72-1004

September 17, 2004
NUH03-04-116

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: Submittal of a Supplement to Revision 1 of Application for Amendment No. 8 to the NUHOMS® Certificate of Compliance No. 1004 (TAC NO. L23653)

References:
1. Revision 1 of Application for Amendment No. 8 to the NUHOMS® Certificate of Compliance (CoC), No. 1004, Submitted July 6, 2004 (TAC NO. L23653).
2. Revision 0 of Application for Amendment No. 9 to the NUHOMS® Certificate of Compliance (CoC), No. 1004, Submitted April 21, 2004 (TAC NO. L23732).

Dear Mr. Wharton:

Transnuclear, Inc. (TN) herewith submits a supplement to Revision 1 (Reference 1) of our application for Amendment No. 8 to the NUHOMS® CoC No. 1004.

Per our earlier discussion with you, this supplement withdraws proposed changes to Technical Specifications 1.2.10 and 1.2.13. These specific changes will be included with a forthcoming supplement to CoC 1004 Amendment 9 application (Reference 2).

In addition, as suggested by the staff, a new Table 1-1s is added to the proposed Technical Specifications to specify Metal Matrix Composite (MMC) poison plate requirements.

Please replace the affected pages of the proposed Technical Specifications of Reference 1 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

U. B. Chopra

Licensing Manager

NMSS

Docket 72-1004

Enclosures:

1. Ten Copies of a Supplement Revision 1 of Application for Amendment No. 8 to the NUHOMS® CoC No. 1004, Proprietary Version (Replacement Pages Only).

ATTACHMENT A

Description, Justification, and Evaluation of COC Amendment Changes

ATTACHMENT A

DESCRIPTION, JUSTIFICATION AND EVALUATION OF AMENDMENT CHANGES

1.0 INTRODUCTION

The purpose of this amendment application is to add a new NUHOMS®-24PTH system to the Standardized NUHOMS® system described in the FSAR. The NUHOMS®-24PTH system is a modular canister based spent fuel storage and transfer system, similar to the Standardized NUHOMS®-24P system described in the FSAR. The NUHOMS®-24PTH system consists of the following new or modified components:

- A new dual purpose (Storage/Transportation) Dry Shielded Canister (DSC), with three alternate configurations, designated as DSC Type NUHOMS®-24PTH-S, -24PTH-L, and -24PTH-S-LC,

- A new 24PTH DSC basket design, which is provided with two alternate options: with aluminum inserts (Type 1) or without aluminum inserts (Type 2). In addition, depending on the boron content in the basket poison plates, each basket type is designated as Type A (low B10), Type B (moderate B10) or Type C (high B10) which results in six different basket types (Type 1A, 1B, 1C, 2A, 2B, or 2C),

- A modified version of the Standardized Horizontal Storage Module (HSM) Model 102 described in the FSAR, designated as HSM-H, equipped with special design features which provide enhanced shielding and heat rejection capabilities, and

- The OS197/OS197H Transfer Cask (TC) described in the FSAR, is provided with an optional modified top lid to allow air circulation through the TC/DSC annulus during transfer operations at certain heat loads when time limits for transfer operations cannot be satisfied. The OS197/OS197H TC with a modified top lid is designated as OS197FC TC.

The NUHOMS®-24PTH system is designed to store up to 24 intact (or up to 12 damaged and balance intact) B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14, and WE 14x14 class PWR fuel assemblies. The fuel to be stored is limited to a maximum assembly average initial enrichment of 5.0 wt. %, a maximum assembly average burn up of 62 GWd/MTU, and a minimum cooling time of 3.0 years. The 24PTH-S and 24PTH-L DSC types are the short and long cavity configurations of the 24PTH DSC designed for a maximum heat load of 40.8 kW. They are transferred to the ISFSI for storage in the HSM-H in either the OS197/OS197H or OS197FC TC depending upon the heat load.

