May 03, 2004

Mr. U. B. Chopra
Licensing Manager
Transnuclear Inc.
39300 Civic Center Drive, Suite 280
Fremont, CA 94538-2324

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE NUHOMS®-24PTH SYSTEM (TAC NO. L23653)

Dear Mr. Chopra:

By letter dated September 19, 2003, Transnuclear Inc. (TN) submitted an amendment request to the U.S. Nuclear Regulatory Commission (NRC) for Certificate of Compliance (CoC) No. 1004. This amendment, Amendment No. 8, proposes the addition of the NUHOMS®- 24PTH system to the Standardized NUHOMS® storage system. On December 9, 2003, you were notified that the NRC staff had completed its acceptance review of your application and that your application contained sufficient information for staff to perform a detailed technical review. We also provided a proposed schedule for completing the technical review of your application.

The staff has determined that further information is needed to complete its technical review. The information requested is listed in the enclosure. Your response should be provided by July 5, 2004. If you are unable to meet this deadline, you must notify us in writing, at least two weeks in advance, of your new submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 72-1004 and TAC No. L23653 in future correspondence related to this licensing action. If you have any questions, please contact me at (301) 415-1396.

Sincerely,

/RA/
L. Raynard Wharton, Project Manager
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1004
TAC No. L23653

Enclosure: Request for Additional Information

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TRANSNUCLEAR INC.

DOCKET NO. 72-1004

REQUEST FOR ADDITIONAL INFORMATION

RELATED TO THE NUHOMS®-24PTH SYSTEM AMENDMENT

By application dated September 19, 2003, Transnuclear Inc. (TN) requested approval of an amendment to Certificate of Compliance (CoC) No. 1004, regarding the addition of the NUHOMS®- 24PTH system to the Standardized NUHOMS® storage system. This amendment incorporates several new or modified features: three alternate dry shielded canister (DSC) configurations, two alternate basket designs (with or without aluminum inserts), a modified horizontal storage module (HSM-H), and a transfer cask with a optional modified top lid (OS197FC TC). The 24PTH is designed to store 24 intact (or 12 damaged and balance intact) PWR fuel assemblies with a maximum assembly average initial enrichment of 5.0 weight % U-235; an assembly average burnup of up to 65,000 MWd/MTU; a minimum cooling time of 3.0 years; and a maximum heat load of 40.8 kW.

This request for additional information (RAI) identifies additional information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the amendment. The requested information is listed by chapter number and title in the applicant's safety analysis report. NUREG -1536, "Standard Review Plan for Dry Cask Storage Systems," was used by the staff in its review of the amendment application.

Each individual RAI section describes information needed by the staff to complete its review of the application and the Safety Analysis Report (SAR) and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

CHAPTER P.1 General Discussion

1-1 Revise the statement on Page P.1-7, Section P.1.2.1.3, second sentence stating, "This external air circulation feature . . . and basket type used in the DSC is 1A, 1B, or 1C. . ." It seems that the external air circulation feature is needed if the basket type used is 2A, 2B, or 2C at maximum heat loads of 31.2 kW per DSC (See Tables on pages P.1-2 and P.3.1-2).

This information is required by the staff to assess compliance with 10 CFR 72.236(f).

1-2 Provide the nominal thickness of major components on Drawing NUH 24PTH-1001 and NUH 24PTH-1002. The "Bill of Material" on these drawings shows only the material type/specification without relevant dimensions such as the thickness. The design details of these drawings show either a maximum or a minimum dimension. The nominal thickness of major components should be specified on the design drawing.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

1-3 Show that adequate radial gap has been provided between the basket assembly and the DSC cavity to accommodate differential thermal expansion and to minimize thermal stresses between components.

Drawing NUH24PTH-1002 shows the DSC outside diameter to be 67.19 inches. With 0.5 inch shell thickness, the DSC cavity inside diameter is 66.19 inches. Drawing NUH24PTH-1003 shows that the basket assembly outside diameter is 65.94 inches. This leaves a total radial gap of only 66.19 - 65.94 = 0.25 inch. Page P.3.4-8 states that, "In the 'radial' direction clearance is provided between the basket outer diameter and DSC cavity inside diameter, and between the poison/aluminum plates and interfacing basket components." Page P.3.4-9 states that the required radial direction clearance is 0.313 inch to insure no interferences with the R90 transition rails and a cold gap of 0.4 inch is provided. Resolve the differences between the required radial gap and the actual gap provided.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

1-4 Show the attachment of the Alternative Door (Drawing NUH-03-7001, Sh. 9) to the HSM-H Module main assembly.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

1-5 Provide the justification for adding Note 2 to Drawing No. NUH-03-8000 per proposed Amendment No. 8. The note states, "Neutron shield relief valve stet pressure of 20 psig mininum (40 psig when used with 24PTH DCS)."

