



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

June 23, 2015

Mr. George H. Gellrich
Vice President
Exelon Generation Company, LLC
1650 Calvert Cliffs Parkway
Lusby, MD 20657

SUBJECT: AMENDMENT REQUEST NO. 1 TO RENEWED MATERIALS LICENSE NO. SNM-2505 FOR THE CALVERT CLIFFS SPECIFIC INDEPENDENT SPENT FUEL STORAGE INSTALLATION – SECOND REQUEST FOR ADDITIONAL INFORMATION, PART 2 (TAC NO. L24912)

Dear Mr. Gellrich:

By letter dated March 26, 2014, as supplemented July 25, October 10, and December 3, 2014, February 3, and March 10, 2015, Exelon Generation Company, LLC (Exelon Generation), submitted license amendment request (LAR) No. 1 to the U.S. Nuclear Regulatory Commission (NRC) for Renewed Materials License No. SNM-2505 (LAR 2505-1) for the Calvert Cliffs independent spent fuel storage installation (ISFSI).

The NRC staff has reviewed your application and has determined that additional information is required to complete its detailed technical review. A request for additional information (RAI) is provided in the enclosure to this letter. We request that you provide the information by July 19, 2015. Please inform us in writing at your earliest convenience, but no later than July 12, 2015, if you are not able to provide the information by the requested date. You should also include a new proposed submittal date and the reasons for the delay to assist us in re-scheduling your review.

Please reference Docket No. 72-8 and TAC No. L24912 in future correspondence related to this licensing action.

G. Gellrich

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If you have any questions, please contact me at (301) 415-6933.

Sincerely,

/RA/

John M. Goshen, P.E., Project Manager
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-8

TAC No.: L24912

Enclosure: As stated

cc: CCNPP Service List (w/o enclosure)

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File location: G:\SFST\Calvert Cliffs ISFSI\Renewed License Amendment 1\RAI 2\CC RN LAR 1
RAI 2 Part 2. docx

ADAMS Accession No.: ML15174A265

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CALVERT CLIFFS INDEPENDENT SPENT FUEL STORAGE INSTALLATION

RENEWED MATERIALS LICENSE NO. SNM-2505

DOCKET NO. 72-8

LICENSE AMENDMENT REQUEST NO. 1

SECOND REQUEST FOR ADDITIONAL INFORMATION

By letter dated March 26, 2014, as supplemented July 25, October 10, and December 3, 2014, February 3, and March 10, 2015, Exelon Generation Company, LLC (Exelon Generation, or the licensee), submitted license amendment request (LAR) No. 1 to the U.S. Nuclear Regulatory Commission (NRC) for Renewed Materials License No. SNM-2505 (LAR 2505-1) for the Calvert Cliffs independent spent fuel storage installation (ISFSI).

Chapter 5 Structural and Materials Evaluation

- 5-1 Provide all applicable drawings associated with the NUHOMS® 32PHB Dry Shielded Canister (DSC) system.

The staff received drawings in response to request for supplemental information (RSI) 5-7 (ADAMS Accession No. ML14202A337) but is unsure if we possess all of them in a readable form. For example, vendor DWG Nos. NUH32PHB-03-3 sheet 2 of 2 and NUH32PHB-30-4 sheet 2 of 2 are presented as DWG No. 84239SH0002. The staff does not possess sheet 1 of 2 for either of these vendor drawings. DWG No. NUH32PHB-30-4 sheet 2 of 2 contains details and sections, but without sheet 1 of 2, the staff is unaware of the component from which the details and sections are taken. Ensure DWG No. NUH32PHB-30-5 is among the included drawings. Additionally, calculation No. NUH32PHB-0201, NUHOMS® 32PHB, "Weight Calculation of DSC/TC System," contains sketches in the appendix that appear to be excerpts from drawings. One of these sketches is a list of American Society of Mechanical Engineers (ASME) code exceptions for the DSC and the basket, but additional notes and the title block with the drawing number are cut off. These code exceptions do not appear anywhere in the proposed revision to the updated safety analysis report (USAR). Although Regulatory Guide 3.62 states that drawings on 8½ x 11 inches are preferred, due to the amount of detail the staff prefers the drawings be submitted on 11 x 17 inches so that the details are legible.

