October 11, 2011

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

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SUBJECT: SUMMARY OF SEPTEMBER 21, 2011, PUBLIC MEETING WITH THE NUCLEAR ENERGY INSTITUTE TO DISCUSS INDUSTRY POSITION ON HELIUM LEAKAGE TESTING OF DRY STORGE SYSTEMS CONFINEMENT BOUNDARIES

Background

On September 21, 2011, a public meeting was held in Rockville, Maryland, with the Nuclear Energy Institute (NEI), utility representatives, and spent nuclear fuel dry storage systems (DSS) vendors to gain input regarding the industry's position on helium leakage testing of the DSS confinement boundary for compliance with 10 CFR Part 72.

The meeting was noticed on September 7, 2011 [ML112500162]. The list of meeting attendees is provided as Enclosure 1. The meeting handouts are provided as Enclosures 2 and 3.

Discussion

The primary purpose of this meeting was to discuss the following information as requested of NEI in the letter dated August 4, 2011, "Receipt of Letter – Acknowledgement Letter" [ML112170116] with regards to the industry's position on helium leakage testing of DSS confinement boundaries:

- The information and evidence that NEI has received indicates "there has been some anecdotal evidence where leakage through base materials occurred".
- The information pertaining to "some discussion related to these cases indicates that leakage can be resolved through methods other than helium leakage testing (e.g. cold working or annealing)."
- The "…differences between the purposes and functions of the transportation package containment boundary and dry storage system confinement boundary" and the implications of applying ANSI N14.5 to dry cask storage casks under 10 CFR Part 72.

SFST staff opened the meeting with a brief presentation clarifying the background and purpose of guidance developed in this area (i.e. "Interim Staff Guidance (ISG) 25 - Pressure and Helium Leakage Testing of the Confinement Boundary of Spent Fuel DSS"). First, the staff discussed

the reasons for issuing ISG-25, one of which was due to the inconsistent scope of leak testing amongst DSS vendors, even to the point of some vendors refraining from leak testing the confinement boundary as specified in their Safety Analysis Report. Second, the staff specifically stressed two characteristics of this ISG: (1) it is not a regulatory requirement and (2) it acknowledges the ability of vendors to use alternative approaches if appropriately justified. Staff also pointed out that while it is understood that no specific compliance method for the evaluation of the integrity of the confinement boundary for DSS is explicitly indicated under 10 CFR Part 72 regulations, this ISG provides one way to satisfy the regulatory requirements by detailing how to implement applicable leakage testing procedures. However, alternative approaches may be used, and the applicable Standard Review Plan provides a thorough explanation on how alternative approaches should be justified.

During NEI's presentation, information was provided to clarify the positions stated in their letter dated June 13, 2011 [ML111950121]. It also incorporated the Industry positions regarding the applicability of helium leakage testing standards, operational experience, and relevant details of DSS fabrication. NEI expressed their opinion that the NRC changed its regulatory position and has established a new regulatory requirement through guidance without articulating a basis for it.

The information presented by NEI on operational experience stated that 100% of over 1,000 canisters and casks that have been loaded have been helium leakage tested, to various extents, passed the test meeting their specific leakage rate criterion. NEI's anecdotal evidence of leakage through base material referenced a Savannah River bulk tritium shipping package; in industry's perspective this was not considered to be applicable to DSS canisters, due to the processing methods used in fabrication. In order to present information supporting the argument that helium leakage through stainless steel base material cannot occur, a research paper (i.e. "Investigation of the Penetration of Metal tube Walls", I. Lupakov and Y. Kuz'michev", Translated from Atomnaya Energiya, Vol. 17, No. 1, 1964.) was referenced, which discussed there was no helium diffusion up to a temperature of 800°C and a pressure of 60 atm. However, the paper mentions that there were three instances of leakage due to flaws in the base material.

As part of their presentation, NEI stated that the application of ANSI N14.5 is problematic due to the differences between: "containment" and "confinement" boundaries, service conditions and the scopes of Parts 71 and 72, without providing specific details about such differences. They also recommended a path forward which included re-evaluating the need for guidance on helium leakage testing and publishing a Regulatory Guide if necessary.

NRC staff, NEI and Industry representatives were able to develop and answer questions to provide further clarification on the items addressed during the presentation. NRC staff pointed out that this guidance was developed to promote consistency in the review of helium leakage testing procedures as referred to in the applicable codes and standards, and is not intended to be a new regulatory requirement. The need for this guidance was reiterated because of continued inconsistencies found in confinement evaluations. Staff also provided clarification on the scope of the ASME pressure testing procedures, explaining that these are performed to ensure that the fabrication of the system meets the design criteria, but does not address the integrity of the confinement boundary or its ability for meeting leak rate criteria. Another position presented by the staff was that the data describing the operational experience that 100% of over 1,000 casks leak tested passed the test meeting the specific leakage rate criterion should be more specific (e.g. leak rates, dose monitoring results, components tested, applicable material fabrication standards, materials, form, among others), in order to be reviewed. Similarly, the

staff noted that the research paper referenced by NEI will be evaluated to determine its applicability to base material of DSS. The staff also clarified that the implementation of the ANSI N14.5 standard, in order to demonstrate the integrity of a DSS confinement boundary, was initiated by applicants and ISG-25 details the procedure provided in this standard for such a demonstration.

Staff expects to submit a formal response to NEI's June 13, 2011, letter by November 19, 2011, and will keep NEI informed about any revision to this date.

TAC No. LA0135

Enclosures:
1. Meeting Attendees
2. Meeting Handout – NRC Presentation
3. Meeting Handout – NEI Presentation

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DISTRIBUTION:
SFST r/f NRC Attendees

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