October 22, 2007

Mr. Donis Shaw
Licensing Manager
Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF AMENDMENT 11 TO THE STANDARDIZED NUHOMS® SYSTEM (TAC NO. L24080)

Dear Mr. Shaw:

By letter dated April 10, 2007, Transnuclear Inc. (TN) submitted an amendment request to the U.S. Nuclear Regulatory Commission (NRC) for Certificate of Compliance (CoC) No. 1004. This amendment proposes to include the following changes to the Standardized NUHOMS® storage system:

- Convert the Technical Specifications (TS) to the format contained in NUREG-1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance."

- Certain aspects associated with the light-weight transfer cask designated as the OS-197L.

On May 23, 2007, you were notified that the NRC staff had completed its acceptance review of your application and that your application contained sufficient information for the 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 December 21, 2007. 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.

The staff believes that given the nature and the complexity of the request for additional information (RAIs) that a public meeting is warranted in order to answer any questions that you may have about the RAIs so that you can determine how best to respond to the RAIs. I will work with you to schedule a meeting at the earliest convenient time.

As you are aware, the staff sent Omaha Public Power District a letter on October 9, 2007, regarding the schedule associated with the Amendment 11 review (see ADAMS accession number ML072780050). Based on the attached RAIs, the staff reaffirms its observation in the October 9, 2007, letter that it does not appear that having Amendment 11 changes codified in the regulations by November 2008 is feasible unless the Amendment is modified.

Please reference Docket No. 72-1004 and TAC No. L24080 in future correspondence related to this licensing action. If you have any questions, please contact me at (301) 492-3325.

Sincerely,

/RA/

Joseph M. Sebrosky, Senior Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1004
TAC No. L24080

Enclosure: Request for Additional Information

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Enclosure: Request for Additional Information

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OFC:	**SFST**	**C**	**SFST**	**C**	**SFST**	**C**	**SFST**		**SFST**		**SFST**		**SFST**	
NAME:	JSebrosky		WWheatley		BShewmaker		JSmith		SHelton		CBajwa		EThompson	
DATE:			10/16/07		10/17/07		10/17/07		10/17/07		10/18/07		10/17/07	

OFC:	**SFST**	**C**	**SFST**	**C**	**SFST**	**C**	**SFST**	**C**	**SFST**		**SFST**		**SFST**	
NAME:	REinziger		RTemps		RParkhill		CRegan		LCampbell		MWaters		RNelson	
DATE:	10/17/07		10/17/07		10/17/07		10/17/07		10/17/07		10/19/07		10/22/07	

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TRANSNUCLEAR INC.

DOCKET NO. 72-1004

REQUEST FOR ADDITIONAL INFORMATION

RELATED TO AMENDMENT 11 TO THE

STANDARDIZED NUHOMS® SYSTEM

By application dated April 10, 2007, Transnuclear Inc. (TN) requested approval of an amendment to Certificate of Compliance (CoC) No. 1004. This amendment proposes to add several items to the CoC including:

- Convert the Technical Specifications (TS) to the format contained in NUREG-1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance."

- Certain aspects associated with the light-weight transfer cask designated as the OS-197L.

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 staff's draft safety evaluation 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 1 General Information

1-1 Update the Certificate of Compliance, the Technical Specifications and the Safety Analysis Report for the Standardized NUHOMS® Amendment 11 application to reflect changes that are being made to Amendment 10 to the Standardized NUHOMS® design.

The Amendment 11 application is based on the proposed Amendment 10 application being approved. The staff issued a request for additional information (RAI) associated with Amendment 10 on August 29, 2007 (see ADAMS accession number ML072410348). The staff believes that these RAIs will lead to changes in the Standardized NUHOMS® Safety Analysis Report and to the Technical Specifications and Certificate of Compliance. Because Amendment 11 is based on Amendment 10, the application for Amendment 11 should be updated to reflect the changes made to the Amendment 10 application.

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

Enclosure

CHAPTER 2 Structural Evaluation

Note: RAI 2-1 through 2-3 apply to the structural review of the General Description of the Updated Final Safety Analysis Report (UFSAR)

2-1 Identify and describe Appendix V that is referenced on proposed UFSAR Page 7.1-1.

References in the UFSAR to other portions of the final safety analysis report should be to information that is currently available and not be to something that may be provided in the future.

This information is needed to confirm compliance with 10 CFR 72.11.

2-2 Provide justification for the omission of detailed drawings of the Trailer Shielding that is classified in Table W.2-1 as Important to Safety. In addition, provide information regarding the design conditions that apply to these shielding structures and components.

Figure W.1-3 and the text on Page W.1-3 indicate that a portion of the shielding is permanently mounted to the cask support skid and that additional shielding plates can be bolted to the skid to provide additional skid shielding in the bottom area of the skid. The top area of the skid shielding is provided by two separate "lid" type structures that are apparently attached to the cask support skid with a "leg and slot" configuration near the four corners.

This information is needed to confirm compliance with 10 CFR 72.11.

2-3 Provide drawings in Section W.1.5 comparable to those for the transfer cask for the Important to Safety trailer shielding that is identified and classified with respect to safety in Table W.2-1. (See also RAI 5-1)

Figures W.1-3 and W.1-4 provide a general overview of the additional shielding that is to be used with the OS197L transfer cask (TC), however only material thicknesses are provided. Other dimensional details and interface connections with the trailer assembly are not provided.

This information is needed to confirm compliance with 72.236(d).

Note: RAI 2-4 applies to the structural review of the principal design criteria

2-4 Identify the design criteria that are to be used for environmental conditions and natural phenomena design conditions for the skid/trailer additional shielding noted in Section W.1.1 as being required with the use of the OS197L TC system.

While Section W.2.2 states for the OS197L TC system that, " The environmental conditions, natural phenomena and design criteria are the same as described for the NUHOMS OS197 TC in Chapter 3, Section 3.2.5.3 only addresses the TC design based

on the ASME Code, Subsection NC for Class 2. Additional required shielding for use on the skid/trailer is not addressed.

This information is needed to confirm compliance with 10 CFR 72.236(b).

Note: RAIs 2-5 and 2-6 apply to the structural review of the installation design

2-5 Identify the material properties of the aluminum material that is to be used in the design and fabrication of the interim aluminum lid of the OS197L TC that can be used during the transfer from the decontamination area to the transfer trailer and the downending operations.

Section W.3.4 indicates that the material properties for the OS197L TC are specified in Section 8.1, Table 8.1-3, however there is no information contained therein for aluminum.

This information is needed to confirm compliance with 10 CFR 72.236(b).

2-6 Provide the comparable information for the interim aluminum cask top lid (cover) that is contained in Tables 8.2.21 through 8.2.23 that reflect the stress analysis results for the stainless steel top lid (cover) relative to the design load conditions listed in Table 3.2-7 and relevant stress criteria comparable to Table 3.2-11.

No information relative to the analyses of the OS197L for the conditions that could exist when the interim aluminum top lid (cover) for the cask is in use appear to be provided.

This information is needed to confirm compliance with 10 CFR 72.236(b).

Note: RAI 2-7 applies to the structural review of the conduct of operations

2-7 Identify both limiting conditions relative to water removal from the dry shielded canister (DSC) just prior to the OS197L TC being lifted from the fuel pool.

The current statement on Page W.8-4 addresses the maximum limit of water to be removed, however the minimum amount (that which will allow the limit of a single-failure proof crane to not be exceeded) is not included in the statement. Both conditional limits should be defined.

This information is needed to confirm compliance with 10 CFR 72.11.

Note: RAI 2-8 through 2-11 apply to the structural review of the technical specifications

2-8 Specify the ASME B&PV Code, Section III, Division 1 edition and the relevant addenda that are to be used in the design and fabrication of the DSCs and the TCs utilizing the Subsections identified in the proposed Technical Specifications in Sections 4.2.2 and 4.2.3.

As proposed these specifications do not identify the year of the Code edition or the addenda that apply. If there is a variation in the Code edition or addenda that apply to

the various models of the DSCs and TCs then a listing should be used to identify the specific model with the Code edition and relevant addenda. Since these Technical Specifications are intended to be Standard Technical Specifications for the Standardized NUHOMS System, they should be consistent with the guidance provided in NUREG-1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance." As proposed the Technical Specifications are not consistent with Section 4.2, Codes and Standards of that document.