This information is needed to demonstrate compliance with 10 CFR 72.24.

- 5-2 Provided justification why the new canister lead gamma shielding is now a Category C material not in accordance with NUREG/CR-6407 guidance.

Drawing parts list provided as part of response to request for additional information (RAI) (ADAMS Accession No. ML14288A127) states the new canister's lead gamma shielding is a category C material.

Enclosure

This information is needed to demonstrate compliance with 10 CFR 72.24 and 10 CFR 72.56.

- 5-3 Provide a scoping evaluation and aging management review (AMR) for the transfer cask with forced-air cooling modifications. Clarify any changes to the NRC-approved aging management program (AMP) for the transfer cask to ensure the AMP is adequate for managing age-related degradation of new subcomponents.

The licensee provided a summary of a scoping evaluation and aging management review for the HSM-HB and NUHOMS® 32PHB DSCs, but did not provide a similar discussion for the transfer cask (see pages 3 and 4 of the license amendment request (LAR)). The licensee stated that the transfer cask uses a new lid, which contains small openings around the periphery for air venting (see page 2 of the LAR). The licensee further states that the modified cask includes a 0.5 inch thick spacer disc with wedge shaped protrusions is installed at the bottom of the transfer cask to facilitate air flow coming through the ram access opening to the annular space around the DSC. The staff notes that drawing NUH-06-8021 also identifies other subcomponents important-to-safety, which are not discussed in the application. The staff requires a comprehensive scoping evaluation and aging management review (AMR) for all new subcomponents meeting criteria 1 and 2 per Section 2.4.2 of NUREG-1927. The staff evaluates the results of the scoping evaluation and aging management review to ensure that the NRC-approved AMP for the transfer cask is adequate for all new subcomponents of the transfer cask.

This information is needed to demonstrate compliance with 10 CFR 72.24.

- 5-4 Provide all applicable drawings for the HSM-HB design and the transfer cask with forced-air cooling modifications. Ensure a bill of materials and safety classification are provided for all subcomponents.

The staff received drawings in the RSI 5-7 response (ADAMS Accession No. ML14202A387), but does not possess all of them in a readable form. For example, the HSM-HB door was modified and identified to be constructed of the same material as the HSM model. The staff reviewed drawing NUH-03-7102, which references two drawings for the HSM door that were not included in the response to RSI 5-7 (NUH-03-7106 "Door Type A" and NUH-037108 "Door Type B"). In another example, drawing NUH-06-8021 references drawing NUH-06-8003. The latter was not provided in the response to RSI 5-7 but it identifies the structural shell assembly incorporating the new spacer disc with wedge shaped protrusions for the forced-air cooling configuration. The staff requires all pertinent drawings (including bill of materials and safety classification) to ensure that the scoping evaluation and aging management review for the HSM-HB and the transfer cask is accurate, and the NRC-approved aging management programs (AMPs) are adequate for the new designs.

This information is needed to demonstrate compliance with 10 CFR 72.24.

5-5 Provide proposed changes to Chapter 9 of the ISFSI USAR in order to address aging management of the NUHOMS® 32PHB DSC, HSM-HB and modified transfer cask designs. The changes should include:

- A summary of all supporting TLAAAs provided in the license amendment request and responses to RAI-1 (ADAMS Accession No. ML14288A127).
- Revisions to indicate that approved aging management programs (AMPs) will be applicable to the new designs, or summaries of proposed changes to NRC-approved AMPs, and
- Revised Tables 9.6-1 through 9.6-4, "Aging Management Review Results". The listings in these tables should clearly differentiate subcomponents specific to the new designs in the license amendment.

