NRC FORM 699 (9-2003) U.S. NUCLEAR REGULATORY COMMISSION

CONVERSATION RECORD

DATE: 09/12/2011

TIME: 3:00 PM

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: See below

TELEPHONE NO.: 888-790-3332

ORGANIZATION: Constellation

SUBJECT: Review draft License renewal RAI 2 prior to dispatch.

TYPE OF CONVERSATION
- ☐ VISIT
- ☐ CONFERENCE
- ☒ TELEPHONE
  - ☐ INCOMING
  - ☒ OUTGOING

SUMMARY *(Continue on Page 2)*

Attendees
NRC - John Goshen, Joe Borowsky, Matt Gordon
CNWRA- Asad Chowdhury, Todd Mintz, Yi- Ming Pan, Lynn Tipton
Contellation - Ken Greene, John Jassari, Heidi Valenta, Ron Seagraves

B-1 Provide further clarification of the calculations presented for estimating the total scalar flux is needed. In particular, provide the mesh tally specifications (e.g. tally cell location, dimensions, energy) used in the MCNP5 model and the relevant model material geometry to interpret the locations of the mesh tally cells in the cask model. Additionally, provide reasons for why there is a large difference in calculated neutron fluxes from the two calculation approaches.

In the RAI response dated June 28, 2011, the licensee provided a partial description of the calculation used in the license renewal application, Appendix B, Section 4.1 for calculation of the estimated total scalar flux. The licensee performed a second calculation to provide an independent check of the approximation used in the license renewal application, Appendix B, Section 4.1 and determined that the results at the centerline of the active fuel region suggest that the method previously utilized may not reflect the peak neutron flux. In the second calculation, the licensee states that the calculation was performed using an in-house MCNP5 model of a NUHOMS–32P dry shielded canister (DSC) containing the design basis neutron source from Calvert Cliffs Calculation CA0672 1, Section 6.5 (see ADAMS Accession Number ML091680542). The licensee states that the MCNP5 model was based on the transfer cask model used in Calvert Cliffs Calculation CA06750 (see ADAMS Accession Number ML091680544) which was modified to include an explicit model of the basket with homogenized fuel. The licensee reports a new value for the peak neutron flux calculated at the center of the neutron absorber plate based upon a mesh tally from the MCNP5 model; however, the licensee does not provide detailed information on how the mesh tally was implemented. Because there are several assumptions that are made in specifying model mesh tallies (e.g. tally cell location, dimensions, energy) that could potentially affect the calculation of the peak neutron flux, the licensee is requested to provide the specifications for the mesh tallies that were used to calculate the neutron flux and the relevant model material geometry to interpret the locations of the mesh tally cells in the

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ACTION REQUIRED
Revise RAI O-2 and discuss with Constellation prior to dispatch.

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
John Goshen		09/12/2011

ACTION TAKEN
RAI revised. Followup discussion held with Constellation on 9/14/11.

TITLE OF PERSON TAKING ACTION	SIGNATURE OF PERSON TAKING ACTION	DATE
John Goshen		09/14/2011

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the cask model. The licensee is also requested to provide reasons for why the two calculation approaches resulted in large differences in the calculated neutron flux.

This is required to evaluate compliance with 10 CFR 72.24(d).

O-2 Provide additional information on the response to the NRC RAI O-3 presented in the June 28, 2011, letter to the NRC.

The staff has reviewed the response and has determined that further clarification identified below is necessary in order to effectively evaluate the licensees RAI response. The staff comments are based on review guidance from NUREG 1567, "Standard Review Plan for Spent Fuel Dry Storage Facilities." In order to facilitate a review of the licensee's application, the staff recommends that step-by-step calculations be provided, including:

Crud
Number of casks, fuel assemblies and rods, total surface area of fuel assemblies and rods, crud activity, crud spallation factor/crud fraction, source term to dose rate calculation, X/Q calculations.

Fines
Number of DSCs, fuel assemblies and rods, fine activity, fine release fraction, source term to dose rate calculation, X/Q calculations.

Volatiles
Number of DSCs, fuel assemblies and rods, volatile activity, volatile release fraction, source term to dose rate calculation, volatile compounds treated as particulates should be considered as a fine, X/Q calculations.
Fission gases
Number of DSCs, fuel assemblies and rods, fission gas activity, fission gas release fraction, source term to dose rate calculation, fission gas compounds treated as particulates should be considered as a fine, X/Q calculations.

