TRANSNUCLEAR
AN AREVA COMPANY

June 10, 2009
E-28236

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

Subject: Revision 5 to Transnuclear, Inc. (TN) Application for Amendment 1 to the NUHOMS® HD System (Docket No. 72-1030; TAC NO. L24153)

References:

1. Letter from B. Jennifer Davis (NRC) to Donis Shaw (TN), "SECOND REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF AMENDMENT 1 TO THE NUHOMS® HD SYSTEM (TAC NO. L24153)," April 3, 2009

2. Letter from Jayant Bondre (TN) to Document Control Desk, "Revision 3 to Transnuclear, Inc. (TN) Application for Amendment 1 to the NUHOMS® HD System, Response to Second Request for Additional Information (Docket No. 72-1030; TAC NO. L24153)," April 30, 2009

3. Letter from Jayant Bondre (TN) to Document Control Desk, "Revision 4 to Transnuclear, Inc. (TN) Application for Amendment 1 to the NUHOMS® HD System (Docket No. 72-1030; TAC NO. L24153)," May 26, 2009

Reference 1 forwarded an NRC request for additional information (RAI) regarding Amendment 1 to the NUHOMS® HD System. Reference 2 provided Transnuclear's (TN) response to the RAI. Following submittal of Reference 2, NRC and TN discussed certain responses and Reference 3 provided additional changes to the CoC 1030 Technical Specifications (TS) and to the NUHOMS® HD System UFSAR, Chapter 9 concerning neutron absorber qualification and testing. Following the submittal of Reference 3 the NRC staff suggested some minor, final changes to UFSAR Chapter 9, which also necessitate a minor TS change. This submittal provides those changes.

Enclosure 1 provides a list of Amendment 1 Revision 5 TS and UFSAR replacement pages included herein, with discussion regarding the changes. Enclosure 2 provides the TS and UFSAR Amendment 1 replacement pages.

In both the TS and the UFSAR, Amendment 1 Revisions 0, 1, 2, 3, 4, and 5 changes are shown using italics for inserted text and revision bars for changed areas; however, Revision 5 changes are shaded to distinguish these new changes from Revisions 0, 1, 2, 3 and 4 changes. For the UFSAR, page footers for replacement pages are annotated as "Amendment 1, Rev. 5, 6/09."

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 410-910-6881.

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NMSS01

Sincerely,

Jayant Bondre, Ph.D.
Vice President - Engineering

cc: B. Jennifer Davis (NRC SFST) (six paper copies of this cover letter and Enclosures 1 and 2, provided separately)

Enclosures:

1. List of Changed Pages and Discussion of Changes for CoC 1030 Amendment 1 Application Revision 5
2. NUHOMS® HD Amendment 1 Application Revision 5, Changed Proposed Technical Specifications and Proposed Updated Final Safety Analysis Report Pages

List of Changed Pages and Discussion of Changes for CoC 1030 Amendment 1 Application Revision 5

Page	Discussion
Tech Specs Page 4-2	Changed to include portions of UFSAR Section 9.5.2.b.
UFSAR Page 9-8	CAUTION block changed to include portions of UFSAR Section 9.5.2.b.
UFSAR Page 9-9	Changed to include portions of UFSAR Section 9.5.2.b. as incorporated by reference into Technical Specifications and to change "this minimum" to "the statistically derived minimum thickness from 9.5.2 a)"
UFSAR Page 9-12	Changed to add "reduce corrosion resistance," to the key process changes and to change "may be" to "are" in the second paragraph of Section 9.5.4.3.

Enclosure 2 to TN E-28236

NUHOMS® HD Amendment 1 Application Revision 5, Changed Proposed Technical Specifications and Proposed Updated Final Safety Analysis Report Pages

4.0 Design Features (continued)

4.3 Canister Criticality Control

The NUHOMS®-32PTH is designed for unirradiated fuel with an assembly average initial enrichment of less than or equal to 5.0 wt. % U-235 taking credit for soluble boron in the DSC cavity water during loading operations and the boron content in the poison plates of the DSC basket. The 32PTH DSC has multiple basket configurations, based on the material type and boron content in the poison plates, as listed in Table 6. Table 7 defines the requirements for boron concentration in the DSC cavity water as a function of the DSC basket type for the various intact and damaged fuel classes (most reactive) authorized for storage in the 32PTH DSC.

