuum drying and residual moisture in casks, it was questioned why NRC is considering this in renewal space. If there is reason to believe that the canisters were not properly dried and there is residual moisture, this would be an issue for the initial storage period as well, so NRC should address any potential issue now as a generic issue and not as a renewal issue.

NRC staff noted that it could be considered a time-dependent aging phenomenon, because of disassociation of any residual water over time, allowing uptake of hydrogen into the fuel cladding.

- For the hydrogen content acceptance criterion, NRC should consider whether licensees would still need to meet this acceptance criterion if they planned to vent the cask before opening it.
- If a surveillance demonstration program identified any issues, all licensees who were affected would need to respond to this OE as it became available and not wait until a “tollgate” period to assess and respond.
- There was a question of how a licensee could implement corrective actions for the demonstration program, if it was not a part of it. NRC staff clarified that the licensee would not actually implement a corrective action for the demonstration program. Rather, if the demonstration indicated a problem, the licensee would need to analyze the problem and take appropriate corrective action for its storage system, as appropriate. Also, if a particular demonstration is not providing information applicable to a licensee’s system, the licensee is free to conduct its own demonstration program.
- There was a question about what happens to fuel if there was a breach in the canister. NRC staff noted that it may take time for the pressure to equalize between the canister and the outside atmosphere to allow oxygen to come into contact with the fuel, and it is expected that very little oxygen would be available for fuel oxidation. The staff noted this is discussed further in Interim Staff Guidance-22, “Potential Rod Splitting Due to Exposure to an Oxidizing Atmosphere During Short-Term Cask Loading Operations in LWR or Other Uranium Oxide Based Fuel.”
- There was a question of whether the casks should be moved or rotated to avoid creep from weight. NRC staff responded that the only observed creep is from the pressure of the gas in the fuel and not under the weight of the fuel.
- There was a question of why other materials, besides carbon steel, stainless steel, etc., are not used in DCSS fabrication. NRC staff noted that it reviews what the industry proposes and applies for, including use of other materials in the DCSS if proposed, and NRC ensures safety is maintained through its safety reviews of the proposed designs and materials.
- It was noted that Idaho National Laboratory conducted a remote visual inspection of the top of the basket of a Castor V/21 dry cask storage system, and the report of this inspection should be available at the end of the summer.

Enclosures:

1. Meeting Attendees
2. Agenda
3. Handouts
  - Introduction and Operations-Focused Approach to Aging Management (NRC)
  - Stakeholder Input on Potential Changes to Guidance for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance (NEI)
  - Elements of Aging Management Programs (NRC)
  - Industry Input on Elements of Aging Management Programs (NEI)
  - Generic Concrete Aging Management Program (NRC)
  - Aging Management Program for Stress Corrosion Cracking (NRC)



- "Lead" System Inspections (NRC)
- Industry Input on Lead System Inspections (NEI)
- Format and Content of Certificate of Compliance Renewal Applications (NRC)
- Industry Perspectives on Renewal Application Format and Content (NEI)
- Considerations for Certificate of Compliance Renewals, and General Licensee Implementation of Aging Management Programs (NRC)
- Back-up slides on Considerations for Certificate of Compliance Renewals, and General Licensee Implementation of Aging Management Programs (NRC)
- Fuel Performance and Cask Internals (NRC)
- Industry Input on Fuel Performance and Canister Internals (NEI)

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## FINAL MEETING AGENDA

### Meeting to Obtain Stakeholder Input on Potential Changes to Guidance for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance

July 14, 2014

8:30 a.m. – 5:00 p.m. (Eastern Daylight Time)  
Two White Flint North Building, Room T-2B1

8:00 a.m. – 8:30 a.m.	Check-in (Security)
8:30 a.m. – 8:40 a.m.	Ground Rules, Facility Information, Security, Agenda (Francis Cameron, Facilitator)
8:40 a.m. – 8:50 a.m.	Welcoming Remarks (Mark Lombard, Director, Division of Spent Fuel Storage and Transportation (SFST), Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission)
8:50 a.m. – 9:00 a.m.	Introduction and Operations-Focused Approach to Aging Management (Kristina Banovac, Project Manager, SFST)
9:00 a.m. – 10:20 a.m.	Stakeholder Presentation and Stakeholder Feedback
10:20 a.m. – 10:35 a.m.	Break
10:35 a.m. – 10:45 a.m.	Elements of Aging Management Programs (Zhian Li, Senior Criticality/Shielding Engineer, SFST)
10:45 a.m. – 12:00 p.m.	Stakeholder Presentation and Stakeholder Feedback
12:00 p.m. – 1:30 p.m.	Lunch
1:30 p.m. – 1:40 p.m.	Generic Concrete Aging Management Program (Ricardo Torres, Materials Engineer, SFST)
1:40 p.m. – 2:00 p.m.	Stakeholder Feedback
2:00 p.m. – 2:10 p.m.	Aging Management Program for Stress Corrosion Cracking (Darrell Dunn, Materials Engineer, SFST)
2:10 p.m. – 3:00 p.m.	Stakeholder Presentation and Stakeholder Feedback
3:00 p.m. – 3:15 p.m.	Break
3:15 p.m. – 3:25 p.m.	“Lead” System Inspections (Darrell Dunn, Materials Engineer, SFST)
3:25 p.m. – 4:45 p.m.	Stakeholder Presentation and Stakeholder Feedback

4:45 p.m. – 5:00 p.m.	Additional Stakeholder Input, Wrap-up
5:00 p.m.	Adjourn

July 15, 2014  
8:30 a.m. – 3:30 p.m. (Eastern Daylight Time)  
Two White Flint North Building, Room T-2B1

8:00 a.m. – 8:30 a.m.	Check-in (Security)
8:30 a.m. – 8:45 a.m.	Review of Ground Rules and Opening Remarks (Francis Cameron, Facilitator Al Csontos, Branch Chief, SFST)
8:45 a.m. – 8:55 a.m.	Format and Content of Certificate of Compliance Renewal Applications (Jennifer Davis, Senior Project Manager, SFST)
8:55 a.m. – 10:15 a.m.	Stakeholder Presentation and Stakeholder Feedback
10:15 a.m. – 10:30 a.m.	Break
10:30 a.m. – 10:45 a.m.	Considerations for Certificate of Compliance Renewals and General Licensee Implementation of Aging Management Programs (Jennifer Davis, Senior Project Manager, SFST)
10:45 a.m. – 12:00 p.m.	Stakeholder Presentation and Stakeholder Feedback
12:00 p.m. – 1:30 p.m.	Lunch
1:30 p.m. – 1:45 p.m.	Fuel Performance and Cask Internals (Robert Einziger, Senior Materials Engineer, SFST)
1:45 p.m. – 3:00 p.m.	Stakeholder Presentation and Stakeholder Feedback
3:00 p.m. – 3:30 p.m.	Additional Stakeholder Input, Wrap-up
3:30 p.m.	Adjourn

## PRESENTATION HANDOUTS