This information is needed to confirm compliance with 10 CFR 72.236(b).

2-9 Identify any alternatives to the governing codes for the design of the cask system and the individual components that are referenced in the proposed Technical Specifications in Sections 4.2.2 and 4.2.3.

As proposed these specifications do not provide any alternatives to the ASME Boiler and Pressure Vessel Code, Section III, that is referenced as the code of record for the cask system. Since these Technical Specifications are intended to be Standard Technical Specifications for the Standardized NUHOMS System, they should be consistent with the guidance provided in NUREG-1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance." As proposed the Technical Specifications are not consistent with Section 4.2, Codes and Standards, of that document.

This information is needed to confirm compliance with 10 CFR 72.236(b).

2-10 Justify the omission in the proposed Technical Specifications of an important site foundation consideration that should be made by the user of the cask system that appears to be missing from Section 4.3.3, Site Specific Parameters and Analyses.

As proposed these specifications address the considerations that must be made for potential foundation conditions relevant to liquefaction, but do not address the foundations of sites where soil-structure interaction may be considered important to the response of the storage pad. The response may be such as to require that an amplified response spectra will be produced at the center of gravity of the supported horizontal storage module.

This information is needed to confirm compliance with 10 CFR 72.236(b).

2-11 Correct the omission of an Important to Safety component, the trailer shielding, identified in Table W.2-1, of the OS197L TC system from Section 4.2, Codes and Standards.

As proposed these specifications do not address the trailer shielding structural design criteria or the fabrication standards that are to be used for this component of the OS197L TC system.

This information is needed to confirm compliance with 10 CFR 72.236(b).

CHAPTER 3 Thermal Evaluation

Note: RAI 3-1 and 3-2 are general thermal evaluation questions

3-1 Review and apply all appropriate RAI questions received for Amendment 10 to the NUHOMS system that also apply to the Amendment 11 application. (Note: The Amendment 10 RAIs are contained in an August 29, 2007, letter (ADAMS accession number ML072410348))

The applicant should carefully evaluate whether the thermal issues identified for the transfer cask and storage designs in Amendment 10 apply to the OS197L transfer cask system and proposed changes to technical specifications in Amendment 11.

This information is needed to satisfy the provisions of 10 CFR 72.11

3-2 Provide a discussion of off-normal events and operational anomalies that could impact the thermal condition of the DSC/TC during transfer operations. These may include (but are not limited to) crane hangup, failure of remote handling equipment, etc. If necessary, provide a thermal analysis of the DSC/TC that demonstrates fuel cladding temperatures remain within applicable limits during these events.

As discussed in RAI question 5-49(b), there are many potential operational occurrences that could affect the DSC/TC during loading and transfer operations. None of these potential occurrences appear to have been evaluated in the SAR for their potential thermal impact on the thermal performance of the components of the DSC/TC system, including fuel cladding.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.2.36(f).

Note: RAI 3-3 and 3-4 apply to SAR Appendix W Chapter 8, “Operating Procedures”

3-3 Provide a thermal analysis of DSCs for which procedures instruct operators to drain water from the DSC following removal from the spent fuel pool. Demonstrate that peak fuel cladding temperature limits are not exceeded for the maximum heat loads for the respective DSCs.

Amendment 11 procedures instruct operators to drain DSCs, prior to sealing of the DSC, in order to accommodate removal with cranes that may have a weight limit imposed. The SAR does not provide an analysis of this operating condition. The staff requires such an analysis to have reasonable assurance that fuel cladding temperatures are not exceeded for the DSCs in question.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-4 Provide an analysis and/or detailed discussion of the potential thermal effect of transfer operations that take place when the liquid neutron shield on the TC is drained (for

transfer of the 32PT DSC). Include a discussion of specific instances when the neutron shield would need to be drained.

Chapter W.8, Page W.8-7 discusses the potential for draining of the liquid neutron shield to meet weight requirements for lower capacity handling crane systems. This condition is not analyzed in the SAR, and a discussion of how this condition is bounded by other analyzed conditions has not been provided.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

Note: RAI 3-5 and 3-6 apply to the DSC Transfer Analyses contained in SAR Appendix W Section W.4.1

3-5 Provide a justification for crediting a 100% helium environment in the DSC for the thermal analysis of the cask loading evolution. Add a Technical Specification (TS) that requires the use of helium during DSC blowdown.

Between the removal of the cask from the spent fuel pool, and the completion of the seal weld on the inner lid of the DSC (as described in Chapter 8, for many of the DSC systems), a helium environment is being credited for the thermal analysis. Because the DSC is not leak-tight following the blowdown, there does not appear to be a mechanism to prevent leakage and therefore maintain a 100% helium environment in the DSC. In addition, there is no TS provided to specify the use of helium during blowdown of the DSCs, when the application states that helium is credited (in Section W.4.1) to maintain the fuel cladding below applicable temperature limits.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-6 Provide a sensitivity study of the effective conductivity of the OS-197L transfer cask (TC) liquid neutron shield (NS) for both vertical and horizontal orientations and report the results of fuel and DSC temperatures when the DSC is within the transfer cask. Include a discussion of Nusselt numbers calculated for the NS region of the TC.

Values for the effective conductivity of the liquid neutron shield have a direct impact on fuel cladding temperatures. Derivation of these values take into account the geometry of the neutron shield cavity, the temperature difference across the cavity, and the hydrodynamic properties (such as the Nusselt number) of the fluid within the cavity. There is uncertainty in any derivation of effective properties, and thus, the study of the variation in the properties calculated is warranted. The staff's preliminary confirmatory analyses indicate that the Nusselt number for the neutron shield region of the TC is on the order of 10. The Nusselt number for the shield region will have a direct impact on the effective conductivity calculated for this region. Use of non-conservative conductivity values could lead to an indication of greater heat removal capacity than actually exists in the system. This would lead to an underestimate of the actual DSC and fuel cladding temperatures. A sensitivity study of the impact of this value on the fuel temperature cladding of the DSC will provide the staff with the necessary information to determine if the effective conductivity used for the OS-197L thermal analyses is appropriate.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

Note: RAIs 3-7 through 3-12 apply to the Technical Specifications

3-7 Provide a justification for the removal of the requirement to assess and report the thermal performance of the first DSC placed in service under the applicable amendment (in this case amendment 11). This requirement appears in Amendment 10, TS 1.1.7.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-8 Provide a justification for the removal of the vacuum drying time limits for the 61BT, 32PT, 24PHB, and 24PTH DSCs from the Technical Specifications (TSs). Vacuum drying limits appear in Amendment 10, TSs 1.1.17, 1.1.17a, 1.1.17b, and 1.1.17c.

The staff needs additional technical justification of the thermal performance of DSCs for which vacuum drying time limits are being removed.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-9 Provide a revised definition of TRANSFER OPERATIONS or provide additional clarification of the relationship between TRANSFER OPERATIONS and "time limit for completion of a DSC transfer" in Section 3.1.3 note 3.1-5.

According to Section 1.1, Definitions, (Page 1.1-2) TRANSFER OPERATIONS are defined to "include all licensed activities involving the movement of a TRANSFER CASK loaded with a DSC containing fuel assemblies. TRANSFER OPERATIONS begin when the TRANSFER CASK is placed horizontal on the transfer trailer following LOADING OPERATIONS and end when the DSC is located in an horizontal storage module (HSM) on the storage pad within the ISFSI perimeter."

The note on Page 3.1-5, Section 3.1.3 states: "The time limit for completion of a DSC transfer is defined as the time elapsed in hours after the completion of draining of TC/DSC annulus water and removal of the TC top cover plate for insertion of the DSC into the HSM." This does not appear to agree with the definition given above for TRANSFER OPERATIONS. In addition, these definitions appear to differ from those presented in the NUHOMS Amendment 10 Technical Specifications.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-10 Justify the definition of transfer time provided in the note on Page 3.1-5, Section 3.1.3 Technical Specifications.