To meet the capacity limits of the lifting crane at the Oconee Station, a third DSC type, designated 24PTH DSC-S-LC, is provided. This is a modified version of the 24PTH-S DSC, provided with thinner top and bottom lead shield plugs instead of steel, resulting in a longer cavity length. It is designed for a maximum heat load of 24 kW per DSC and may be stored in

either the currently licensed Standardized HSM Model 102, or in the new HSM-H, and is to used with the currently licensed Standardized TC (with a solid neutron shield) only for onsite transfer.

Fuel assemblies with Control Components (CCs) are to be stored only in 24PTH-L and 24PTH-S-LC DSC Types, due to their longer cavity length.

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

Revision 1 of this application is being submitted to reflect TN's response to the NRC Request for Additional Information (RAI) dated May 3, 2004 (TAC No. L23653).

Revision 2 withdraws proposed changes to Technical Specifications 1.2.10 and 1.2.13 and adds a new Table 1-1s.

2.0 BRIEF DESCRIPTION OF THE CHANGE

2.1 Significant Changes to the Technical Specifications of NUHOMS® CoC 1004, Amendment 7

The changes listed below are relative to CoC Amendment 7:

A complete mark up of the changes to the Technical Specifications due to the addition of the NUHOMS®-24PTH system to CoC 1004 is included as Attachment B in Enclosures 2 and 3 of this submittal. A few of the proposed changes listed here correct errors, inconsistencies and/or discrepancies within the existing Specifications. None of these corrections have any significant effect on safety. A brief justification for each of such suggested corrections to the Specifications is also provided herewith.

- Revise "Limit/Specification" and "Action" sections of Specification 1.2.1, "Fuel Specification", to add reference to Tables 1-11, and 1-1m. Table 1-11 , and 1-1m specify the applicable parameters for each type of PWR fuel allowed to be stored in the NUHOMS®-24PTH system.

- Revise the "Surveillance" section of Specification 1.2.1, Fuel Specification", to say "*Prior to loading.....*" instead of "Immediately before insertion...". to allow operational flexibility to a Cask user. There is no change to the requirement of independent identification and verification of each assembly being placed into the DSC.

- Revise the "Bases" section of Specification 1.2.1, "Fuel Specification", to provide the supporting bases for storage of intact and/or damaged PWR fuel, with or without Control Components (CCs) in the NUHOMS®-24PTH DSC. Add a cross reference to Appendix P where the safety analyses for the 24PTH are provided.

- Add Table 1-11 to identify the acceptable parameters for each type of intact PWR fuel assembly class allowed to be stored in the NUHOMS®-24PTH DSC.

- Add Table 1-1m to specify PWR fuel assembly design characteristics for storage into NUHOMS®-24PTH DSC.

- Add Table 1-1n to specify the thermal and radiological characteristics for CCs authorized for storage in the NUHOMS®-24PTH DSC.

- Add Table 1-1p to specify the maximum assembly average initial enrichment for which each intact fuel assembly class (with or without CCs) is qualified as a function of soluble boron concentration and basket type (fixed boron).

- Add Table 1-1q to specify the maximum assembly average initial enrichment for which each damaged fuel assembly class (with or without CCs) is qualified as a function of soluble boron concentration and basket type (fixed boron) and the maximum number of damaged fuel assemblies allowed to be stored.

- Add Table 1-1r to specify the minimum B10 content of the poison plates as a function of the six NUHOMS®-24PTH basket types.

- *Add Table 1-1s to specify the Metal Matrix Composite (MMC) requirements.*

- Add Fuel Qualification Tables 1-3a, 1-3b, 1-3c, and 1-3d for the NUHOMS®-24PTH DSC (PWR Fuel without CCs).

- Add Fuel Qualification Tables 1-3e, 1-3f, 1-3g, and 1-3h for the NUHOMS®-24PTH DSC (PWR Fuel with CCs).

- Relocate the existing Figure 1-10 from its existing location (page A-65) to page A-63 as shown. This is an editorial change and represents a more logical location for this Figure in the Technical Specifications.

