TRANSNUCLEAR
AN AREVA COMPANY

December 20, 2012
E-34150

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: Revision 1 to Transnuclear, Inc. (TN) Application for Amendment 2 to NUHOMS® HD Certificate of Compliance No. 1030 for Spent Fuel Storage Casks (Docket No. 72-1030, TAC No. L24691)

Reference: Letter from Lucieann Vechioli (NRC) to Don Shaw (TN), "Application for Amendment No. 2 to NUHOMS® HD Certificate of Compliance No. 1030 for Spent Fuel Storage Casks – Request for Supplemental Information," December 5, 2012 (Docket No. 72-1030, TAC No. L24691)

The letter referenced above advised that NRC staff performed an acceptance review of TN's September 28, 2012 application for Amendment 2 to the NUHOMS® HD Certificate of Compliance No. 1030 and that supplemental information is needed for the staff to continue their review. The letter also included observations to allow TN to start earlier on items containing the potential to be asked at a later date. The letter indicated that responses to the observations are not required for the staff to begin a detailed technical review.

The purpose of this submittal is to respond to the request for supplemental information (RSI) and the observations. The responses are provided as Enclosure 2. Enclosures 4 and 5 provide the changed technical specifications (TS) and changed updated final safety analysis report (UFSAR) pages, respectively, which are associated with the RSI responses. In the TS, all Amendment 2 changes continue to be tracked with italicized text and revision bars, with new inserts shaded. In the UFSAR, the changed pages are annotated as Revision 1 with changes indicated by italicized text and revision bars. New inserts are shaded, except for the graphic in Figure 7-1. Enclosure 3 provides a list of changed TS and UFSAR pages with a reason for each change.

Should the NRC staff require additional information to support review of this application, please do not hesitate to contact Mr. Don Shaw at 410-910-6878 or me at 410-910-6820.

Sincerely,

Paul A Triska

Paul Triska
Vice President, Operations

NMSS26

7135 Minstrel Way, Suite 300, Columbia, MD 21045
Phone: 410-910-6900 • Fax: 410-910-6902

cc: Lucieann Vechioli (NRC SFST), as follows:

- Three paper copies of this cover letter and Enclosures 2, 3, 4, and 5
- Three computer disks containing this cover letter and Enclosures 2, 3, 4, and 5

Enclosures:

1. Not used
2. RSIs, Observations, and Responses
3. List of Changed TS and UFSAR Pages with Reason for Change
4. CoC 1030 Amendment 2, Revision 1 Changed TS Pages
5. CoC 1030 Amendment 2, Revision 1 Changed UFSAR Pages

REQUEST FOR SUPPLEMENTAL INFORMATION

RSI-1:

Provide additional justification that the 32PTH1 Dry Shielded Canister (DSC) documented in reference 10 of the Final Safety Analysis Report (FSAR) is bounding for the 32PTH DSC for all conditions of loading, storage and transfer. This amendment request indicates that the 32PTH1 optimum pitch configuration bounds the 32PTH double shear configuration at 2800 ppm boron concentration for the various basket types; however, there does not appear to be adequate explanation as to why this is the case. Please clarify why this assumption is applicable to both intact and damaged configurations.

This information is necessary to ensure compliance with 10 CFR 72.236(c).

RESPONSE TO RSI-1

The design basis intact and damaged fuel criticality analysis models employed in the 32PTH1 DSC described in Appendix U.6 of the Standardized NUHOMS® System UFSAR Revision 12 are used for the evaluations at a boron concentration of 2800 ppm for the four fuel assembly classes. From a criticality standpoint, the 32PTH1 DSC is identical to the 32PTH DSC for all conditions of loading, transfer and storage although the 32PTH1 DSC model is more reactive than the 32PTH DSC model. The maximum allowable enrichment for each fuel assembly class as a function of basket type and soluble boron concentration for the 32PTH DSC is calculated to be higher than those for the 32PTH1 DSC for both intact and damaged fuel assemblies. This indicates that the reactivity of the 32PTH1 model is higher than that of the 32PTH model and therefore provides the justification that this model is applicable and conservative.

The application is revised to provide a detailed justification in UFSAR Chapter 6, Section 6.4.2.

RSI-2:

Provide an illustration of the confinement boundary and redundant sealing system in Figure 7-1 of the FSAR (e.g., solid and dashed lines to show the confinement boundary and redundant sealing system for the DSC).