The "time limit for completion of a DSC transfer" is defined as the time from completion of the draining of the TC/DSC annulus (in the fuel handing building) to removal of the

TC top cover plate. This implies that the transfer time does not include the time required to maneuver the DSC trailer up into position, perform the final alignment of the DSC with the HSM door, and actually insert the DSC into the module by means of a hydraulic ram. During this interval, the DSC is still within the TC, and is subject to the heat transfer conditions of transit within additional shielding. If the time required to insert the DSC into the HSM is to be considered negligible, this must be justified.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-11 Provide more detailed description of the alternate means of cooling the transfer cask if forced air circulation is unavailable as described in Section 3.1.3 of the Technical Specifications.

If the transfer time limit is exceeded, the list of possible actions that can be taken includes initiating external cooling of the cask by means of forced air circulation, or "by other means". The thermal analyses described in the SAR do not provide details of any other means of cooling the DSC than natural convection or forced air circulation. The SAR does not describe how the effectiveness of these 'other means' will be evaluated or how much more time they would provide before the fuel cladding temperature limit is reached.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

3-12 Clarify the meaning of the transfer time limit as defined in the note on Page 3.1-5, Section 3.1.3 of the Technical Specifications.

"The time limit for completion of a DSC transfer is defined as the time elapsed in hours after the completion of draining of TC/DSC annulus water and removal of the TC top cover plate for insertion of the DSC into the HSM." It is unclear whether this means that the time limit starts from the moment the plug on the annulus drain port is replaced after draining, or if it ends when the last bolt on the TC top cover has been removed. The time taken in the process of removing the TC lid should be included in the time limit (if it is not already), as there will be thermal effects on the DSC, because it is in the transfer cask environment for the full duration of this evolution. A general clarification of exactly when the start and finish of the transfer evolution are would aid the staff.

This information is needed to satisfy the provisions of 10 CFR 72.11 and 10 CFR 72.236(f).

CHAPTER 5 Shielding Evaluation

Note: RAI 5-1 through 5-3 apply to the Certificate of Compliance (CoC)

5-1 Provide materials and nominal dimensions of major radiation shielding features for the various TC designs. The staff believes that this is consistent with the guidance

contained on Page 2 of NUREG-1745, “Standard Format and Content for 10 CFR Part 72 Cask Certificates of Compliance.” (See RAI 2-3)

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

5-2 Add a Condition to the proposed CoC that general licensees using the OS197L TC must handle the bare TC using a single-failure proof crane. The staff believes that lifting the light-weight transfer cask with a non-single failure proof crane could more likely lead to scenarios that are hard to recover from without exceeding occupational dose limits.

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

5-3 Revise CoC Condition 3.d, "Basic Components," to list the supplemental shielding (for the OS197L TC) on the transfer trailer and in the decontamination area as important to safety. This is consistent with other important to safety equipment that is listed in this CoC Condition. Additionally, SAR Table W.2-1 classifies the trailer shielding as important to safety.

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

Note: RAI 5-4 through 5-14 apply to the Technical Specifications

5-4 Clarify the definition of TRANSFER CASK.

The technical specifications define the TRANSFER CASK (TC) as the "...TC (Standardized TC, OS197, OS197H, OS197L, OS197FC, OS197FC-b, OS200, OS200FC TC or other models enveloped by these designs)..." Delete the text "or other models enveloped by these designs". Additionally, add text describing the supplemental shielding that must be used with the OS197L TC. Also specify which DSCs may be used in each TC.

This information is necessary to verify compliance with 10 CFR 72.11.

5-5 Clarify the definitions of LOADING OPERATIONS and TRANSFER OPERATIONS.

Specify whether LOADING OPERATIONS or TRANSFER OPERATIONS include down-ending of the TC onto the transfer trailer. Clarify whether there is a period of time that may exist between the end of LOADING OPERATIONS and the beginning of TRANSFER OPERATIONS (i.e., revise the definition of TRANSFER OPERATIONS to include down-ending of the transfer trailer.) Preferably, no such period of time may exist.

This information is necessary to verify compliance with 10 CFR 72.11. Also see the guidance in NUREG-1745.

5-6 Revise TS 4.3 to require the system user to perform the verifications and evaluations in accordance with 10 CFR 72.212.

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

5-7 Revise TS 4.4 to specify the following (or other appropriate technical specifications):

a. Specify that a single-failure proof crane must be used for all movements of the bare OS197L TC and its supplemental shielding. If this is not specified in the TS, an accident analysis must be presented in Chapter W.11 analyzing drops of the supplemental shielding (in both the decontamination area and on the trailer) on the OS197L TC.

b. Section W.5.3 states that, during normal operations, use of the OS197L TC is not expected to have any significant adverse impact on personnel dose rates since crane operations will be performed remotely. Specify in TS 4.4 that remote operations, including the use of a laser/optical targeting system and cameras for confirmation of the cask location without the need for personnel in the vicinity of the cask, are to be used at all times that the OS197L TC is not shielded by temporary shielding (e.g., during the lift from the pool to the decontamination area, and also during transfer from the decontamination area to the transfer trailer). Additionally, specify that users of the OS197L TC must have contingency procedures in place, prior to loading the OS197L TC with fuel, in case of failure of the remote operations. (See RAI 5-42)

c. Provide specifics (such as condition of use, design criteria, and operational parameters) regarding the use of the decontamination area and trailer supplemental shielding for the OS197L TC. State that this shielding must be used at all times that remote operations are not in use.

d. Chapter W.8 indicates that an interim cask cover may be installed on the OS197L TC during downending. Revise TS 4.4 to address the conditions under which the interim cask cover may be used (state that the interim cask cover may not be used unless necessary due to weight constraints), and state that the interim cask cover must be replaced with the standard cask top cover. If necessary, due to the dose analysis of the interim cask cover, specify a time limit for how long the interim cover may be installed.

e. Chapter W.8 indicates that placement of the outer trailer shield may be delayed for some period of time, due to load limits within the building. Revise TS 4.4 to address the conditions under which the placement of the outer trailer shield may be delayed (state that the placement of the outer trailer shield may not be delayed unless building load limits would be exceeded). Specify a time limit, based on the surface and 100-meter dose rates (see RAI 5-31) for completing placement of the outer trailer shield once the trailer exits the building.

f. If a period of time may exist between LOADING OPERATIONS and TRANSFER OPERATIONS, specify that the OS197L TC must be either shielded by temporary shielding or used in conjunction with remote operations during this time. Preferably, no such space of undefined time would exist between LOADING OPERATIONS and TRANSFER OPERATIONS (see RAI 5-5).

g. Include the caution on Page W.8-11 regarding monitoring of the outer top trailer shield vents and the openings around the cask ends for signs of steaming. Include a time limit for taking the appropriate corrective actions.

This information is necessary to assure compliance with 10 CFR 72.236.

5-8 Revise TS 5.2.2 to include the loading operations as described in Chapter W.8.

Several loading operations chapters are listed in TS 5.2.2; however, those described in Chapter W.8 have been omitted. Revise TS 5.2.2 to include the loading operations as described in Chapter W.8.

This change is necessary to satisfy the requirements of 10 CFR 72.11.

5-9 Revise the dose assessment described by TS 5.2.4(a) to address the following:

a. Account for occupational exposures during TRANSFER OPERATIONS and any period of time that may exist between LOADING OPERATIONS and TRANSFER OPERATIONS (see RAI 5-5)

b. Account for occupational and public exposures from off-normal and accident conditions

c. An ALARA assessment to verify that licensee use of the OS197L (versus upgrading the crane) is consistent with ALARA principles. TS 5.2.4(a) should specify that the ALARA assessment should include assessment of occupational and public exposures associated with (but not necessarily be limited to) the following:

1. normal and off-normal conditions
2. malfunction of remote handling equipment
3. crane hang-up during movement of OS197L from the spent fuel pool to the decontamination area
4. crane hang-up during movement of OS197L from the decontamination area to the transfer trailer
5. surface and 100-meter dose rates on the transfer trailer without the outer trailer shielding in place
6. worker doses associated with use of the interim cask cover
7. worker doses associated with visual inspection off the openings at the top and bottom of the decontamination area

e. Assess whether use of the OS197L (in normal, off-normal, or accident conditions) may set off radiation alarms in the fuel handling building

f. Assess whether use of the OS197L (in normal, off-normal, or accident conditions) may impact any plant operations requiring access to the fuel handling building or other locations at the facility critical to protecting public health and safety, including the control room.

g. Add a discussion of the remote operations that must be used with the OS197L TC. Specify when remote operations must be used, whether redundant trains of equipment are necessary, and whether there are any quality standards for the remote handling equipment.

