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10 CFR 72.56

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Calvert Cliffs Nuclear Power Plant, Units Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-53 and DPR-69
NRC Docket Nos. 50-317 and 50-318

Calvert Cliffs Nuclear Power Plant
Independent Spent Fuel Storage Installation, License No. SNM-2505
NRC Docket No. 72-8

Subject: Response to Amendment Request No. 11 to Materials License No. SNM-2505 for the Calvert Cliffs Specific ISFSI – Partial First Request for Additional Information

References:
1. Letter from G. H. Gellrich (Exelon Generation) to Document Control Desk (NRC), dated March 26, 2014, License Amendment Request: High Burnup NUHOMS-32PHB Dry Shielded Canister
2. Letter from J. M. Goshen (NMSS) to G. H. Gellrich (Exelon Generation), dated September 12, 2014, Amendment Request No. 11 to Materials License No. SNM-2505 for the Calvert Cliffs Specific ISFSI – Acceptance Review and Partial First Request for Additional Information

Reference 1 submitted a license amendment request for the Calvert Cliffs Nuclear Power Plant site-specific independent spent fuel storage installation. The amendment, if approved, would authorize the storage of Westinghouse and AREVA Combustion Engineering 14x14 fuel in the NUHOMS-32PHB Dry Shielded Canister system. The Nuclear Regulatory Commission staff performed an acceptance review of the application and found it acceptable. In addition, the staff has requested additional information (Reference 2). Responses to the requested additional information are provided in Attachment (1). Enclosure (2) contains information that is proprietary to AREVA Inc., therefore, it is accompanied by an affidavit signed by AREVA, the owner of the information (Attachment 2). The affidavit sets forth the basis on which the information may be withheld form public disclosure by the Commission, and addresses, with specificity, the consideration listed in 10 CFR 2.390(b)(4). Accordingly, it is requested that the

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information that is proprietary to AREVA, Inc. be withheld from public disclosure. A non-proprietary version of the proprietary information is not available.

The additional information provided does not change the environmental assessment provided in Reference 1 and the categorical exclusion set forth in 10 CFR 51,22(c)(11) is still valid. There are no regulatory commitments contained in this correspondence.

Should you have questions regarding this matter, please contact Mr. Douglas E. Lauver at (410) 495-5219.

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 10, 2014.

Respectfully,

George H. Gellrich
Site Vice President

GHG/PSF/bjd

Attachment: (1) Response to Request for Additional Information

Enclosures:
1. Drawings
2. PROPRIETARY - NUH32P-0105, Revision 1, Procurement Specification for the NUHOMS 32P and 32PHB Dry Shielded Canisters
3. Design Specification SP-0564D, NUHOMS-32PHB Dry Shielded Canister Design Specification
4. Confinement Boundary Sketch
5. NUH32PHB-0404 Spreadsheet
6. NUH32PHB-0101, Revision 3, Design Criteria Documents for the NUHOMS 32PHB System for Storage

(2) AREVA TN Affidavit

cc: NRC ISFSI Project Manager

(Without Enclosure 2)
NRC Project Manager, Calvert Cliffs
NRC Regional Administrator, Region I
NRC Resident Inspector, Calvert Cliffs
S. Gray, MD-DNR

ATTACHMENT (1)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Calvert Cliffs Nuclear Power Plant
October 10, 2014

The Nuclear Regulatory Commission (NRC) staff has requested additional information concerning the March 26, 2014, License Amendment Request: High Burnup NUHOMS-32PHB Dry Shielded Canister (DSC). The request and the responses are provided below.

NRC RAI 9-1:

Provide drawing NUH32PHB-30-1, Sheet 2 of 2, and drawing NUH32PHB-30-10 so that a review of the NUHOMS-32PHB design can be performed.

Only one sheet (Sheet 1 of 2) of drawing NUH32PHB-30-1 was provided in the response to RSI 9-2. In addition, Note 7 of drawing NUH32PHB-30-2 indicates a parts list in drawing NUH32PHB-30-10, but was not provided.

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

CCNPP RESPONSE TO RAI 9-1:

The requested drawings (NUH32PHB-30-1, sheet 2 and NUH32PHB-30-10) are provided in Enclosure 1.