The supplemented renewal application (ADAMS Accession No. ML14267A065) included an "ISFSI Updated Safety Analysis Report Supplement and Changes" supplement. The renewed license requires the licensee to incorporate this supplement in Chapter 9 of the ISFSI USAR (see License Condition 18, ADAMS Accession No. ML14274A022). The licensee should provide proposed changes to the ISFSI USAR in order to properly document the aging management review, TLAAAs and AMPs pertinent to the NUHOMS® 32PHB DSC, HSM-HB designs and transfer cask.

This information is needed to demonstrate compliance with 10 CFR 72.24.

5-6 Provide additional details on the criteria to include the HSM-HB and NUHOMS® 32PHB DSC components into the next lead canister inspection as noted in NUREG-1927, Appendix E (see page 4 of LAR).

The staff requests additional information on the mechanisms by which the licensee will make a determination for the need to conduct baseline inspection(s) on the HSM-HB and NUHOMS® 32PHB DSC. The licensee has stated that the new designs will be included in the scope of the approved Aging Management Programs, but did not indicate if a baseline inspection will be conducted on the new designs prior to their period of extended operation (including expected sample size). While this inspection would not occur until 20 years after the amendment is approved, the staff is interested in details on the mechanisms and provisions in the licensee's Corrective Action Program for ensuring that degradation in the new designs is properly baselined prior to the start of the period of extended operation. The staff notes that it has recently discussed draft staff guidance for the review of lead system inspection data, including criteria for lead system(s) selection (see ADAMS Accession No. ML15068A331).

This information is needed to demonstrate compliance with 10 CFR 72.24.

5-7 Provide details on how the data from the DOE-funded High Burnup Dry Storage Cask Research and Development Project" (HDRP) will be used to make a determination on safe storage of high burnup fuel up to 62 GWd/MTU.

The current maximum fuel assembly average burnup limit is 47,000 MWd/MTU for the NUHOMS® 24P DSCs and 52,000 MWd/MTU for the NUHOMS® 32P DSCs. The proposed amendment would add a new maximum fuel assembly average burnup limit of 62,000 MWd/MTU for fuel stored in NUHOMS® 32PHB DSCs. The High Burnup Fuel Aging Management Program in Attachment 4 of the supplement to the license renewal application (ML14267A065) was approved per guidance in ISG-24. ISG-24 indicates that the maximum burnup of the fuel in the application should be less than the burnup of the fuel in the demonstration. If the burnup is higher than the fuel in the demonstration program, the applicant would provide evidence, based on characteristics of the fuel, that the demonstration fuel is reasonably characteristic of the stored fuel and the additional burn-up would not change the results determined by the demonstration. Per the latest DOE Cask Demo Design Loading Plan (ML15133A082), the maximum burnups are: 55.5 GWd/MTU (ZIRLO™ cladding), 53.5 GWd/MTU (M5® cladding), 50.6 GWd/MTU (Zircaloy-4 cladding), and 50 GWd/MTU (low-Sn Zircaloy cladding). The applicant is asked to justify that the demonstration results from lower burnup cladding will be characteristic for higher burnup cladding; more specifically, that the acceptance criteria in the High Burnup Fuel Aging Management Program is adequate for burnups up to 62 GWd/MTU.

This information is needed to demonstrate compliance with 72.122(h)(1) and 72.122(l).

Chapter 6 Thermal Evaluation

- 6-1 Provide additional information and justification that forced cooling (FC) will be maintained during transport and is reliable for recovery action.

The staff reviewed the response to RAI 6-2b ((ADAMS Accession No. ML14288A127) and concluded that it lacks sufficient detail to verify that FC is always operable during transport or FC would be quickly recoverable in the event of failure. The staff performed an independent analysis of the transfer operation and determined that the peak cladding temperature limit of 752 °F would be exceeded in the event that FC fails and is not quickly recoverable. Technical Specification (TS) 3.3.2.1 does not currently consider this scenario. Therefore, the staff needs additional information to assure FC will be operable during transport or justify why FC could be quickly recoverable in the event of a failure, or the staff requests that TS 3.3.2.1 be modified to incorporate appropriate actions to be taken in the event that FC cannot be maintained.