These changes are necessary to ensure compliance with 10 CFR 72.236(d).

5-10 Revise TS 5.2.4.d to require the check of the smearable surface contamination levels to occur prior to welding the DSC.

TS 5.2.4.d indicates that if the surface contamination levels are not met, the user is to "...remove the fuel assemblies from the DSC and put them back in the fuel pool..." If the user may need to remove the fuel assemblies, the smearable surface contamination levels should be checked prior to welding the DSC. Additionally, an early check of the surface contamination levels will help to ensure that occupational doses remain ALARA.

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

5-11 Revise TS 5.3.1 to clarify the applicability of 10 CFR Parts 50 and 72.

TS 5.3.1 states "The requirements of 10 CFR Part 72 apply outside the FUEL BUILDING. The requirements of 10 CFR Part 50 apply inside the FUEL BUILDING." Clarify that this statement is only valid with respect to lifting/handling height limits.

This revision is necessary to ensure compliance with 10 CFR 72.11.

5-12 Revise TS 5.3.2 to address drops of the supplemental shielding for the OS197L TC.

Revise the technical specification to address required inspections of the DSC after drops of the supplemental shielding onto the OS197L TC.

This revision is necessary to comply with 10 CFR 72.236.

5-13 Justify why TS 5.4.1 allows the HSM front surface dose rate limits to be measured at 3 feet from the HSM front surface. Similarly, justify why no dose rate limit is specified on the HSM front surface for the 24P, the 52B, and the 61BT DSCs in TS 5.4.2.

TS 5.4.1 states that the HSM front surface dose rates may be measured at 3 feet from the HSM front surface. Table 5.4.2 provides HSM front surface dose rate limits for all DSC models excepting the 24P, the 52B, and the 61BT. As stated in the guidance provided in NUREG-1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance," the administrative controls are to include a cask loading, unloading and preparation program that establishes criteria that need to be verified to address FSAR commitments and regulatory requirements. These criteria include surface dose rates to assure proper loading and consistency with the offsite dose analysis.

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

5-14 Revise TS 5.4.3 to indicate that each of the actions described in 5.4.3 (a-c) should be taken to achieve compliance.

TS 5.4.3.a states, "Ensure proper installation of the HSM door, or" and TS 5.4.3.b states "Administratively verify ..., or." The corresponding Amendment 10 technical specification (TS 1.2.7) does not contain the "or" logic for each of these actions. Each action should be performed to ensure compliance with the technical specification. Additionally, consider revising TS 5.4.3.a to instruct the user to check for streaming after ensuring proper installation of the HSM door.

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

Note: RAI 5-15 through RAI 5-17 apply to the main safety analysis report Chapters

5-15 Clarify the description of the on-site TC in Sections 3.1.2.1, 4.2.3.3, and 4.7.3.2. Clarify other sections that describe the on-site TC, as necessary.

Section 3.1.2.1 describes the on-site TC as providing "neutron and gamma shielding adequate for biological protection at the outer surface of the cask." This statement does not apply to the OS197L TC, which must be used in conjunction with remote handling and additional shielding to provide adequate biological protection.

Section 4.2.3.3 states "the transfer cask provides the principal biological shielding ... for the DSC and SFAs during handling in the fuel/reactor building, DSC closure operations, transport to the ISFSI, and transfer to the HSM." This statement does not apply to the OS197L, which relies on the use of remote operations in conjunction with supplemental shielding during handling, transport, and transfer operations to provide biological shielding.

Section 4.2.3.3 states "The transfer cask may be fitted with a shielded collar to extend the cask cavity length to accommodate the longer NUHOMS -52B DSC..." However, Appendix W (which describes the OS197L TC and lists the NUHOMS -52B DSC as a DSC that the OS197L is designed to accommodate) does not address use of the shielded collar. Clarify whether the statement in Section 4.2.3.3 applies to the OS197L TC.

Section 4.2.3.3 states "The transfer cask is constructed from three concentric cylindrical shells to form an inner and outer annulus. These are filled with lead..." This description is not applicable to the OS197L TC, which does not contain any lead.

Section 4.7.3.2 states "The [transfer] cask's cylindrical walls are formed from three concentric steel shells with lead poured between the inner liner and the structural shell to provide gamma shielding during DSC transfer operations." This description is not applicable to the OS197L TC, which does not contain any lead.

This information is necessary to ensure compliance with 10 CFR 72.11.

5-16 Justify that the design and use of the OS197L TC is consistent with ALARA principles. (See RAI 8-5)

The conclusion that use the design of the NUHOMS DSC and HSM comply with ALARA requirements is predicated on the following statements in Section 7.1-2:

"Features of the NUHOMS system design that are directed toward ensuring ALARA are ... Use of a heavy shielded transfer cask for DSC handling and transfer operations to ensure that the dose to plant and ISFSI workers is minimized."

"Fuel loading procedures which follow accepted practice and build on existing experience."

These statements are not applicable to the OS197L TC, which is not heavily shielded, and relies on the use of remote operations in conjunction with supplemental shielding in order to minimize dose to plant and ISFSI workers. Therefore, the design and use of the OS197L appears to contradict conclusions reached in Section 7.1.2 that ALARA principles are followed.

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

5-17 Revise SAR Chapter 10 to provide a cross-reference index of the technical specification bases in the Amendment 10 CoC and their current location in the SAR that supports Amendment 11 to CoC 1004.

The location of all the information previously included in the Tech Spec bases is not easily determined in the revised SAR.

This information is necessary to verify compliance with 10 CFR 72.11.

Note: RAI 5-18 through 5-55 apply to SAR Appendix W of the Amendment 11 application.

Note: RAI 5-18 through RAI 5-22 apply to Chapter 1, “General Description” of SAR Appendix W.

5-18 Clarify which DSCs may be loaded into the OS197L TC.

a. Clarify whether the OS197L TC accommodates the NUHOMS -52B DSC. Section 4.2.3.3 states "The transfer cask may be fitted with a shielded collar to extend the cask cavity length to accommodate the longer NUHOMS -52B DSC..." However, Appendix W does not address use of the shielded collar.

b. Reconcile the apparently conflicting statements: Chapter W.1 states that the OS197L TC accommodates the 24P, 52B, 24PT2, 61BT, 32PT, and 24PHB DSCs. However, the statements on Pages W.3-1, W.4-1, and W.5-1 indicate that the OS197L TC accommodates "DSCs currently licensed under CoC 1004," which includes other DSC designs not listed in Chapter W.1.

This information is necessary to ensure compliance with 10 CFR 72.11.

5-19 Clarify Section W.1.2 regarding the general description of the TC.

Section W.1.2 states, "The OS197L TC ... provides shielding and protection from potential hazards during the DSC fuel loading/unloading operations..." However, the OS197L TC does not provide shielding and protection unless it is used in conjunction with remote handling operations and supplemental shielding. Further, this section references Figure W.1-1, which shows the OS197L TC. This figure does not show the additional shielding that must be used in the decontamination area or on the transfer trailer. Revise Section W.1.2 to reflect the fact that the OS197L TC, used on its own, does not provide adequate shielding.

Additionally, clarify that item 2 on Page W.1-3 refers to shielding on the OS197L TC support skid.

This revision is necessary to ensure compliance with 10 CFR 72.11.

5-20 Revise Section W.1.2.2 to indicate that the OS197L TC must be shielded by supplemental shielding at all times that remote handling operations are not in use.

"Lifting Cask from Pool" in Section W.1.2.2 describes the differences in primary operations for the OS197L TC as compared to the operations described in Section 1.3.3 of the main SAR. This includes a description of the use of remote crane operations. However, this section does not mention the decontamination area supplemental shielding, which must be used to maintain doses ALARA during all operations, that are not performed remotely, within the fuel handling building (not including those operations involving the TC on the transfer trailer, which has additional shielding).

This information is necessary to ensure compliance with 10 CFR 72.11, 72.230(a), and 72.236(d).

5-21 State whether a time limit exists for how long the OS197L TC may be in place on the transfer trailer without the outer top additional shielding installed.