A figure showing the confinement boundary and redundant sealing system is needed to accept the provision of redundant sealing of confinement systems.

This information is needed to determine compliance with 10 CFR 72.236(e).

RESPONSE TO RSI-2

UFSAR Figure 7-1 is revised to show both the confinement boundary (shown as a solid line on the revised figure) and the redundant sealing system (shown as a dashed line on the revised figure) of the 32PTH DSC.

OBSERVATIONS

OBS 4.0 Design Features – Technical Specifications

Clarify if the purpose of the proposed changes to Section 4.3.1 of the Technical Specification is to introduce an exemption process for acceptance testing of neutron absorbers, into the Technical Specifications, to avoid the need for an amendment request.

This information is required for compliance with 10 CFR 72.146(a).

RESPONSE TO OBS 4.0

The purpose of the proposed changes is to create a provision similar to that provided for proposed alternatives to the ASME code in Technical Specifications Section 4.4.4, Alternatives to Codes and Standards, due to the similarity in the nature of the requirements. There is also a precedent for this approach, as the same provision has been included in the application for CoC 1004 Standardized NUHOMS® Amendment 13, which is nearing the final phases of NRC review. This can be seen on Technical Specifications Section 4.3.1 on pages 4-2 and 4-3 in the following reference:

(ML12096A304) - Portions of Revision 2 to Transnuclear, Inc. (TN) Application for Amendment No. 13 to the Standardized NUHOMS® System, Response to First Request for Additional Information (Docket No. 72-1004; TAC No. L24519)

OBS 5.0 Administrative Controls – Technical Specifications

Clarify how the Horizontal Storage Module (HSM-H) concrete will be tested "during the fabrication process for elevated temperatures," to verify that the concrete is acceptable.

The language in Section 5.5 of the Technical Specifications, "Concrete Testing," is unclear and implies that the concrete will be tested at elevated temperatures during the fabrication (curing) process.

This information is required for compliance with 10 CFR 72.236(d).

RESPONSE TO OBS 5.0

For each concrete mix design used in fabricating the HSM-H, representative samples of the mix design are obtained and cured for 28 days. The samples are then heated for a period not less than 40 hours to a temperature equal to or above the calculated peak temperature for the blocked vent accident. The samples are then tested to verify that the compressive strength meets the requirement of the structural analysis and inspected for signs of spalling and cracking. Curing is only one of the steps in the overall fabrication process.

OBS 7.0 Confinement Evaluation – Technical Specifications

Clarify the two leak testing procedures of the confinement boundary in the Technical Specifications.

Under TS section 5.2.4 d), the applicant provided a reference for the leak testing procedures performed to the confinement boundary after loading the DSC. For the NUHOMS®-32PTH, the confinement boundary is tested through two procedures in order to meet the leak tight criteria per ANSI N14.5. The first procedure is performed to test the inner bottom cover plate, the canister shell and associated welds during fabrication, and the second procedure tests the remaining components of the confinement boundary. The first procedure performed to leak test the confinement boundary is not referred to in the TS or the Certificate of Compliance (CoC) although it is part of the acceptance tests required for approval of this application. The second procedure is referred to in T.S. 5.2.4 d), but only addresses the confinement boundary welds.

This information is needed to determine compliance with 10 CFR 72.236(j) and 72.236(l).

RESPONSE TO OBS 7.0

Section 5.2.4 d) of the Technical Specifications is revised as follows:

1. A description of the first leak-testing procedure, which is performed during fabrication of the 32PTH DSC, is added to the beginning of section 5.2.4 d).
2. The description of the second leak-testing procedure, which is performed after loading the 32PTH DSC and welding the covers, and which previously only addressed leak-testing of the confinement boundary welds, is revised to mention the remaining confinement boundary components tested during this procedure (inner top cover/shield plug and siphon and vent ports cover plates) in order to clarify that these components are also leak-tested, and not just their welds.
3. Additionally, editorial corrections are made to the section to ensure clarity.