This information is required by the staff to assess compliance with 10 CFR 72.11.

CHAPTER P.2 Principal Design Criteria

2-1 Correct the typographical error on page P.2-17 Section 2.5.1, that states, "The principal design criteria for the NUHOMS® -24PTH DSC are presented in Table P.2-17." It is noted that Table P.2-17 should have been Table P.2-18.

2-2 Revise Table P.2-18 to incorporate the different configurations of the NUHOMS®-24PTH DSC System with the maximum allowable heat load generation rate per DSC. If this is not desirable, provide a separate summary table for the different configuration of the NUHOMS®-24PTH System. The maximum heat load of the stored fuel per DSC should be included in the table for design criteria or provided in a separate summary table.

This information is required by the staff to assess compliance with 10 CFR 72.236(b) and 72.236(f).

CHAPTER P.3 Structural Evaluation

3-1 Provide justification for the alternative to the ASME Code in Table P.3.1-2, Section NG-3352. The fusion (spot) or plug type welds between the stainless steel fuel insert plates (straps) and the stainless steel fuel compartments are qualified based on testing. To meet the 36 kips capacity requirements, the capacity of the welded connection is determined from the individual specimen test result times the number of welds on each side of the tube. The size of the fusion (spot) or plug welds and the total number of welds per each side of the tube are not shown. Furthermore, it is not clear that shearing

force will be evenly shared by all spot welds. If the shearing force is not evenly shared, some spot welds may fail first and create a domino effect leading to failure of all spot welds and the welded connection.

This information is required by the staff to assess compliance with 10 CFR 72.236.

3-2 Provide the basis to conclude that the maximum weld loads on the welds connecting the steel insert straps and the fuel tubes listed in Table P.3.6-8 are reasonably accurate and conservative.

The application states that, "Loads on the welds connecting the steel insert straps and the fuel compartment tubes are evaluated using the beam element forces obtained from the LS-DYNA analysis." However, the weld loads as shown in Table P.3.6-8 are small when compared to the maximum stresses in the steel straps shown in Table P.3.6-7. Please provide an explanation. Clarify if steel straps and the welds are both included in the LS-DYNA analysis or if only the welds are included.

This information is required by the staff to assess compliance with 10 CFR 72.236.

3-3 Describe the method to identify whether the OS197 FC TC design is based on the OS197H design or the OS197 design. It was stated in Section P.3.4.3 Lifting Devices that, "The maximum critical lift weight with a NUHOMS®-24PTH DSC is approximately 215,000 lbs. Therefore, an OS197 FC TC that is based on the OS197H design is acceptable with any NUHOMS®-24 DSC. An OS197FC TC that is based on the OS197 design is limited to a total critical lift weight of 208,500 lbs." It is not clear how to identify which design the OS 197 FC TC is based on.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

3-4 Provide an explanation for the discrepancy between Section P.3.7.4.2.1 DSC Shell Assembly Horizontal Drop Analysis and Section P.3.7.4.2.3 DSC Shell Assembly Stress Analysis. Section P.3.7.4.2.1 states that, "Elastic-Plastic analyses are performed and stresses are determined for each DSC shell assembly component." However, Section P.3.7.4.2.3, states that, "Equivalent static linear elastic analysis is conservatively used for drop analyses." These two statements are not consistent.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

3-5 The application states that thermal effects on material stiffness (E) and yield stress (S_y) are included in the analysis (See page P.3.7-15). Provide a discussion on how temperature dependent material properties are applied to the finite element model and analysis.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

CHAPTER P.4 Thermal Evaluation

4-1 Provide the basis for the use of Final Safety Analysis Report (FSAR) Section M.4.9 neutron shield effective thermal properties for transfer cask analyses at high heat loads. If necessary, update the transfer cask thermal analyses.

The FSAR Section M.4.9 effective thermal properties were computed for a heat load of 24 kW. The higher heat loads associated with this amendment may significantly affect the thermal properties.

This information is required by the staff to assess compliance with 10 CFR 72.236(f).