Section W.1.2.2 states "The outer top additional shielding is to be installed inside the fuel handling building if the floor loads can accommodate it (if floor loading is a concern, the additional shielding may be placed on the skid outside the fuel handling building). It does not appear a time limit exists for how long the OS197L TC may be in place on the transfer trailer without the outer top additional shielding installed. Additionally, there does not appear to be a dose assessment that was performed to verify that doses will be within the limits of 72.104 (see RAI 5-31). A time limit should be established to ensure worker doses remain ALARA and public doses remain within the limits of 10 CFR 72.104. This time limit should also be addressed in Section W.8 and in the technical specifications.

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

5-22 Justify why fabrication of the transfer trailer and the decontamination area supplemental shielding will not also be performed by one or more qualified fabricators under TN's quality assurance program.

Section W.1.3 states that fabrication of the OS197L TC will be done by one or more qualified fabricators under TN's quality assurance program. Figure W.1-1 shows that the OS197L TC does not include the transfer trailer and the decontamination area supplemental shielding, therefore it is not clear that these components will be fabricated under TN's quality assurance program.

This information is necessary to satisfy the requirements of 10 CFR 72.144.

Note: RAI 5-23 through 5-25 apply to SAR appendix W Section W.2, “Principal Design Criteria”

5-23 Revise Section W.2.2 to address the discussion in Chapter W.8.

Page W.2-1 states that the "... OS197L TC is handled and utilized in the same manner as the existing ... OS197 TC System." This does not appear to be consistent with the Operating Procedures in W.8, as there are several differences noted. For example, discuss the drainage of the DSC during the lift from the pool, the remote crane handling operations, any differences in handling/utilization with regards to decontamination operations, and the use of supplemental shielding in the decontamination area and on the transfer trailer.

This information is necessary for compliance with 10 CFR 72.11.

5-24 Revise Section W.2.3.5, "Radiological Protection," to address the discussion in Chapter W.10.

The statement that there is "no change" for the OS197L in Section W.2.3.5 appears to be inconsistent with the analysis of a failure of the remote handling equipment provided in Chapter W.10, "Radiation Protection." Further, there are changes in the radiological protection with respect to the use of remote handling equipment and supplemental shielding in the decontamination area and on the transfer trailer.

This information is necessary to demonstrate compliance with 10 CFR 72.11.

5-25 Justify why Table W.2-1 does not classify the decontamination area shield as important to safety, when the transfer trailer shielding is classified as such.

The supplemental shielding in the decontamination area is being used as an integral part of the OS197L transfer system during loading, in a similar manner as the bare transfer cask. The shielding is required by general licensees to meet the requirements of 10 CFR 72.104(a) regarding the dose limits for normal conditions of operation. Supplemental shielding used to meet the requirements of 10 CFR 72.104(a) regarding the dose limits for normal conditions of operation should be classified as important to safety. Table W.5-1 indicates that the 100-meter dose rate from the bare OS197L TC is 4.53 mrem/hr. 10 CFR 72.236(d) requires the cask system to meet the requirements in 10 CFR 72.104. Therefore, without the supplemental shielding in place, and depending on the layout of the fuel handling building with respect to the controlled area boundary, the limits of 10 CFR 72.104 may be exceeded at 100 meters in less than 6 hours for loading of a single cask, and the limits of 10 CFR 20.1301(a) may easily be challenged.

As indicated in Interim Staff Guidance - 13, "Real Individual," at least 20 casks should be considered when evaluating compliance with 10 CFR 72.104.

Additionally, Figure W.1-2 illustrates how the Decontamination Area Shielding surrounds the OS 197L TC but since there are no detailed drawings, it is unclear what the configuration of the TC bottom to the lower cask shield interface is and there is no discussion regarding the behavior of the assemblage under all loading scenarios. It is noted that on Page W.8-5 it is stated that the shielding will be nominally 6" of carbon steel.

Finally, in Section W.1.1, it is stated that the additional shielding in the decontamination area is required because of the configuration of the OS197L TC. Removal of shielding from the body of the TC, an Important to Safety component, does not necessarily make the shielding Not Important to Safety.

Therefore, the decontamination area supplemental shielding should be classified as important to safety.

This information is necessary to satisfy the requirements of 10 CFR 72.236(b) and 10 CFR 20.1301(a).

RAI 5-26 applies to SAR Appendix W Chapter W.3, “Structural Evaluation”

5-26 Revise Section W.3.9 to address the performance of the interim cask cover during the postulated drop scenarios.

Address the performance of the interim cask cover during the postulated drop scenarios. Section W.3.9 and Chapter W.8 (Page W.8-9) indicate that the interim cask cover may be installed for movement of the TC from the decontamination area to the trailer. Section W.3.9 should be revised to address whether the interim cask cover survives the postulated drop scenarios such that the water is maintained in the annulus and also such that DSC remains inside the TC. Describe the functionality of the gasket during the postulated drop scenarios as well. If necessary, address gasket failure and interim cask cover failure in the shielding and accident analyses in Chapters W.5 and W.11, as appropriate.

This information is necessary to verify compliance with 10 CFR 72.236(d).

Note: RAI 5-27 through RAI 5-41 apply to SAR Chapter W.5, “Shielding Evaluation”

5-27 Revise the shielding evaluation in Chapter W.5 to provide justification that the 32PT DSC is the bounding source term for the OS197L TC.

The application reports dose values considering the OS197L TC loaded with a 32PT DSC. However, Section W.11.1.4 states that the 24PHB provides the highest 100-meter dose rate. Therefore, it appears that the bounding source term was not analyzed for the OS197L TC.

If there is justification for why the 32PT DSC source term bounds the 24PHB source term, additional justification is needed to show that the previously-determined design-basis fuel for the 32PT DSC remains bounding for the 32PT DSC inside the OS197L TC. Appendix M, Chapter M.5 states that the design-basis fuel for the 32PT DSC was selected based on the OS197/OS197H TC. The OS197/OS197H TC designs have lead shielding. It is not clear that the previously-determined design-basis is valid, due to the significant shielding differences between the OS197L TC and the OS197/OS197H TC.

The revised discussion should also address the drainage of the DSC/TC annulus and the neutron shield during downending onto the transfer trailer, and whether these evolutions impact the design-basis source term.

This information is necessary to verify compliance with 10 CFR 72.104 and 10 CFR 72.106. Additionally, NRC guidance in NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," directs the shielding reviewer to verify that the applicant calculated the source term on the basis of the fuel that will actually provide the bounding source. Further, this information is necessary for the staff to ensure that occupational radiation exposures satisfy the limits of 10 CFR Part 20 and meet the objective of maintaining exposures ALARA.

5-28 Revise the shielding evaluation to address the impact of the use of the interim cask top cover.

Section W.3.9 and Chapter W.8 indicate that an interim cask top cover may be installed for movement of the TC from the decontamination area to the trailer. However, neither Section W.5.3 nor Table W.5-1 provides an estimate of the increased dose rate anticipated due to use of the interim cask top cover. Additionally, address any impact on the shielding analysis from the structural evaluation of the performance of the interim cask cover during the postulated drop scenarios.

This information is necessary to verify compliance with 10 CFR 72.236(d).

5-29 Clarify which DSCs are authorized for transfer within the OS197L TC.

Section W.5 (Page W.5-1) states "This Appendix presents the shielding evaluation of the OS197L TC when used for fuel loading and transfer of the DSCs currently licensed under CoC 1004...." and then lists a subset of the DSCs currently licensed under CoC 1004. Clarify whether the OS197L TC is intended for use of all DSCs currently licensed under CoC 1004, or whether it is intended only for use with the listed DSCs.

This information is necessary to verify compliance with 10 CFR 72.11.

5-30 Correct and/or clarify the apparent discrepancies between Section W.5.3 and Table W.5-1.

Section W.5.3 states that OS197L TC surface dose rates are 54 rem/hr and 57 rem/hr during the lifts from the pool to the decontamination area and from the decontamination

area to the trailer, respectively. However, Table W.5-1 states that the OS197L TC surface dose rate is 53.249 rem/hr. Explain the apparent discrepancy.

This information is necessary to verify compliance with 10 CFR 72.11.

5-31 Revise Chapter W.5 to describe the various shielding configurations and corresponding dose rates anticipated during normal, off-normal, and accident conditions.