- Add Figures 1-11, 1-12, 1-13 and 1-14 to specify the four heat load zoning configurations analyzed for the 24PTH-S or 24PTH-L DSC. Add Figure 1-15 to specify the heat load zoning configuration analyzed for the 24PTH-S-LC DSC.

- Add Figure 1-16 to specify the location inside the NUHOMS®-24PTH DSC where up to 12 damaged fuel assemblies may be stored.

- Revise the Limit/Specification of Specification 1.2.2 to delete the requirements of a "stepped" evacuation. The requirement of a stepped evacuation is a process detail which does not affect safety. As stated in the basis subsection, achieving a stable vacuum pressure of 3 mm Hg ensures that the 0.25 volume % oxidizing gases is met. This 3 mm limit may be achieved by the licensee in several ways without this additional restraint.

- Revise the Applicability subsection of Specification 1.2.2 to add the clarification that "the term 'inner top cover' used in this and other Technical Specifications means either the inner top cover plate or the top shield plug assembly." Accordingly replace the term "cover plate"

with "cover" in Action Statement No. 4. This change avoids ambiguity in interpretation of the requirements of this Specification (and other Technical Specifications such as Specification 1.2.3, 1.2.3a, 1.2.4, 1.2.4a), since it is the DSC top cover which is welded to the DSC shell. The DSC "top cover" may be the top cover plate for DSC designs (such as 24PTH-S or 24PTH-L) or the "top shield plug assembly" for other DSC designs (such as 24PTH-S-LC). A similar change is also made to page A-2 of the Specifications.

- Revise the Title and "Applicability" subsections of Specification 1.2.3a to extend the applicability of this specification to the 24PTH DSC.

- Revise Action Statement No. 5 of Specifications 1.2.3 and 1.2.3a to say "Check and repair the seal weld *between the inner top cover and the DSC shell*" instead of "Check and repair the seal weld on the DSC top shield plug". See justification provided for Specification 1.2.2 above.

- Revise the title ,"Applicability" and the "Bases" sections of Specification 1.2.4a to extend the applicability of this specification to 24PTH DSC.

- Revise Specification 1.2.4 and 1.2.4a to replace the term "top cover plate" with "top cover" as marked. See justification provided for Specification 1.2.2 above.

- Revise the Applicability Specification 1.2.5 to correct a spelling error of the term "siphon".

- Add a new Specification 1.2.7c, entitled "HSM-H Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC Only", to specify the limiting doses rates due to the storage of a loaded 24PTH-S or 24PTH-L DSC inside the HSM-H.

- Add a new Specification 1.2.7d, entitled "HSM or HSM-H Dose Rates with a Loaded 24PTH-S-LC DSC Only", to specify the limiting doses rates due to the storage of a loaded 24PTH-S-LC DSC inside either the Standardized HSM or HSM-H.

- Revise the Title of Specification 1.2.8 to include 24PTH-S-LC DSC, since this DSC is authorized to be stored in the Standardized HSM. Also, revise the third sentence in the Action Statement of this Specification to say "...than the upper limit *in the Specification 1.2.1 .....*" instead of "than the upper limit specified in Section 3 of the FSAR...". This is a betterment change.

- Add a new specification 1.2.8a, entitled "HSM-H Maximum Air Exit Temperature with a Loaded 24PTH DSC", to specify the limiting air exit temperature due to the storage of a NUHOMS®-24PTH DSC inside the HSM-H.

- Revise Specification 1.2.9 to reflect that the alignment requirements of the TC with the HSM as specified herein are also applicable to the HSM-H.

- Add a new Specification 1.2.11b, entitled "Transfer Cask Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC", to specify the limiting doses rates due to the transfer of a loaded 24PTH-S or 24PTH-L DSC inside the Transfer Cask.

- Add a new Specification 1.2.11c, entitled "Transfer Cask Dose Rates with a Loaded 24PTH-S-LC DSC", to specify the limiting doses rates due to the transfer of a loaded 24PTH-S-LC inside the Transfer Cask.