List of Changed TS and UFSAR Pages with Reason for Change

Page #	Reason for Change
Tech Spec Pages	
5-4	OBS 7.0
5-5	Text shift
SAR Pages	
6-13	RSI-1
6-13a	Text shift
Figure 7-1	RSI-2

Enclosure 4 to TN E-34150

CoC 1030 Amendment 2, Revision 1

Changed TS Pages

5.2 Programs (continued)

5.2.4 Radiation Protection Program

The Radiation Protection Program will establish administrative controls to limit personnel exposure to As Low As Reasonably Achievable (ALARA) levels in accordance with 10 CFR Part 20 and Part 72.

a) As part of its evaluation pursuant to 10 CFR 72.212, the licensee shall perform an analysis to confirm that the limits of 10 CFR *Part* 20 and 10 CFR 72.104 will be satisfied under the actual site conditions and configurations considering the planned number of 32PTH DSCs to be used and the planned fuel loading conditions.

b) A monitoring program to ensure the annual dose equivalent to any real individual located outside the ISFSI controlled area does not exceed regulatory limits is incorporated as part of the environmental monitoring program in the Radiological Environmental Monitoring Program of Section 5.2.3.

c) *When using a TC with a liquid neutron shield (NS), if draining the NS is required to meet the plant lifting crane capacity limits, the NS shall be verified to be filled after completion of the lift. If DSC cavity draining or TC/DSC annulus draining operations, as applicable, are initiated after the lift, the NS shall be verified to be filled before these draining operations are initiated and continually monitored during the first five minutes of the draining evolution to ensure the NS remains filled. Observation of water level in the expansion tank or some other means can be used to verify compliance with this requirement.*

d) *Following completion of the 32PTH DSC shell assembly at the fabricator facility, the inner bottom cover plate, canister shell and all associated welds are leak-tested to demonstrate that these welds and components meet the "leak-tight" criterion (≤ 1.0 x 10^{-7} reference cm^3/sec) as defined in "American National Standard for Radioactive Materials – Leakage Tests on Packages for Shipment", ANSI N14.5-1997. If the leakage rate exceeds 1.0 x 10^{-7} reference cm^3/sec, check and repair these welds or components.*

Following completion of the welding of *the* 32PTH DSC inner top cover/shield plug *and* siphon and vent cover plates, these welds *and components* are leak-tested to demonstrate that *they* meet the "leak-tight" criterion (≤ 1.0 x 10^{-7} reference cm^3/sec) as defined in "American National Standard for *Radioactive Materials –* Leakage Tests on Packages for Shipment", ANSI N14.5-1997. If the leakage rate exceeds 1.0 x 10^{-7} reference cm^3/sec, check and repair these welds *or components*.

These specifications ensure that an inert helium atmosphere will be maintained around the fuel and radiological consequences will be negligible.

(continued)

e) Following placement of each loaded Transfer Cask into the cask decontamination area and prior to transfer to the ISFSI, the 32PTH DSC smearable surface contamination levels on the outer top 1 foot surface of the 32PTH DSC shall be less than 2,200 dpm/100 cm^2 from beta and gamma emitting sources, and less than 220 dpm/100 cm^2 from alpha emitting sources.

The contamination limits specified above are based on the allowed removable external radioactive contamination specified in 49 CFR 173.443 (as referenced in 10 CFR 71.87(i)) the system provides significant additional protection for the 32PTH DSC surface than the transportation configuration. The HSM-H will protect the 32PTH DSC from direct exposure to the elements and will therefore limit potential releases of removable contamination. The probability of any removable contamination being entrapped in the HSM-H airflow path released outside the HSM-H is considered extremely small.

Enclosure 5 to TN E-34150

CoC 1030 Amendment 2, Revision 1

Changed UFSAR Pages

6.4.2 Fuel Loading Optimization

The criticality analysis is performed for the 32PTH DSC loaded with 32 intact or 32 damaged fuel assemblies. The following sub-sections describe the various analyses performed with the intact *and damaged* fuel assemblies.

The design basis intact and damaged fuel criticality analysis models employed in the 32PTH1 DSC described in Appendix U.6 of the Standardized NUHOMS® System UFSAR [10] are utilized herein for the evaluations at a boron concentration of 2800 ppm for the four fuel assembly classes. Further, these models are also employed in all the calculations for the CE 16x16 class fuel assemblies. From a criticality standpoint, the 32PTH1 DSC is identical to the 32PTH DSC for all conditions of loading, transfer and storage.