List in explicit detail all shielding configurations and corresponding dose rates (both axial and radial) anticipated during normal, off-normal, and accident conditions; and provide the corresponding OS197L TC surface dose rates. Chapter W.8 indicates that, at various times, the DSC/TC annulus may be drained, the neutron shield may be drained, and an interim cask cover may be used. Additionally, Chapter W.8 indicates that placement of the 3" outer shield on the transfer trailer may be delayed. Revise Chapter W.5 to describe each of these configurations, using both text and figures. For each configuration, provide the estimated surface and 100-meter dose rates, for both axial and radial directions. Currently, Chapter W.5 does not provide axial dose rates.

This information is necessary to demonstrate compliance with 10 CFR 72.236(d).

5-32 Revise Sections W.5.2 and W.5.3 to describe the shielding calculations performed for the OS197L TC.

a. Discuss the material densities used and the dimensions assumed for the OS197L TC, the decontamination area shielding, and the trailer shielding.
b. Revise Figure W.5-1 to provide a level of detail similar to Figure M.5-24, showing all axial and radial dimensions modeled in the 3-D MCNP analysis.
c. Provide a figure, similar to the revised Figure W.5-1, showing the model used for the 3-D analysis of the OS197L TC inside the transfer trailer. If no such analysis was performed, justify why it was not necessary. Such justification must address dose rates anticipated for the duration of time that the top trailer shielding is not installed.
d. Describe the spatial source distribution assumed.
e. Describe all assumptions used for the normal, off-normal, and accident condition shielding analyses, including whether the neutron jacket was full or empty, the annulus full or empty, the interim cask cover was used, etc.
f. Specify the flux-to-dose rate conversion factors used
g. Specify cross-section data used
h. Specify general assumptions used in the analysis
i. Describe the MCNP calculations performed
j. Provide a 3-D analyses similar to Section M.5.4.12.1 for the bounding DSC, including:
    i. Dose rate distribution along OS197L TC side for the various configurations of the TC (i.e., DSC/TC annulus full/empty, neutron shield full/empty, quantifying the increased neutron source term along the neutron shield weld)
    ii. Dose rates expected during decontamination operations (i.e., OS197L TC top-end dose rates, dose rate distribution along the decontamination area supplemental shielding side, including contributions from the openings in

the upper and lower shield bells depicted in Figure W.1-2. Section W.8.1.3 contains a step to visually inspect these openings to assure no significant blockage.

iii. Dose rate profiles expected during welding of the inner and outer covers of the DSC. Specifically address whether the manual welding operations mentioned in the UFSAR (Page 4.7 5) may be performed when using the OS197L TC. If manual welding operations are allowed, provide expected dose rate profiles that would be encountered during such operations.

This information is necessary to demonstrate compliance with 10 CFR 72.236(d).

5-33 Revise Section W.5.3 to clarify what is meant by "the UFSAR configuration above," "the specific model used in the UFSAR," "the UFSAR analysis," and "the OS197 TC configurations shown above."

These statements (see 2nd full paragraph of Page W.5-2) refer to configurations, analyses, and models that were not discussed earlier in Chapter W.5. Clarification is needed regarding each of these statements. Additionally, these statements imply that figures are needed depicting additional configurations. Revise Chapter W.5 to add in these figures, as appropriate.

This information is necessary to satisfy the requirements of 10 CFR 72.11 and 72.236.

5-34 Justify that the relative effect on dose rates of the OS197L TC configuration and the decontamination area/trailer shielding configurations with respect to the OS197 TC are applicable to "all CoC 1004 licensed DSC payloads."

Sections W.5.3 and W.11.1.4 state that relative effect on dose rates of the OS197L TC configuration and the decontamination area/trailer shielding configurations with respect to the OS197 TC are applicable to "all CoC 1004 licensed DSC payloads for the OS197L TC." Justify this statement.

This information is necessary to satisfy the requirements of 10 CFR 72.11 and 72.236(d).

5-35 Justify the conclusion in Section W.5.3 that the loss of neutron shield accident dose rates bound the doses from the accident fire condition.

Section W.5.3 states "[The loss of neutron shield] dose rates bound the doses from accident fire condition [stet] because the shielding on the trailer is not affected by the fire condition." This statement does not address whether the loss of neutron shield accident dose rates bound the doses from the accident fire condition in the decontamination area. Justify that the loss of neutron shield accident dose rates are bounding for the fire, regardless of where the OS197L TC is located (on the crane, in the decontamination area, in the trailer) during the accident fire condition.

This information is necessary to determine compliance with 10 CFR 72.236(d).

5-36 Revise Section W.5.3.2 to analyze neutron streaming through the seams of the neutron shield, and to justify the conclusion that the dose rate (including both gammas and neutrons) in the vicinity of the seams would not increase due to the lack of neutron shielding at the seams.

Section W.5.3.2 states that the neutron dose would increase at the seams joining the two halves of the neutron shield. It also states that the gamma dose would decrease at the seams due to the increased amount of steel. Revise Section W.5.3.2 to quantify the increase in neutron dose and decrease in gamma dose at the neutron shield seams. Provide a table with these results similar to Table W.5-2.

This information is necessary to verify compliance with 10 CFR 72.236.

5-37 Provide a reference for the OS197 TC dose rates listed in Table W.5-1.

Table W.5-1 lists dose rates for an "OS197 TC" configuration. Provide a reference for these dose rates, and/or revise Chapter W.5 to add a discussion of the analysis performed determining these dose rates, as appropriate.

This information is necessary to verify compliance with 10 CFR 72.236.

5-38 Clarify what shielding configurations were modeled to obtain the "OS197L TC with Decon Area or Trailer Additional Shielding" dose rates in Table W.5-1.

Figure W.1-2 indicates that the decontamination area supplemental shielding is 6-inches thick. Figure W.1-3 indicates that the trailer supplemental shielding is 5.5-inches thick. Neither figure specifies the amount of air gap between the OS197L TC and the supplemental shielding. Revise Table W.5-1 and add discussion to Chapter W.5, as appropriate, to clarify what configuration was modeled to determine the "OS197L TC with Decon Area or Trailer Additional Shielding" dose rates in Table W.5-1.

This information is necessary to verify compliance with 10 CFR 72.236.

5-39 Clarify the apparent discrepancy between Figure W.5-1 and Figure W.1-2.

Figure W.5-1 shows that the decontamination area shielding was modeled as 5.5-inches of steel. However, Figure W.1-2 indicates that the decontamination area supplemental shielding is 6-inches thick. Clarify this apparent discrepancy.

This information is necessary to verify compliance with 10 CFR 72.11.

5-40 Clarify the statement regarding the bounding condition from a dose perspective.

Page W.8-10 states "The OS197L TC system shielding ... provides a level of shielding equivalent to that provided by the standard OS197 TC (with lead shielding) and is the bounding condition of the two from a dose perspective (decon area and transfer trailer)." This statement is not justified with dose rate values, and it is not clear what is meant by "bounding." Justification and clarification is necessary.

This information is necessary to verify compliance with 10 CFR 72.236.

5-41 Justify that the dose limits of 10 CFR 72.104 and 10 CFR 20.1301(a)(2) will be met.

Table W.5-1 indicates that the dose rate from the bare OS197L TC is 4.53 mrem/hr at 100 meters, the regulatory minimum distance to the controlled area boundary. 10 CFR 72.104 specifies annual dose limits of 0.25 Sv (25 mrem) to the real individual (also see the other dose limits) during normal operations and anticipated occurrences. Therefore, depending on the layout of the fuel handling building and also on the type of containment structure (e.g., the building structure above the spent fuel pool in a Mark I containment provides very little radiation shielding), the limits of 10 CFR 72.104 may be exceeded to a real individual at 100 meters in less than 5 hours for loading of a single cask. As stated in Interim Staff Guidance - 13, “Real Individual,” at least 20 casks should be considered when evaluating compliance with 10 CFR 72.104 (less than 20 cask maybe appropriate if applicable restrictions are applied). Also as stated in the staff guidance, “It is important to note that the general ISFSI licensee is permitted to use additional engineering features, such as berms, to mitigate doses to real individuals near the site. If such features are used in the cask SAR to show compliance with the regulations, they should be included in the cask conditions of use. In addition the SAR should determine the degree to which the normal condition dose rates could change for the identified off-normal conditions.” Therefore, the applicant should analyze a theoretical 20-cask loading campaign, considering both the normal conditions and the off-normal conditions (i.e., anticipated occurrences) for movements of the bare OS197L TC. The off-normal conditions should include crane hang-up, failure of remote handling equipment, and other factors unique to the OS197L. Additionally, the analysis should include discussion of all assumptions regarding the amount of time the OS197L TC is on the crane during normal and off-normal conditions, and the amount of shielding (if any) provided by the fuel handling building structure. Based on the results of the analysis, any necessary conditions to the certificate should be identified; e.g., time limits for normal condition crane moves, annual limits on the number of times the OS197L TC may be used to move fuel, specifications of containment type/fuel handling building structure, and/or minimum distance to the controlled area boundary of greater than 100 meters.