A Type I basket contains poison plates that are either borated aluminum or MMC while a Type II basket contains Boral® poison plates. The basket types are further defined by the B-10 areal density in the plates, ranging from the lowest, Type A to the highest, Type E.

4.3.1 Neutron Absorber Tests

Borated Aluminum, MMCs, or Boral® shall be supplied in accordance with FSAR Sections 9.1.7.1 *through 9.1.7.4,* 9.5.2.*a*, *portions of 9.5.2.b, all of 9.5.3.3.1, 9.5.3.4,* 9.5.3.5, *9.5.4.1* and *9.5.4.2*, with the minimum B10 areal density specified in Table 6. These sections of the FSAR are hereby incorporated into the NUHOMS® HD CoC.

4.4 Codes and Standards

4.4.1 Horizontal Storage Module (HSM-H)

The reinforced concrete HSM-H is designed to meet the requirements of ACI 349-97. Load combinations specified in ANSI 57.9-1984, Section 6.17.3.1 are used for combining normal operating, off-normal, and accident loads for the HSM-H.

If an independent spent fuel storage installation site is located in a coastal salt water marine atmosphere, then any load-bearing carbon steel DSC support structure rail components of any associated HSM-H shall be procured with a minimum 0.20 percent copper content for corrosion resistance.

4.4.2 Dry Shielded Canister (32PTH DSC)

The 32PTH DSC is designed, fabricated and inspected to the maximum practical extent in accordance with ASME Boiler and Pressure Vessel Code Section III, Division 1, 1998 Edition with Addenda through 2000, Subsections NB, NF, and NG for Class 1 components and supports. Code alternatives are discussed in 4.4.4.

4.4.3 Transfer Cask (OS187H)

The OS187H Transfer Cask is designed, fabricated and inspected to the maximum practical extent in accordance with ASME Boiler and Pressure Vessel Code Section III, 1998 Edition with Addenda through 2000, Subsection NC for Class 2 vessels.

alloy (e.g., from 6000 to 1000 series aluminum), or if the boron content is reduced without changing the boron phase.

The thermal analysis in Chapter 4 assumes a 3/16 inch thick neutron absorber paired with a 5/16 inch aluminum 1100 plate. The specified thickness of the neutron absorber may vary, and the thermal conductivity acceptance criterion for the neutron absorber will be based on the nominal thickness specified. The minimum thermal conductivity shall be such that the total thermal conductance (sum of conductivity * thickness) of the neutron absorber and the aluminum 1100 plate shall equal the conductance assumed in the analysis, as shown in Table 9-3, where the acceptance criterion is highlighted.

The aluminum 1100 plate does not need to be tested for thermal conductivity; the material may be credited with the values published in the ASME Code Section II part D. The neutron absorber material need not be tested for thermal conductivity if the nominal thickness of the aluminum 1100 plate is 0.425 inch or greater. This case is examined explicitly in chapter 4, where no credit is taken for the thermal conductivity of Boral®.

9.5.2 Specification for Acceptance Testing of Neutron Absorbers by Neutron Transmission

CAUTION

Section 9.5.2.a and portions of 9.5.2.b are incorporated by reference into the NUHOMS® CoC 1030 Technical Specifications (paragraph 4.3.1) and shall not be deleted or altered in any way without a CoC amendment approval from the NRC. The text of information incorporated by reference in these sections is shown in bold type to distinguish it from other sections.

a. **Neutron Transmission acceptance testing procedures shall be subject to approval by the Certificate Holder. Test coupons shall be removed from the rolled or extruded production material at locations that are systematically or probabilistically distributed throughout the lot. Test coupons shall not exhibit physical defects that would not be acceptable in the finished product, or that would preclude an accurate measurement of the coupon's physical thickness.**

A lot is defined as all the pieces produced from a single ingot or heat *or from a group of billets from the same heat.* If this definition results in lot size too small to provide a meaningful statistical analysis of results, an alternate larger lot definition may be used, so long as it results in accumulating material that is uniform for sampling purposes.

The sampling rate for neutron transmission measurements shall be such that there is at least one neutron transmission measurement for each 2000 square inches of final product in each lot.

The B10 areal density is measured using a collimated thermal neutron beam of *no more than 1 inch* diameter.