NRC RAI 9-2:

Describe the details of the fabrication and closure helium leak tests and the extent of the confinement boundary that is helium leak tested during those tests. It is suggested that interim staff guidance (ISG)-25 be considered when responding.

Observation 9-1 was written to understand whether the entire confinement boundary is to be helium leak tested to the "leaktight" criteria, thereby confirming the amendment request's statement that a confinement dose analysis is unnecessary. The response was not clear as to the extent of the confinement boundary that is leak tested during fabrication and closure. For example, TN Report number NUH32PHB-0111 and NUH32PHB-0101 mentions: "helium leak testing of the final pressure boundary to a "leak tight" condition as defined by ANSI N14.5-1007(sic)." However, the response to Observation 9-1, as well as discussion within Attachment 1 and Enclosure 1 of the application focused on the helium leak test of the welds.

In addition to the response to this RAI, the information presented in the technical specifications must be clearly defined as to the extent of the confinement boundary that is helium leak tested during those tests.

a) *When describing the extent of the confinement boundary that is helium leak tested during fabrication and closure, also specify whether the siphon/vent block (item 52), alignment block (item 53), top casing plate (item 54), lifting lug round bars (item 58), DSC shell (item 2), bottom cover plate, (item 10), and the associated welds between the above components are helium leak tested. (Note: item numbers are from the response to request for supplemental information (RSI) 9-2).*
b) *Provide details of the helium leak tests, such as acceptance criteria and type of test (i.e., evacuated envelope, per ANSI N14.5 Table A.1). For example, is a temporary seal plate lid used to during the fabrication leak test of the confinement boundary?*
c) *Describe where ISG-5, ISG-15, and ISG-18 are applied.*
d) *Provide Design Specification SP-0564D, which addresses certain details of the helium leakage testing.*
e) *Clarify that a NDT Level III would develop/approve the leakage rate test procedures.*

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

CCNPP RESPONSE TO RAI 9-2:

a) The Procurement Specification for the NUHOMS 32P and 32PHB Dry Shielded Canisters (NUH32P-0105, Revision 1), section 4.10.14 governs the performance of the helium leak test during fabrication of the 32PHB Dry Shielded Canisters (DSCs). There are two helium leak tests performed at the fabricator: one on the 32PHB DSC cavity and one on the top shield plug cavity. The 32PHB DSC cavity is helium leak tested following the welding of all circumferential and longitudinal seams of the canister shell and the welding of the inner bottom cover plate. Hence the entire confinement boundary associated with the canister shell is tested at the fabrication shop. The procurement specification Section 4.10.14.1 allows the fabricator to alternatively split the helium leak test of the canister into two separate tests: one on the bottom cover plate prior to attaching to the 32PHB DSC shell and one on the shell following the completion of the bottom shield plug assembly to shell weld. This is permitted to support pre-fabrication of the bottom shield plug assembly, however AREVA TN has not typically seen this option utilized. The top shield plug is helium leak tested following the welding of the top casing plate, side casing plate, alignment block, siphon and vent block, and top shield plug lifting plug round bars. Hence, all of the confinement boundary components and welds associated with the top shield plug are helium leak tested. The final helium leak test occurs on site following fuel loading and the welding of the top shield plug to the canister shell.

NUH32P-0105, Revision 1, is contained in Enclosure 2.

b) NUH32P-0105, Revision 1, section 4.10.14.1 provides the acceptance criteria for the helium leak test. The maximum acceptable leakage is $1x10^{-7}$ atm cc/s He, which is bounded by the maximum acceptable leak rate per American National Standards Institute (ANSI) N14.5, "Radioactive Materials – Leakage Tests on Packages for Shipment".