- Revise Specification 1.2.12, Surveillance section to delete the last 2 sentences related to decontamination of the transfer cask. This change makes the Specification consistent with its Applicability section.

- Revise the second sentence of the "Bases" section of Specification 1.2.14, entitled "TC/DSC Operations at High Ambient Temperatures" to state that the fuel cladding limits of ISG-11, Rev. 2 also apply to the 24PTH system. Also, Item No. 2 of the Limit/Specification is revised to delete the words "*up to 125 °F*", since the upper ambient temperature limit is different for each canister type as stated in paragraph 1.1.1, item 2 of CoC.

- For Specifications 1.2.15, 1.2.15a, and 1.2.15b, revise the surveillance activities No. 1 and 2 to reflect a time requirement of 24 hours instead of 4 hours for determination of boron concentration in the SFP water and the water inside DSC cavity. The current four hour requirement results in an increased exposure to the Cask user without providing a commensurate increase in public safety.

- Add a new Specification 1.2.15c, entitled "Boron Concentration in the DSC Cavity Water for the 24PTH Design Only", to specify the minimum boron concentration required during loading of the NUHOMS®-24PTH system.

- Revise the Limits/Specifications of Specification 1.2.16 to delete the additional constraint of "*and the fully loaded TC weight is less than 190 kips*" to make this Specification consistent with its Applicability statement. In accordance with RAI 12-2 response, revise the Action Statement of this Specification to delete the words "...and determine if the cask weight is less than 190 kips". This revision corrects an omission from the original submittal.

- Add a new Specification 1.2.17c, entitled "24PTH DSC Vacuum Drying Duration Limit", to specify the vacuum drying duration limit for the NUHOMS®-24PTH DSC.

- Add a new Specification 1.2.18, entitled "Time Limit for Completion of 24PTH DSC Transfer Operation" to specify the limits for completion of transfer of a loaded NUHOMS®-24PTH DSC.

- Revise the Surveillance and Monitoring requirements of Specification 1.3 to eliminate the mandatory requirements of implementing both 1.3.1 and 1.3.2 on a daily basis. Implementation of any one of the two surveillance requirements is sufficient to accomplish the specified objective of this specification. Implementation of both requirements adds to the exposure requirements of the Cask user without providing a commensurate increase in

public safety. In addition, revise Specifications 1.3.1 and 1.3.2 to show that the requirements of these Specifications apply to "HSM or HSM-H".

- Update Table 1.3.1 to reflect the changes as described above as applicable.

- Revise the Captions of Tables and Figures to delete underline, as applicable. This is a format change which makes the appearance of the document consistent. No change to the contents of the Specification.

2.2 Changes to NUHOMS® FSAR, Revision 8

Attachment C of this submittal includes a new FSAR Appendix P which has been prepared in a format consistent with the Standard Review Plan for Dry Cask Storage (NUREG 1536). It provides a description of the design features and a comprehensive evaluation of the new 24PTH system. It also documents the changes where applicable to the existing safety analyses provided in the FSAR.

Revision 1 to Appendix P reflects the SAR changes due to RAI responses. Table 1 of this Attachment A provides a listing of some minor additional changes implemented in Revision 1 of this application.

3.0 JUSTIFICATION OF CHANGE

The NUHOMS®-24PTH System design has been developed based on research and development efforts driven by the needs of the commercial nuclear power industry. TN is in discussions with two utilities for dry storage systems using the 24PTH system. To support the needs of these utilities, fabrication of the 24PTH canisters is planned to begin in early 2004 to support initial use in mid 2005. Accordingly, TN requests that the staff assign appropriate priority for review of this application consistent with the issuance of an RAI, if needed, by February 2004.