The regulations in 10 CFR 20.1301(a)(2) state: "The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with § 35.75, does not exceed 0.002 rem (0.02 millisievert) in any one hour." Table W.5-1 indicates that the dose rate from the bare OS197L TC is 4.53 mrem/hr at 100 meters, the regulatory minimum distance to the controlled area boundary. Justify that the dose limits of 20.1301(a)(2) will be met. In order to assure compliance with the dose limits of 10 CFR 20.1301(a)(2) consider the following:

- specify a condition of use of the controlled area boundary, or other boundary as appropriate, of greater than 100 meters, if necessary.

- specify other mitigative measures such as operational controls (e.g. closed fuel building structures) that do not create a direct beam of radiation to the unrestricted area.

This information is necessary to ensure compliance with 10 CFR 72.104 and 20.1301(a)(2).

Note: RAI 5-42 through RAI 5-47 apply to SAR appendix W Chapter W.8, “Operating Procedures”

5-42 Revise Chapter W.8 to require the licensee to develop and have in place procedures for recovery from a crane malfunction and failure of other remote operations equipment such as the optical targeting system, cameras, etc.

Section W.5.3 states "Should a failure of the crane occur during [remote crane operation using a laser/optical targeting system and cameras], procedures will be in place to either repair the crane using proper ALARA practices and resume remote operations, or manually position the load in a safe, shielded location." The operating procedures must be revised to direct the licensee to have such contingency procedures in place prior to loading the OS197L TC with fuel.

This revision is necessary to satisfy the requirements of 10 CFR 72.236.

5-43 Revise the caution on Page W.8-4 regarding licensee development of appropriate measures to keep dose rates ALARA during recover from a potential malfunction of "these devices."

Clarify what "these devices" means. Remove the words "if needed." Additionally, move the caution to appear earlier in the operating procedures so that licensees are instructed to develop these measures prior to loading the OS197L TC with fuel.

This revision is necessary to satisfy the requirements of 72.236.

5-44 Justify that OS197L TC dose rates during "Sequence 6" on Page W.8-6 are ALARA.

Justify that TC dose rates during this operation are ALARA. Revise Chapter W.10 to include a dose assessment of anticipated occupational exposures. The assessment should discuss both axial and radial dose rates and their contribution to occupational exposures.

This information is necessary for compliance with 10 CFR 72.11.

5-45 Clarify how much water will be present in the DSC/TC annulus during the downending operations.

Page W.8-7 states "... the DSC/TC annulus will essentially remain filled ... during downending operations." Quantify what "essentially" means. If there is any potential impact on the shielding and thermal calculations, revise the thermal, shielding, and radiation protection sections as appropriate.

This information is necessary to satisfy the requirements of 10 CFR 72.11 and 72.136.

5-46 Revise Section W.8.1.2 to specify use of remote operations when handling the bare OS197L TC.

Revise the 5th bullet in Section W.8.1.2 to specify use of remote operations when placing the bare OS197L TC into the decontamination area shielding sleeve and for lowering the shielding bell.

This information is necessary to demonstrate compliance with 10 CFR 72.11 and 72.236(d).

5-47 Revise Section W.8.1.3 to require verification of TC dose rates to assure compliance with the technical specifications.

Section W.8.1.3 requires verification of TC dose rates to assure consistency with the analysis provided in the UFSAR. Revise this section to require verification of TC dose rates to assure compliance with TS 5.2.4 (see RAI 8-2).

This information is necessary to demonstrate compliance with 10 CFR 72.236(d).

Note: RAI 5-48 applies to SAR appendix W Chapter 9, “Acceptance Criteria and Maintenance Program”

5-48 Clarify whether any changes to the acceptance criteria and maintenance requirements described throughout the UFSAR are necessary for the supplemental shielding (both the decontamination area and trailer shielding) for the OS197L TC.

Chapter W.9 states that the acceptance criteria and maintenance requirements described throughout the UFSAR for the OS197 and OS197H TCs are identical to the acceptance criteria and maintenance requirements for the OS197L TC. However, Chapter W.9 does not state whether additional or different acceptance criteria and maintenance requirements are necessary for the supplemental shielding that must be used in conjunction with the OS197L TC in the decontamination area and on the transfer trailer. Additionally, clarify if the statement in Chapter W.9 is applicable to the interim cask cover.

This information is necessary to satisfy the requirements of 10 CFR 72.11.

Note RAI 5-49 and RAI 5-50 apply to SAR Chapter 10, “Radiation Protection”

5-49 Expand the discussion of how worker doses were obtained. Provide all assumptions used to determine the worker doses.

a. The backscatter correction factor, derived in calculation NUH06L-503, was used to determine the 1,600 man-mrem dose reported as the additional occupational exposure associated with a recovery from a remote handling device failure. Discuss the impact to worker doses on changes in the backscatter correction factor, noting sensitivities such as whether this factor will be larger or smaller for different size rooms.

b. Provide worker doses for each of the scenarios discussed in NUH06L-503, including off-normal conditions such as crane hangup, failure of remote handling equipment, etc. (See RAI 9-27)
c. Provide doses for the trailer without the outer top shield installed.
d. Provide occupational doses associated with visually checking that the openings in the supplemental shielding are not blocked.
e. Provide all assumptions for each analysis (e.g., the 1,600 man-mrem reported assumes that no workers have to get within 10 meters of the TC).
f. Justify the statement "...use of the OS197L TC does not significantly affect personnel dose rates (during closure operations, handling, or storage) or site boundary dose rates." This statement appears to only apply to normal conditions of operation. Address the crane hang-up scenario (and other off-normal conditions such as remote handling operations failure scenarios)
g. Provide worker doses for the activity described on Page W.8-7 involving installation of the necessary equipment to provide makeup to the DSC/TC annulus during movement of the cask from the decontamination area to the trailer.

5-50 Revise the first sentence to clarify that personnel and site boundary dose rates are not affected for normal conditions of operation.

The first sentence of Chapter W.10 states "... the OS197L TC does not significantly affect personnel dose rates ... or site boundary dose rates." This statement is true for normal conditions, but may not be true for off-normal and accident conditions. Revise this statement to reflect that it only applies to normal conditions.

This information is necessary to demonstrate compliance with 10 CFR 72.11.

Note: RAI 5-51 through RAI 5-55 applies to SAR appendix W Chapter 11, “Accident Analyses”

5-51 Clarify whether the accident analyses consider the impact of the supplemental shielding and the interim top cover for the OS197L TC.

It is not clear that the missile impact analysis, the earthquake analysis, or the drop analyses would not change due to the presence of the supplemental shielding either in the decontamination area or on the trailer. Since the supplemental shielding is not optional and must be used in conjunction with the OS197L TC, as noted in Section W.1.2, the accident analyses must consider the presence of the shielding. Unless a single-failure proof crane is required in the certificate or technical specifications, assess the impact of dropping the supplemental shielding.

Additionally, address any impact of the interim top cask cover for the OS197 TC on the accident analysis. In addition to providing any relevant analyses, discuss the performance of the interim cask cover during the missile impact, the earthquake, and the accidental drop.

This information is necessary to demonstrate compliance with 10 CFR 72.236.

5-52 Clarify the tables in Section W.11.1.4.

a. Clarify the difference between the "UFSAR" and the "OS197 TC" configuration. The text states that the UFSAR configuration is the OS197 TC loaded with a 32PT DSC. For the OS197 TC configuration, specify for which DSC the dose rates apply.
b. State all assumptions made regarding the configuration of the OS197 TC and its supplemental shielding. Be sure to address whether the DSC/TC annulus was assumed to be full or drained.
c. Revise the table on Page W.11-3 to indicate whether the contact dose rate is radial or axial.