The design basis models for the 32PTH1 DSC employ a more conservative representation of the basket where the basic egg-crate section is modeled with a height of 13.48 inches (poison + 1.75 inches steel) instead of 15.03 inches (poison + 1.75 inches steel). This results in a slightly lower amount of poison in the axial direction for the 32PTH1 DSC model. Further, the basket periphery of the 32PTH1 DSC is modeled with solid aluminum, while the 32PTH DSC periphery contains a mixture of aluminum, steel and water, which results in a slightly higher reactivity for the 32PTH1 model. Due to these modeling differences, the most reactive damaged configuration for the WE 17x17 class fuel assemblies at 2800 ppm boron concentration is due to optimum pitch based on the 32PTH1 model while that at other boron concentrations is due to double shear for the 32PTH model. This results in a conservative calculation of the k_{eff} at 2800 ppm.

The maximum allowable enrichment for the each fuel assembly class as a function of basket type and soluble boron concentration for the 32PTH1 DSC is shown in Table U.6-3 of Appendix U.6 of reference [10] for intact fuel assemblies and Table U.6-4 of Appendix U.6 of reference [10] for damaged fuel assemblies. The maximum allowable enrichment for the each fuel assembly class as a function of basket type and soluble boron concentration for the 32PTH DSC is calculated to be higher than those for the 32PTH1 DSC as shown in Table 6-1 for both intact and damaged fuel assemblies. This indicates that the reactivity of the 32PTH1 model is higher than that of the 32PTH model and therefore provides the justification that this model is applicable and conservative.

6.4.2.1 Most Reactive Fuel Assembly and Assembly Position Studies

The first series of analyses determines the most reactive fuel assembly design and the most reactive fuel positioning within the steel tubes. The first KENO run models the fuel assemblies as being centered within the basket compartment tubes. The off-center fuel assembly positioning is modeled by shifting all the fuel assemblies radially inward such that the fuel pins come in contact with the two faces of the compartment tubes. This is "inward" positioning and the fuel assemblies are at the closest approach relative to the center of the basket.

These calculations are repeated for all four fuel assembly classes listed in Table 6-3. These runs are carried out at nominal compartment dimensions with varying internal moderator density assuming a Type B basket and fuel at 4.30 wt. % U-235 and a boron concentration of 2500 ppm. The CE 16x16 calculations are carried out at an enrichment of 4.25 wt. % U-235, a fixed poison loading of 18.75 mg B-10/cm^2. All input and output files are included on the attached compact disk. In all other respects, the model is the same as that described in Sections 6.3.1 and 6.3.2. The 2D KENO plots are shown in Figure 6-12 and Figure 6-13 and the results are shown in Table 6-10.

The peripheral rails were not modeled for these calculations. The rail material was assumed to be completely replaced by the internal moderator (borated water at 2500 ppm). This assumption does not affect this parametric study. For the CE 16x16 calculations, the rail structure was modeled with solid aluminum. *The rail structure was also modeled with solid aluminum for all assembly classes at 2800 ppm soluble boron.*

The most reactive fuel assembly design is the WE 17x17 standard fuel assembly for the WE 17x17 class, the WE 15x15 standard fuel assembly for the WE 15x15 class, the CE 16x16 System 80 fuel assembly for the CE 16x16 class and the CE 14x14 Fort Calhoun Fuel assembly for the CE 14x14 class of fuel assemblies. The "inward" positioning of fuel assemblies is most reactive.

Table 6-41 presents the results of the criticality analysis performed for the WE 15x15 standard fuel with fuel OD of 0.3669", and guide tube OD of 0.546" and ID of 0.512", and fuel OD of 0.3659", and guide tube OD of 0.546" and ID of 0.512", for intact fuel with and without BPRAs, and damaged fuels with BPRAs. These results, in comparison with the design basis intact and damaged fuel analysis performed for standard fuel, with fuel OD of 0.3669", guide tube OD of 0.545" and ID of 0.510", with and without BPRAs demonstrate that the reactivity differences between the additional dimension combinations for the standard fuel and the design basis fuel are statistically insignificant, and standard fuel with the two additional dimension combinations are acceptable as reload fuel.

The results in Table 6-42 presented for the WE 15x15 OFA fuel with fuel OD of 0.3659" and guide tube OD of 0.533" and ID of 0.499" also demonstrate that the OFA fuel is acceptable as reload fuel.

6.4.2.2 Determination of the Most Reactive Configuration

The fuel loading configuration of the canister/cask affects the reactivity of the package. Several series of analyses determined the most reactive configuration for the canister/cask.