This information is required by the staff to determine compliance with 10 CFR 72.128(a)(4).

Chapter 9 Confinement Evaluation

- 9-1 Provide an explanation for the 10% fuel rod rupture assumption during the storage accident condition pressure calculation and confirm the structural integrity of the 32PHB DSC system under accident conditions, assuming 100% fuel rod failure.

Exelon's RAI 9-4 response (ADAMS Accession No. ML14288A127) assumed 10% of the fuel rods fail during the accident blocked vent storage condition. The response also quoted the NUREG-1536 guidance of assuming 100% fuel rod failure during an accident event but provided no justification for not following that guidance.

This information is needed to determine compliance with 10 CFR 72.122.

- 9-2 Provide an accurate description of the confinement boundary in the proposed USAR pages in order to provide a complete description of the NUHOMS® 32PHB DSC system.
- a) The confinement boundary is a critical component of the NUHOMS® 32PHB DSC system. As requested in the previously submitted RSI 9-2 (ADAMS Accession No. ML14202A387) and RAI 9-3 (ADAMS Accession No. ML14288A127), a description of the confinement boundary was presented, in text and figure formats. This description should be provided in proposed FSAR pages.
 - b) The RAI 9-3 response sketch of the confinement boundary appears to be different than the actual NUHOMS® 32PHB DSC system, as denoted in drawing NUH32PHB-30-3. The extent of the confinement boundary, especially near the shielding plug assembly and shell, is uncertain and therefore, an updated sketch should be provided.

This information is needed to determine compliance with 10 CFR 72.24.

- 9-3 Provide draft FSAR pages that clearly define that the confinement boundary, which includes the base metal of the components provided in the RSI 9-2 (ADAMS Accession No. ML14202A387) and RAI 9-3 (ADAMS Accession No. ML14288A127) responses and the welds associated with those components, will be helium leak tested to the application's stated 1E-7 atm cc/sec acceptance criterion of "leaktight", as defined by ANSI N14.5.

As stated in the staff's RAI 1 request, helium leakage testing of the entire confinement boundary to a 1E-7 ref cc/sec acceptance rate is necessary to demonstrate a "leaktight" system so that release/leakage analyses would be unnecessary. However, parts of the supplied FSAR pages, such as page 13.1-63, indicate that only certain parts of the confinement boundary (e.g., closure welds) are tested to meet a "leaktight" criterion.

This information is needed to determine compliance with 10 CFR 72.122.

- 9-4 Clarify that the procedures for the helium leak tests in the field, such as during closure, are developed and implemented by an American Society for Nondestructive Testing (ASNT) Level III certified in leakage testing.

Exelon's response to RAI 9-2 (ADAMS Accession No. ML14288A127) indicated that an ASNT non-destructive testing (NDT) Level III procedure would be developed to implement the helium leakage tests during fabrication but did not address the helium leakage tests required to be performed in the field.

This information is needed to determine compliance with 10 CFR 72.122.

9-5

Confirm that a non-reactive environment will exist within the NUHOMS® 32PHB DSC system during the proposed 40-year license period and specify the fraction and the number of moles of volatile gases, fission gases, and fill gases used in the calculation spreadsheet.

- a) The spreadsheet presented in Enclosure 5 of the RAI 9-4 response (ADAMS Accession No. ML14288A127) indicated a helium backfill pressure of 18.2 psia, but there was no analysis to verify that a non-reactive environment would be maintained during the proposed 40-year license period.
- b) The previously submitted RAI 9-4 requested justification for the volatile and gas release fractions for the high burnup fuel but the explanation, and corresponding spreadsheet, did not discuss the differences associated with high burnup fuels.

This information is needed to determine compliance with 10 CFR 72.122.

Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, ISFSI

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