4.0 EVALUATION OF CHANGE

TN has evaluated the NUHOMS®-24PTH system for structural, thermal, shielding, confinement and criticality adequacy and has concluded that the addition of the NUHOMS®-24PTH System to the standardized NUHOMS® System has no significant effect on safety. This evaluation is documented in Appendix P of the FSAR (Attachment C).

ATTACHMENT B

Suggested Changes to Technical Specifications of CoC 1004 Amendment No. 7

The NUHOMS®-32PT is designed for unirradiated fuel with an initial fuel enrichment of up to 5.0 wt. % U-235 as shown in Table 1-1g, taking credit for Poison Rod Assemblies (PRAs), poison plates, and soluble boron in the DSC cavity water during loading operations. The required number of PRAs as a function of assembly class and maximum initial enrichment is per Table 1-1g. The required PRA locations are per Figures 1-5, or 1-6 or 1-7. Table 1-1h specifies the minimum B10 content for poison plates. Specification 1.2.15a defines the requirements for boron concentration in the DSC cavity water for the NUHOMS®-32PT design only.

The NUHOMS®-24PHB is designed for unirradiated fuel with an assembly average initial enrichment of less than or equal to 4.5 wt. % U-235 as shown in Table 1-1i, taking credit for soluble boron in the DSC cavity water during loading operations. Specification 1.2.15b defines the requirements for boron concentration in the DSC cavity water for the NUHOMS®-24PHB design only.

The NUHOMS®-24PTH is designed for unirradiated fuel with an assembly average initial enrichment of less than or equal to 5.0 wt. % U-235, as shown in Table 1-1l, 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, as shown in Table 1-1p for intact fuel and Table 1-1q for damaged fuel. The 24PTH DSC basket is designated as Type 1, if it is provided with aluminum inserts and Type 2 if it does not contain the aluminum inserts. Each basket type is designed with three alternate configurations, based on the boron content in the poison plates, as listed in Table 1-1r. The specification for the Metal Matrix Composite (MMC) for the 24PTH poison plates is provided in Table 1-1s. Specification 1.2.15c defines the requirements for boron concentration in the DSC cavity water as a function of the DSC basket type for the various fuel classes authorized for storage in the 24PTH DSC for the NUHOMS®-24PTH design only.

The thermal design criterion of the fuel to be stored is that the total maximum heat generation rate per assembly and BPRA or Control Components be such that the fuel cladding temperature is maintained within established limits during normal and off-normal conditions. For the NUHOMS®-24P, 52B and 61BT systems, fuel cladding temperature limits were established based on methodology in PNL-6189 and PNL-4835. For the NUHOMS®-32PT, 24PHB and 24PTH systems, fuel cladding limits are based on ISG-11, Rev. 2 (Reference 3).

The radiological design criterion is that fuel stored in the NUHOMS® system must not increase the average calculated HSM or transfer cask surface dose rates beyond those calculated for the 24P, 24PHB, 52B, 61BT, or 32PT canister full of design basis fuel assemblies with or without BPRAs. The design value average HSM and cask surface dose rates for the 24P and 52B canisters were calculated to be 48.6 mrem/hr

Table 1-1r
B10 Specification for the NUHOMS®*-24PTH Poison Plates*

NUHOMS®-24PTH DSC Basket Type(1)	Minimum B10 Aerial Density, gm/cm²	
	Natural or Enriched Boron Aluminum Alloy / Metal Matric Composite (MMC)	Boral®
1A or 2A	.007	.009
1B or 2B	.015	.019
1C or 2C	.032	.040

(1) *Basket Type 1 contains aluminum inserts in the R45 transition rails of the basket, Type 2 does not contain aluminum inserts.*

Table 1-1s
Specification for the Metal Matrix Composite (MMC) for the NUHOMS®-24PTH Poison Plates

No.	Specification
1	The metal matrix composite shall consist of boron carbide powder in an aluminum alloy matrix.
2	The boron carbide content shall be limited to a maximum 40% by volume.
3	No more than 10 wt % of the boron carbide powder shall be larger than 60 microns.
4	The product shall be at least 98% of theoretical density.
5	The composite final product form shall have the tensile properties: • Minimum yield strength, 0.2% offset: 1.5 ksi • Minimum ultimate strength: 5.0 ksi • Minimum elongation in 2 inches: 1%

