72-1004

TRANSNUCLEAR
AN AREVA COMPANY

November 29, 2004
NUH03-04-178

Mr. L. Raynard Wharton
Spent Fuel Project Office, NMSS
U. S. Nuclear Regulatory Commission
11555 Rockville Pike M/S O13-D-13
Rockville, MD 20852

Subject: Response to the Request for Additional Information (RAI) and Submittal of Revision 4 of Application for Amendment No. 9 to the NUHOMS® Certificate of Compliance (CoC) No. 1004 (TAC NO. L23732).

References:
1. NRC Request for Additional Information for Review of the Transnuclear NUHOMS Amendment No. 9 Application (TAC No. L23732), Dated November 2, 2004.
2. Revision 3 of Application for Amendment No. 9 to the NUHOMS® CoC No. 1004 (TAC NO. L23732), Submitted October 11, 2004.

Dear Mr. Wharton:

Transnuclear, Inc. (TN) herewith submits our response to the RAI (Reference 1) and Revision 4 of our application for Amendment No. 9 to the NUHOMS CoC No. 1004 (Replacement Pages Only).

Please replace the affected pages of Reference 2 with the changed pages included herewith.

Should you or your staff require additional information to support review of this application, please do not hesitate to contact me at 510-744-6053 or Mr. Jayant Bondre at 510-744-6043.

Sincerely,

U. B. Chopra

Licensing Manager

Docket 72-1004

Enclosures:

1. Response to the RAI (TAC No. L23732), Dated November 2, 2004.
2. Thirteen Copies of Replacement Pages of Revision 4 of Amendment No. 9 to the NUHOMS® CoC No. 1004.

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TRANSNUCLEAR, INC.
DOCKET NO. 72-1004
TAC NO. L23732

REQUEST FOR ADDITIONAL INFORMATION RELATED TO NUHOMS®
AMENDMENT NO. 9

DATED November 2, 2004

## Chapter M.5 Shielding Evaluation

### Question 5-1

*Provide a definition and detailed description of reconstituted fuel.*

*This information is required to assure compliance with 10 CFR 72.124 and 72.236(d).*

### Response to 5-1

Reconstituted fuel assembly is an intact fuel assembly in which one or more enriched fuel rods have been replaced with either stainless steel rods or zircaloy clad rods with depleted, natural or lower than original enriched uranium dioxide as fuel material referred to as "lower enrichment $UO_2$ rods" in this section.

The replacement rod is of similar outside dimensions as the original fuel rod, displacing the same amount of water in the fuel matrix. The lower enrichment $UO_2$ rods are of similar design and behavior as the standard fuel rods aside from the uranium enrichment.

SAR Page M.5-2 is revised to reflect the above definition and description of reconstituted fuel.

# ATTACHMENT A

## Description, Justification, and Evaluation of Amendment 9 Changes

# ATTACHMENT A

## DESCRIPTION, JUSTIFICATION AND EVALUATION OF AMENDMENT CHANGES

### 1.0 INTRODUCTION

The purpose of this application for Amendment No. 9 to CoC 1004 is:

- To expand the NUHOMS®–32PT DSC Fuel Specification and Fuel Qualification Tables (FQTs), previously approved per CoC 1004 Amendment No. 5, to include reconstituted fuel assemblies and assemblies with low initial enrichment levels (between 1.1 and 2.0 wt % U-235).

- To revise the 32PT DSC Fuel Specification Table 1-1g to show the minimum soluble boron loading concentration required as a function of the fuel initial enrichment for the CE 14x14, WE 14x14, and CE 15x15 Class PWR fuel assemblies. Also, revise Fuel Specification 1.2.15a to be consistent with this change.

- To add CE 14x14, WE 14x14, WE 15x15, and WE 17x17 Class PWR fuel assemblies to the authorized contents of the NUHOMS®–24PHB DSC, that was previously approved per CoC 1004 Amendment No. 6.

This application provides the supporting shielding analysis and criticality analyses for the above listed changes. Thermal, structural, and confinement analyses for the 32PT DSC and 24PHB DSC are not affected by these changes.

This section of the application provides (1) a brief description of the changes, (2) justification for the changes, and (3) a safety evaluation for these changes.

Revision 1 of this application requests changes to Tech Specifications 1.2.2 (Table 1-1g), 1.2.10 and 1.2.13.

Revision 2 and 3 of this application revises the suggested changes to Tech Specs 1.2.10 and 1.2.13 in response to NRC comments.

*Revision 4 of this application reflects the response to NRC's Request for Additional Information.*

### 2.0 BRIEF DESCRIPTION OF THE CHANGE

#### 2.1 Significant Changes to the Technical Specifications Relative to NUHOMS® CoC 1004, Amendment 8

Attachment B of this submittal includes a mark-up of the affected Technical Specifications. The changes listed below are relative to CoC 1004 Amendments 8 which is currently under NRC review:

- For the 32PT DSC, revise Fuel Qualification Tables 1-2d, 1-2e, 1-2f, 1-2g and 1-2h to include fuel assemblies with low enrichment levels and provide cooling times for regions depicted as "Not Analyzed" in these specific Tables. Also, revise these Tables to indicate cooling time requirements for reconstituted fuel assemblies.

- For the 32PT DSC, revise Fuel Specification Table 1-1e to include reconstituted fuel assemblies. Also, revise Table 1-1f to clarify that CE 15x15 fuel assemblies with stainless steel plugging clusters are acceptable.

- For the 32PT DSC, revise Fuel Specification Table 1-1g to include variable soluble boron loading as a function of initial enrichment for CE 14x14, CE 15x15 and WE 14x14 assembly class. Table 1-1g is revised to reflect the alternate poison plate configurations for each 32PT DSC basket type.