For this analysis, the most reactive fuel type is used to determine the most reactive configuration. The canister/cask is modeled, with the WE 17x17 standard assembly, over a 15.03-inch axial section with periodic axial boundary conditions and reflective radial boundary conditions. This represents an infinite array in the x-y direction of canister/casks that are infinite in length, which is conservative for criticality analysis. The starting model is identical to the model used above. The canister/cask model for this evaluation differs from the actual design in the following ways:

- The boron 10 content in the poison plates is 10% lower than the minimum required,
- The stainless steel and aluminum basket rails, which provide support to the fuel compartment grid, are modeled using a homogenized material and,

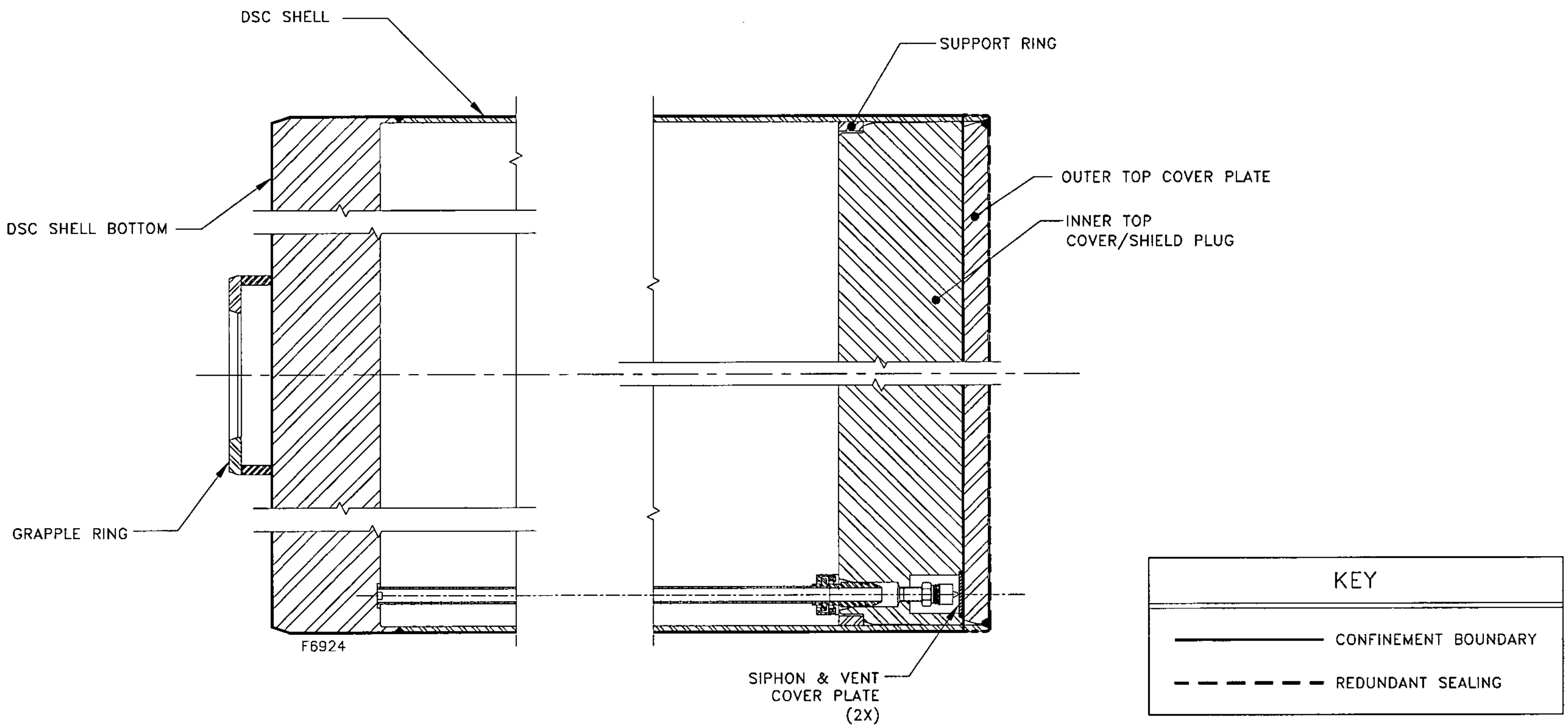

Figure 7-1
Typical 32PTH DSC Confinement Boundary