The procurement specification invokes ANSI N14.5, for the procedure, and American Society for Testing and Materials (ASTM) E1603, "Standard Practice for Leakage Measurement Using Mass Spectrometer Leak Detector or Residual Gas Analyzer in the Hood Mode." and American Society of Engineers (ASME) Boiler and Pressure Vessel Code, Section V, "Nondestructive Examination," Article 10 as guides. AREVA TN's fabricators use ANSI N14.5, Table A.1, Item A.5.3, "Gas Filled Envelope," as the configuration for the leakage test. To perform this test, DSC fabricators have the option of either attaching a temporary head with a leak tight gasket over the respective cavities or welding a temporary head into place to create a seal for the cavity, and then removing the head following the completion and acceptability of the test.

c) Interim Staff Guidance (ISG)-5

ISG-5, "Confinement Evaluation," applies to the confinement boundaries which include the confinement vessel (i.e., DSC), its penetrations, valves, seals, welds and closure devices and corresponding information concerning the redundant sealing.

ISG-5 applies to the acceptance criteria associated with confinement analysis and acceptance of "leak tight" testing instead of detailed confinement analysis.

The 32PHB DSC has a closure lid that is designed and tested to be "leak tight", thus complying with ISG-5 requirements by application of the "leak tight criteria" per ANSI N14.5-1997.

ISG-15

ISG-15, "Material Evaluation," applies to the multi-pass weld that joins the canister shell to the structural lid of the austenitic stainless steel DSC. This multi-pass weld is executed and examined consistent with the guidance provided in ISG-15.

ISG-15 also applies to the volumetric or multi-pass penetrant testing inspection methods for acceptance described in ISG-15, section X.5.2.3 "Welded Lids", sub-section "Austenitic Stainless and Nickel-Base Alloy Steel Cask Design"

ISG-18

ISG-18, "Design/Testing of Lid Welds," applies to: Helium leakage test for closure welds; and design and examination criteria to be met before any closure weld may be exempted from the helium leakage test.

"Leakage Testing a Dual Lid Design - Sketch B" of ISG-18 applies to the dual lid design of the 32PHB DSC. The 32PHB DSC top shield plug assembly field closure weld satisfies the helium leakage test to the "leak-tight" requirement of ANSI N14.5, which also demonstrates compliance with 10 CFR 72.236.

ISG-18 applies to the top cover plate of the 32PHB DSC. The 32PHB DSC demonstrates compliance with this provision and with 10 CFR 72.236 by satisfying the conditions identified under "Specific Guidance" as addressed per the Helium Leakage Test - Large Weld Exception Criteria.

Note: Drawing NUH32PHB-30-20 R-1 specifies applicable ISG requirements for the fabrication and the field closure welds of the 32PHB DSC by AREVA TN.

d) The requested design specification, SP-00564D, "NUHOMS-32PHB Dry Shielded Canister Design Specification," is provided in Enclosure 3.

e) ASNT-TC-1A 1992, "Personnel Qualification and Certification in Nondestructive Testing," Section 4.3(3) provides the requirements for a Level III individual's training and background. It states, "An NDT Level III individual shall be capable of establishing techniques and procedures; interpreting codes, standards, specifications, and procedures; and designating the particular NDT methods, techniques, and procedures to be used."

By the definitions provided by ASNT-TC-1A, the only individual in a fabrication organization that can develop helium leak test procedures would be the Level III individual. This statement ensures that a Level III individual would develop and implement those procedures.

ASNT-TC-1A is incorporated by reference in the procurement specification NUH32P-0105 Revision 1, Sections 2.2.4 and 4.10.17.

NRC RAI 9-3:

Clarify the presence of redundant welds for the confinement system closures.

The confinement boundary sketch on page 15 of the RSI response did not indicate a redundant closure boundary. In addition, describe any impact of the new top cover plate design to the redundant closure.

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

CCNPP RESPONSE TO RAI 9-3:

Enclosure 4 provides a revised confinement and redundant boundary sketch. The confinement boundary is indicated by a heavy dashed line, while the redundant closure boundary is indicated by a heavy solid line, as depicted on the legend on the sketch.

The top cover plate design for the 32PHB DSC is identical to the 32P DSC, therefore there is no new top cover plate design.

NRC RAI 9-4:

Justify the percentage of rods ruptured and the gas and volatile release fractions of the high burnup fuel when calculating the pressure within the NUHOMS-32PHB; the pressure is an important parameter when reviewing the integrity of the confinement boundary.

a) Calculation package NUH32PHB-0404 did not explain the basis for the fraction of rupture rods used when performing the calculation for high burnup fuel. In addition, the basis for the amount of fission gas and volatiles release from a high burnup fuel rod was not provided. These parameters are used to obtain accurate or bounding pressures within the DSC.

b) Provide the spreadsheet listed on page 17 of 17 of calculation package NUH32PHB-0404.