The neutron transmission through the test coupons is converted to B10 areal density by comparison with transmission through calibrated standards. These standards are composed of a homogeneous boron compound without other significant neutron absorbers. For example, boron carbide, zirconium diboride or titanium diboride

sheets are acceptable standards. These standards are paired with aluminum shims sized to match the effect of neutron scattering by aluminum in the test coupons. Uniform but non-homogeneous materials such as metal matrix composites may be used for standards, provided that testing shows them to provide neutron attenuation equivalent to a homogeneous standard. ***Standards will be calibrated, traceable to nationally recognized standards, or by attenuation of a monoenergetic neutron beam correlated to the known cross section of boron 10 at that energy.***

Alternatively, digital image analysis may be used to compare neutron radioscopic images of the test coupon to images of the standards. The area of image analysis shall be ***no more than 0.75 sq. inch.***

The minimum areal density specified shall be verified for each lot at the 95% probability, 95% confidence level or better. ***If a goodness-of-fit test demonstrates that the sample comes from a normal population, the one-sided tolerance limit for a normal distribution may be used for this purpose. Otherwise, a non-parametric (distribution-free) method of determining the one-sided tolerance limit may be used. Demonstration of the one-sided tolerance limit shall be evaluated for acceptance in accordance with the Certificate Holder's QA procedures.***

b. The following illustrates one acceptable method *and is intended to be utilized as an example. Therefore, the following text is not part of the Technical Specifications.* The acceptance criterion for individual plates is determined from a statistical analysis of the test results for their lot. The B10 areal densities determined by neutron transmission are converted to volume density, i.e., the B10 areal density is divided by the thickness at the location of the neutron transmission measurement or the maximum thickness of the coupon. The lower tolerance limit of B10 volume density is then determined, defined as the mean value of B10 volume density for the sample, less K times the standard deviation, where K is the one-sided tolerance limit factor with 95% probability and 95% confidence [7].

Finally, the minimum specified value of B10 areal density is divided by the lower tolerance limit of B10 volume density to arrive at the minimum plate thickness which provides the specified B10 areal density.

Any plate which is thinner than ***the statistically derived minimum thickness from 9.5.2 a)*** **or the minimum design thickness, whichever is greater, shall be treated as non-conforming, with the following exception. Local depressions are acceptable, so long as they total no more than 0.5% of the area on any given plate, and the thickness at their location is not less than 90% of the minimum design thickness.**

Non-conforming material shall be evaluated for acceptance in accordance with the Certificate Holder's QA procedures.

9.5.3 Specification for Qualification Testing of Metal Matrix Composites

9.5.4 Specification for Process Controls for Metal Matrix Composites

This section provides process controls to ensure that the material delivered for use is equivalent to the qualification test material.

CAUTION
Sections 9.5.4.1 and 9.5.4.2 are incorporated by reference into the NUHOMS® CoC 1030 Technical Specifications (paragraph 4.3.1) and shall not be deleted or altered in any way without a CoC amendment approval from the NRC. The text of these sections is shown in bold type to distinguish them from other sections.

9.5.4.1 Applicability and Scope

Key processing changes shall be subject to qualification prior to use of the material produced by the revised process. The Certificate Holder shall determine whether a complete or partial re-qualification program per Section 9.5.3 is required, depending on the characteristics of the material that could be affected by the process change.

9.5.4.2 Definition of Key Process Changes

Key process changes are those which could adversely affect the uniform distribution of the boron carbide in the aluminum, reduce density, *reduce corrosion resistance*, or reduce the mechanical strength or ductility of the MMC.

9.5.4.3 Identification and Control of Key Process Changes

The manufacturer shall provide the Certificate Holder with a description of materials and process controls used in producing the MMC. The Certificate Holder and manufacturer shall identify key process changes as defined in Section 9.5.4.2.

An increase in nominal boron carbide content over that previously qualified shall always be regarded as a key process change. The following are examples of other changes that *are* established as key process changes, as determined by the Certificate Holder's review of the specific applications and production processes:

(a) Changes in the boron carbide particle size specification that increase the average particle size by more than 5 microns or that increase the amount of particles larger than 60 microns from the previously qualified material by more than 5% of the total distribution but less than the 10% limit,

(b) Change of the billet production process, e.g., from vacuum hot pressing to cold isostatic pressing followed by vacuum sintering,

(c) Change in the nominal matrix alloy,