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1.2.10 DSC Handling Height Outside the Spent Fuel Pool Building

Limit/Specification:

1. The loaded TC/DSC shall not be handled at a height greater than 80 inches outside the spent fuel pool building.

2. In the event of a drop of a loaded TC/DSC from a height greater than 15 inches: (a) fuel in the DSC shall be returned to the reactor spent fuel pool; (b) the DSC shall be removed from service and evaluated for further use; and (c) the TC shall be inspected for damage and evaluated for further use.

Applicability: The specification applies to handling the TC, loaded with the DSC, on route to, and at, the storage pad.

Objective:

1. To preclude a loaded TC/DSC drop from a height greater than 80 inches.

2. To maintain spent fuel integrity, according to the spent fuel specification for storage, continued confinement integrity, and DSC functional capability, after a tip-over or drop of a loaded DSC from a height greater than 15 inches.

Surveillance: In the event of a loaded TC/DSC drop accident, the system will be returned to the reactor fuel handling building, where, after the fuel has been returned to the spent fuel pool, the DSC and TC will be inspected and for future use.

Basis: The NRC evaluation of the TC/DSC drop analysis concurred that drops up to 80 inches, of the DSC inside the TC, can be sustained without breaching the confinement boundary, preventing removal of spent fuel assemblies, or causing a criticality accident. This specification ensures that handling height limits will not be exceeded in transit to, or at the storage pad. Acceptable damage may occur to the TC, DSC, and the fuel stored in the DSC, for drops of height greater than 15 inches. The specification requiring inspection of the DSC and fuel following a drop of 15 inches or greater ensures that the spent fuel will continue to meet the requirements for storage, the DSC will continue to provide confinement, and the TC will continue to provide its design functions of DSC transfer and shielding.

1.2.13 TC/DSC Lifting Heights as a Function of Low Temperature and Location

Limit/Specification:

1. No lifts or handling of the TC/DSC at any height are permissible at DSC basket temperatures below -20°F inside the spent fuel pool building.

2. The maximum lift height of the TC/DSC shall be 80 inches if the basket temperature is below 0°F but higher than -20°F inside the spent fuel pool building.

3. No lift height restriction is imposed on the TC/DSC if the basket temperature is higher than 0°F inside the spent fuel pool building.

4. The maximum lift height and handling height for all transfer operations outside the spent fuel pool building shall be 80 inches and the basket temperature may not be lower than 0°F.

Applicability: These temperature and height limits apply to lifting and transfer of all loaded TC/DSCs inside and outside the spent fuel pool building.

The requirements of 10 CFR Part 72 apply outside the spent fuel building. The requirements of 10 CFR Part 50 apply inside the spent fuel pool building.

Objective: The low temperature and height limits are imposed to ensure that brittle fracture of the ferritic steels, used in the TC trunnions and shell and in the DSC basket, does not occur during transfer operations.

Action: Confirm the basket temperature before transfer of the TC. If calculation or measurement of this value is available, then the ambient temperature may conservatively be used.

Surveillance: The ambient temperature shall be measured before transfer of the TC/DSC.

Bases: The basis for the low temperature and height limits is ANSI N14.6-1986 paragraph 4.2.6 which requires at least 40°F higher service temperature than nil ductility transition (NDT) temperature for the TC. In the case of the standardized TC, the test temperature is -40°F; therefore, although the NDT temperature is not determined, the material will have the required 40°F margin if the ambient temperature is 0°F or higher. This assumes the material service temperature is equal to the ambient temperature.

The basis for the low temperature limit for the DSC is NUREG/CR-1815. The basis for the handling height limits is the NRC evaluation of the structural integrity of the DSC to drop heights of 80 inches and less.