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

CCNPP RESPONSE TO RAI 9-4:

a) For normal and off-normal conditions, 1% and 10% of the fuel rods are assumed to rupture, respectively. For the accident transfer condition, 100% of the fuel rods are assumed to rupture. For the accident blocked vent storage condition, 10% of the fuel rods are assumed to rupture.

   The basis for the fraction of ruptured fuel rods is found in NUREG-1536, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility," Revision 0, Section 4.0.V.5.c which states:

   "The NRC accepts that normal-conditions occur with less than 1 percent of the fuel rods failed, off-normal-conditions occur with up to 10 percent of the fuel rods ruptured, and 100% of the fuel rods will have ruptured following a design-basis accident event."

   Additionally, these fractions also match the fractions given in NUREG-1536, Revision 1, Table 5-2.

   The highest fuel assembly burnup for the 32PHB DSC is 62 GWd/MTU. The total amount of fission and filled gases released per fuel rod is 97.9186 in^3 at standard temperature and

pressure (i.e., 68°F and 1.0 atmosphere) that is determined by the bounding value at rod average burnup of 62 GWd/MTU.

The fission and fill gas moles used for the 32PHB DSC evaluation were developed using the Westinghouse FATES3B code for the population of standard Combustion Engineering (CE) 14x14 fuel targeted for loading in the 32PHB DSCs. Westinghouse CE 14x14 Integral Fuel Burnable Absorber (IFBA) fuel assemblies with ZrB_2 coated fuel pellets provide the limiting gas release. The FATES3B code is used to predict fuel rod temperature distributions and internal gas pressures as a function of mechanical design and operating history. The FATES3B code has been verified against fission gas release data from 92 fuel rods that have operated under both steady-state power and bumped power (i.e., the rod power is increased from a steady-state value to a higher power level and held for a given amount of time) operating conditions. The rod powers of this fission gas release data are typically near the maximum power allowed by Technical Specification for CE 14x14 fuel. The benchmark release data also represents a wide range of burnup between 7 GWd/MTU to 62 GWd/MTU (rod average). Results from the FATES3B code are used in fuel rod design (e.g., for setting initial fill gas pressure) and in-core and spent fuel pool safety analyses. The use of this code has been previously approved by the NRC for these applications at Calvert Cliffs.

b) The requested spreadsheet from AREVA-TN calculation NUH32PHB-0404, "Internal Pressure for NUHOMS 32PHB DSC for Storage and Transfer Conditions," is provided in Enclosure 5.

NRC RAI 9-5:

Provide a list of the Important to Safety (ITS) components and their category for the NUHOMS-32PHB and HSM-HB.

The category of the ITS components will ensure that appropriate quality assurance is maintained for the NUHOMS-32PHB and HSM-HB.

This information is needed to determine compliance with 10 CFR 72.144.

CCNPP RESPONSE TO RAI 9-5:

The requested list of Important to Safety components is provided in Enclosure 1, drawing NUH32PHB-30-10. The quality categories were chosen are based on the criteria in NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety."

NRC RAI 9-6:

Clarify that the NUHOMS32-PHB is designed and tested to meet the leaktight criteria in ISG-18 and ANSI N14.5 for both normal and accident conditions.

Section 14 of document NUH32PHB-0101 refers only to accident conditions, although 72.104 and 72.106 must both be met.

This information is needed to determine compliance with 10 CFR 72.104 and 10 CFR 72.106.

CCNPP RESPONSE TO RAI 9-6:

The response to RAI 9-2c clarifies that the 32PHB DSC is designed and tested to meet the leak tight criteria in both ISG-18 and ANSI N14.5 under normal and accident conditions.

In addition, Enclosure 6 provides NUH32PHB-0101, "Design Criteria Documents for the NUHOMS 32PHB System for Storage," Revision 3, which contains an editorial revision to Section 14 of to correctly state that the 32PHB DSC is designed and tested to comply with the requirements of both 10 CFR 72.104 and 10 CFR 72.106.