4-2 Provide additional basis such as confirmatory calculations (using methodologies validated against similar geometries and heat loads) or test results to justify the effective thermal conductivity of air in the HSM for the blocked vent accident analysis.

The correlation used in the SAR to estimate the conductivity employs a simplified model of a cylinder within a cylinder. Validation of this model is necessary due to the significant differences between the correlation and model geometries. NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems" (SRP), Section 4.V states that the staff “should assess models used by the applicant for thermal analysis.”

This information is required by the staff to assess the adequacy of the cask system heat removal capacity in compliance with 10 CFR 72.236(f).

4-3 Clarify the disposition of the fuel for the blower’s redundant power supply on the transfer cask skid.

Additional fuel must be accounted for in the fire accident analysis. In addition, SRP Section 4.V.4.a requires staff to verify that the model used in the thermal evaluation is clearly described.

The information is required by the staff to assess compliance with 10 CFR 72.236(f).

4-4 Describe how applicable ANSYS Class 3 error reports for Version 6.0 have been addressed regarding the thermal analyses.

For example, two error reports, 2002-9 (edge convection and flux loads) and 2002-11 R1 (film coefficients), describe situations that could lead to significant errors in ANSYS thermal models.

This information is required by the staff to assess compliance with 10 CFR 72.236(f).

4-5 Provide details of why component temperatures are bounded as addressed in Table P.4-15, footnote 2, Table P.4-16, footnote 1, and Table P.4-21, footnote 1.

It is not clear from the text and corresponding footnotes why these temperatures are bounded.

This information is required by the staff to assess compliance with 10 CFR 72.236(f).

4-6 Correct apparent inconsistencies in Tables P.4-3 and P.4-4.

The titles of these tables state that “Normal and Off-normal” cases are presented. The actual tables only present results for Off-normal cases.

This information is required by the staff to assess compliance with 10 CFR 72.11.

CHAPTER P.5 Shielding Evaluation

5-1 Provide the following information regarding source term estimates:

(a) Specify in Section P.5.2, numerically, the expected error in source term estimates for actinides and fission products important to radiological protection (e.g.,Cs-134 and Cm-244), and source term estimates for actinides and fission products important for total decay heat for the high burnup fuels requested in the amendment.

(b) Justify why high burnup source term uncertainties are not applied in the new shielding and thermal analyses.

This amendment requests a significant increase in radiological and thermal source terms. Calculation uncertainties in the source term methodology may now have a greater impact on doses and cask temperatures, with respect to radiological and thermal safety margins present in the currently approved design. A sensitivity analysis may be a method to illustrate the effect of uncertainties on radiological and thermal safety margins.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236(d) and (f).

5-2 Demonstrate that gamma doses from energies above 3.0 MeV are insignificant for cooling times less than 5 years.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236(d).

5-3 Provide the following information regarding the neutron source spectrum used in the shielding analysis:

(a) Confirm that ^{244}Cm accounts for the majority of the total neutron source for the new high burnup fuel, and for the fuel with cooling times less than 5 years.

(b) Clarify if there are any additional uncertainties in the neutron source spectrum with respect to the source term evaluation for fuel cooled less than 5 years.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236(d).

CHAPTER P.10 Radiation Protection

10-1 Clarify whether the evaluation of off-site dose estimates includes the contribution from bounding non-fuel hardware. If not, revise Section P.10 to specify how a general licensee should incorporate non-fuel hardware contributions into its site-specific evaluations under 10 CFR 72.212.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236(d).

CHAPTER P.12 Technical Specifications

12-1 Technical Specification 1.2.16 states that: " The determination of horizontal acceleration acting at the center of gravity (CG) of the loaded TC must be based on a peak horizontal ground acceleration at the site, but shall not exceed 0.25g." Chapter P.2, Section P.2.2.3 Seismic Design, stated that: "The seismic design criteria for the HSM-H is consistent with the criteria set forth in Section 3.2.3, with the exception that the NRC Regulatory Guide 1.60 response spectra is anchored to a maximum ground acceleration of 0.30g (instead of 0.25g) for the horizontal components. . . " Provide the basis for the different seismic design criteria used for the design of HSM-H system and the TC.

This information is required by the staff to assess compliance with 10 CFR 72.236(b).

12-2 Clarify the meaning of the term "cask" in Tech Spec 1.2.16, under "Action." Does the term "cask" mean a loaded TC? Explain the significance of the "cask weight." What will happens if the cask weight is less than 190 kips?

This information is required by the staff to assess compliance with 10 CFR 72.236(b).