Fines and crud should be included in the analysis considering that lower welds have a leak rate of approximately 1E-3 cc/sec (per the Final Safety Analysis Report (FSAR)). The calculations appear to be based on a leak rate of 1E-4 cc/sec rather than 1E-3 cc/sec, which is the sensitivity of the bubble leak test for bottom, girth, and longitudinal welds. The various leak rates used in the calculations (1E-3 cc/sec, 1E-4 cc/sec, and 1E-7 cc/sec per RAI Response O-4) should be noted and explained. The licensee should also provide the calculation for the "size penetration" (e.g., hole size). Staff calculations show a hole size much larger than 10 μm for leak rates of 1E-4 cc/sec and 1E-3 cc/sec. Additionally, the basis for the "Cask to HSM" fractions should be stated explicitly. Values of 0.05 and 0.0008 for volatiles, 0 and 0.02 for fines, and 0 and 0.02 for crud do not appear reasonable. Considering the convection heat transfer taking place within the HSM (this convection is the basis for heat removal), the factors should be approximately 1, especially for small particles. Fines and crud must be included in the calculations. Further, the calculations for normal, off-normal and accident conditions should use the release fractions discussed in NUREG-1567.

Recognizing this is a 40 year license renewal, a second site dose calculation should consider the effect of the remaining DSCs based on more stringent helium leak rate tests mentioned in the June 28, 2011, RAI Response O-4.

Note: A site dose calculation that considers crud, fines, volatiles, and fission gas activity sources very often results in the need for stringent canister helium leak rates. Alternatively, as discussed in NUREG–1536, site dose calculations are not necessary if the canister is demonstrated to be leak tight per American National Standards Institute N14.5.

This is required to evaluate compliance with 10 CFR 72.104, 10 CFR 72.106, 10 CFR 72.122(h) and 10 CFR 72.126(d).

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O-3 Clarify the information provided in the response to NRC RAI O-4 concerning the helium leak test details of the future modules.

The staff specifically requests additional information (testing requirements, standards, etc.) on leak testing the DSC, including the shell, baseplate, lid, port covers, base materials, and all canister welds (lid to shell, base plate to shell, longitudinal, siphon and vent port cover welds, etc.) of the future modules. In addition, clarify what constitutes an "existing module" and provide the helium leak testing requirements for DSC components fabricated during the license renewal period.

This is required to evaluate compliance with 10 CFR 72.104, 10 CFR 72.106, 10 CFR 72.122(h) and 10 CFR 72.126(d).

O-4 Provide the visual examination results of the lead cask to be performed in April 2012 to the staff for review prior to re-licensing. These results should include any indications of rust blooms on the cask surface, if present, accompanied by appropriate corrective action.

Rust blooms have been demonstrated to be precursors to stainless steel chloride induced stress corrosion cracking in environments of interest. Observation
of any potential rust blooms could indicate the possibility of stress corrosion cracking on the lead cask.

This information is required to evaluate compliance with 10 CFR 72.120(d).

O-5 Justify that the graphitic dry film lubricant, "Perma-Slik," will not induce galvanic corrosion on the HSM and transfer cask support rails.

Graphite is a noble element on the galvanic scale and will induce corrosion of aluminum and steel in the presence of moisture.

This information is required to evaluate compliance with 10 CFR 72.120(d).

O-6 Provide justification that no welds or cask surfaces currently have or will have a temperature of ≤ 85 C over the next 40 years, at temperatures bounded by normal conditions of storage. If the surface temperature decreases below 8 C at conditions in which the stainless steel components are susceptible to stress corrosion cracking, justify why the planned inspections are adequate to detect potential degradation as a result of stress corrosion cracking.

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" reports that stress corrosion cracking and pitting corrosion of 304 and 316 stainless steel may occur at temperatures less than 85o C in bounding relative humidity environments.

This information is required to evaluate compliance with 10 CFR 72.120(d).

O-7 Clarify the industrial codes used for qualification of inspectors, inspection methods, and acceptance criteria for safety-related systems structures and components (SSCs) which require an aging management program (AMP).

Widely recognized industrial codes should be used to govern the inspection and maintenance of aging management procedures, (e.g., American Concrete Institute codes for the AMP of concrete).

This information is required to evaluate compliance with 10 CFR 72.120(d).

O-8 Provide the schedule date for the lead cask inspection to the staff when the date is finalized. (Currently scheduled in April 2012)

The schedule is required for NRC staff to observe the inspection.

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SUMMARY

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