- For the 32PT DSC, revise "Limit/Specification" section of Specification 1.2.15a to delete 2500 ppm and add reference to Table 1-1g.

- For the 24PHB DSC, revise Table 1-1i to include storage of WE 17x17, WE 15x15, CE 14x14 and WE 14x14 PWR assembly class to the 24PHB DSC.

- Technical Specification 1.2.10 Changes

  (a) Revise the title of Specification 1.2.10 to say "TC/DSC" instead of "DSC" to be consistent with the rest of the Specification. This is an editorial correction.

  (b) Revise Limit 1 of this Specification as shown to allow handling a loaded TC/DSC outside the spent fuel pool building at heights greater than 80" provided the specified restrictions are met.

  Justification:

  There is no change to the existing 80" height limit when a loaded NUHOMS® TC/DSC cask is outside the spent fuel building and is supported on a transfer skid in a horizontal orientation enroute to the ISFSI pad. The basis for this specification is the accident analysis described in FSAR Section 8.2.5.

  When a loaded TC/DSC is being handled beyond the 80" height limit outside the fuel building with a single failure proof handling system, the TC drop accident is not credible. As described in FSAR Sections 3.2.5.3 and 8.1.1.9, the allowable stress limits for the upper TC trunnions are developed to meet the ANSI N14.6-1993 requirements for a non-redundant lifting device. In addition, as stated in FSAR Section 3.4.4.1, the Lifting Yoke is also designed and tested as a special lifting device to meet the requirements of ANSI N14.6 for a non-redundant lifting device. The design of a loaded TC/DSC meets the heavy loads requirements of NUREG-0612 as documented in Specification 1.1.4.

# ATTACHMENT C-1

## Updated FSAR Revision 8 Changed Pages

Revisions indicated relative to Updated FSAR, Revision 8. Listed below are the affected FSAR Appendix M pages:

- M.1-4
- M.2-3
- M.2-13 thru M.2-15
- M.2-17 thru M.2-21
- M.5-1 thru M.5-2
- M.5-4 thru M.5-8
- M.5-8a thru M.5-58c (New)
- M.5-89a (New)
- M.5-90 thru M.5-99
- M.5-99a thru M.5-99g (New)
- M.6-2
- M.6-4
- M.6-4a (New)
- M.6-8 thru M.6-9
- M.6-10a (New)
- M.6-11
- M.6-11a (New)
- M.6-12
- M.6-30
- M.6-32
- M.6-34
- M.6-42 thru M.6-46
- M.6-46a (New)
- M.6-47 thru M.6-48
- M.6-48a thru M.6.48d (New)
- M.6-49
- M.6-49a thru M.6-49c (New)
- M.6-50
- M.6-56a thru M.6-56nn (New)

rates on and around the NUHOMS®-32PT system. In order to model Heat Load Zoning Configuration 2, all sixteen assemblies in the outer ring of the DSC are modeled with source terms consistent with 1.2 kW. Therefore, the source terms result in fairly conservative dose rates because the shielding analysis is based on a 28.8 kW heat load compared to the 24 kW heat load limit.

The bounding burnup, minimum initial enrichment and cooling time combinations used in this analysis are as follows:

- 30 GWd/MTU, 2.5 wt. % U-235, 8-year cooled – Inner sixteen assemblies in the HSM models,
- 41 GWd/MTU, 3.1 wt. % U-235, 5-year cooled – Outer sixteen assemblies in the HSM and TC models, and
- 45 GWd/MTU, 3.3 wt. % U-235, 23-year cooled - Inner sixteen assemblies in the TC models.

The design-basis source terms for the authorized BPRAs are taken from Appendix J. The design-basis source terms cover three BPRA designs: (1) B&W 15x15 Burnable Absorber Assemblies with up to 2 cycles burnup and 5-year cooled, (2) WE 17x17 Pyrex Burnable Absorber, 2-24 Rodlets with up to 2 cycles burnup and 10-year cooled, and (3) WE 17x17 WABA Burnable Absorber, 3-24 Rodlets with up to 2 cycles burnup and 10-year cooled. The properties used to calculate the design-basis source terms for the authorized BPRAs are reproduced in Table M.5-2.

*Reconstituted fuel assembly is an intact fuel assembly in which one or more enriched fuel rods have been replaced with either stainless steel rods or zircaloy clad rods with depleted, natural or lower than original enriched uranium dioxide as fuel material referred to as "lower enrichment $UO_2$ rods" in this section.*

*The replacement rod is of similar outside dimensions as the original fuel rod, displacing the same amount of water in the fuel matrix. The lower enrichment $UO_2$ rods are of similar design and behavior as the standard fuel rods aside from the uranium enrichment.*

Reconstituted fuel assemblies with up to 56 solid stainless steel rods or unlimited number of lower enrichment $UO_2$ rods that replace fuel rods are also acceptable for the 32PT DSC payload. The reconstituted rods may be placed at any location in the fuel assembly and the reconstituted assemblies may be placed anywhere in the basket. The cooling time required for reconstituted fuel assembly is increased consistent with the fuel qualification Table M.2-5 through Table M.2-9.

CE 15x15 fuel assemblies with plugging clusters having a nominal mass of 2.3 kg 304L stainless steel (including 0.1 kg Inconel x-750) are evaluated. The material weights in the top, plenum and the incore region (including the weight of the heavy metals) used for the design basis source term calculation bound the CE 15x15 fuel assembly with plugging clusters.

The methodology, assumptions, and criteria used in this evaluation are summarized in the following subsections.