This information is necessary to demonstrate compliance with 10 CFR 72.11.

5-53 Clarify the general recovery actions for the loss of neutron shield accident described in Section W.11.1.4.

Clarify the general recovery actions and assumed exposure times for the loss of neutron shield accident. Include a discussion of the anticipated worker doses and the distances and locations assumed to calculate the anticipated doses.

This information is necessary to determine compliance with 10 CFR 72.236.

5-54 Revise the wording on Page W.11-3 to indicate that the total dose at 100 meters is at the controlled area boundary, not the "site boundary."

Page W.11-3 reports the total dose at the "site boundary," which is a term defined in 10 CFR Part 20 and is not necessarily the same as the controlled area boundary, which is defined in 10 CFR Part 72.

This information is required to comply with 10 CFR 72.11.

5-55 Correct the typo on Page W.11-3.

The last paragraph on Page W.11-3 states: "... results in a total person-dose of 18x18=144 mrem." It appears that this should report a person-dose of 18x8=144 mrem.

This information is necessary to demonstrate compliance with 10 CFR 72.11.

Note: RAI 5-56 and RAI 5-57 apply to Calculation NUH06L-503

5-56 Justify why the peaking factor from Configuration E in Calculation NUH06L-0500 applies to the OS197L TC.

The shielding of Configuration E includes 4.25 inches of steel and 1.88 inches of lead shielding in the radial direction, whereas the OS197L only has 3.18 inches of steel and no lead shielding in the radial direction. Therefore, the energy spectrum of the gamma

radiation on the surface of Configuration E would differ from the energy spectrum of the gamma radiation on the surface of the OS197L TC. Justification is needed to demonstrate that the difference in energy spectrums does not impact the peaking factor. Additionally, justify that the peaking factor for the OS197L would follow the same trend as the peaking factor for Configuration E; i.e., justify that the peaking factor approaches 1.0 at distances greater than 10 meters from the surface of the OS197L TC.

This information is necessary to verify compliance with 10 CFR 72.236(d).

5-57 Clarify how the backscatter correction factor was derived.

It appears that a factor of 5 or higher (instead of the factor of 2 assumed for the calculation) may be more appropriate for some scenarios and some plant layouts. Explain how the position of the TC (i.e., horizontal or vertical) impacts the correction factor. Additionally, explain how the layout of the fuel handling building impacts this factor. State whether the factor is expected to increase or decrease for smaller rooms.

This information is necessary to verify compliance with 10 CFR 72.236(d).

5-58 Justify the assumption that the loading/transfer operations will not involve workers coming nearer than 10 meters to the bare TC during normal and off-normal operations.

The calculation reports dose values assuming that workers will not come nearer than 10 meters to the bare TC during normal and off-normal operations. Justify that this assumption is valid. If necessary, provide a revised calculation that addresses worker doses considering off-normal conditions, including (but not limited to) scenarios involving crane hangup, failure of remote handling equipment, or difficulty engaging/disengaging the yolk.

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

CHAPTER 6 Criticality Evaluation

6-1 Justify the assertion that the changes proposed in Appendix W are of insignificant importance to criticality safety.

Although the changes do not impact the orientation of the fuel or the contents allowed, the modifications to the outer surface of the cask may affect the reactivity of the system when modeled as an infinite cask array. No calculations were provided with the application to provide a comparison of the relative reactivity change.

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

6-2 Technical Specification Table 1-1h should be reformatted to clearly indicate the four applicable basket types similar to the other Tables specified in Tech Spec 4.1.

This comment is intended to make the tables consistent with each other but to also ensure that the required information is readily available in the Tech Specs.

This information is necessary to determine compliance with 10 CFR 72.11.

CHAPTER 7 Materials Evaluation

7-1 Clarify where the TS bases associated with Amendment 10 TS 1.2.5 exists in Amendment 11.

Amendment 10 Sec 1.2.5 DSC Dye Penetrant Test of Closure welds was moved to TS 5.2.4b of the amendment 11 TS verbatim. It is not clear where the bases of the TS exists in Chapter 10 of the Amendment 11 FSAR.

This information is needed to determine compliance with 10 CFR 72.11.

7-2 Clarify where the TS bases associated with Amendment 10 TS 1.2.1 exists in Amendment 11.

TS 1.2.1 Fuel Specifications for Amendment 10 consists of a number of tables that were transferred verbatim to Sec 2.1 of the new tech specs. The basis for the Tech Spec was moved to chapter 10 of the FSAR in the form of a table that guides one to the appropriate appendices for the details. Some of the detail in the basis write up indicating what went into each cask was dropped from the revision and should be added back for clarity.

This information is needed to determine compliance with 10 CFR 72.11.

7-3 Add footnotes requiring testing of the boron content, similar to current footnotes (2) and (3), to the other models in the table in Section 4.1 of Amendment 11.

The boron in the plates is used for criticality control. Inadequate boron in the plates could allow unexpected criticality to occur.

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

CHAPTER 8 Radiation Protection Evaluation

8-1 Justify the sampling protocol described in TS 5.1 which checks for helium, but not radioactivity.

It is not clear how checking only for helium accounts for potential contaminants in the cask cavity.

This information is necessary to determine compliance with10 CFR 72.11.

8-2 Revise proposed TS 5.2.4 to specify the following:

a. Provide both radial and axial surface dose rate limits for the transfer cask/DSC combinations in the proposed Technical Specification (TS) 5.2.4, "Radiation

Protection Program." Propose and justify the confirmatory measurements and locations chosen.

The applicant has proposed a modified radiation protection program in TS 5.2.4 that does not include transfer cask dose rate limits. The staff believes that the radiation protection program should include transfer cask dose limits based on the following discussion. As stated in the guidance provided in NUREG 1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance," the administrative controls are to include a cask loading, unloading and preparation program that establishes criteria that need to be verified to address FSAR commitments and regulatory requirements. One of the criteria listed in Section 5.1.2 of NUREG 1745 that the applicant "shall establish" is "Surface dose rates to assure proper loading and consistency with the offsite dose analysis." The guidance further states that the program requirements are to be completed prior to the cask's removal from the 10 CFR Part 50 structure; for the Standardized NUHOMS system, this means establishing TS surface dose rate limits for the transfer cask.

10 CFR 72.236(d) requires the provision of radiation shielding features sufficient to meet the requirements of 10 CFR 72.104. 10 CFR 72.104(b) requires licensees to establish operational restrictions to meet as low as reasonably achievable objectives for direct radiation levels associated with ISFSI operations. 10 CFR 20.1101(b) also requires licensees to use procedures and engineering controls based upon sound radiation protection principles to achieve doses that are ALARA. TS dose rate limits for the transfer cask, therefore, ensure that transfer cask features remain sufficient to enable the licensee to meet these regulatory requirements. Also, TS dose rate limits for the transfer cask provide the licensee with the information necessary to perform a thorough ALARA evaluation and establish appropriate operational restrictions for anticipated cask work to minimize personnel exposure, thus aiding the effectiveness of the licensee's implementation of its 10 CFR Part 50 and Part 20 programs with respect to spent fuel handling (such as ensuring that TS affecting operations in the fuel handling building are met). Additionally, the transfer cask surface dose rate limits also serve as a check against potential misloadings of a DSC. Staff further notes that licensee radiation protection personnel will be making multiple measurements during cask loading operations; therefore, measurements that verify compliance with TS dose rate limits will be among those performed by these personnel and will thus be readily available.

b. Justify the number and selection of dose rate measurement locations for the surface dose rate limits for the transfer cask in the proposed TS 5.2.4, “Radiation Protection Program,” and revise the operating procedures to incorporate measurements as appropriate.

Dose rate limits for the surface of the transfer cask, along with the number and locations of dose rate measurements and cask configuration (e.g. prior to DSC closure) when performing measurements (consistent with the shielding analysis and package operations), should be specified as part of the applicant's radiation protection program in proposed TS 5.2.4. Surface dose rate limits should be

provided for each transfer cask DSC combination that are proposed in the CoC. The dose rate limits for all transfer cask configurations will ensure transfer cask features remain sufficient to enable the licensee to meet 10 CFR 72.104(b) and 10 CFR 20.1101(b) requirements for future operations involving all DSCs under this amendment.

This information is needed to confirm compliance with 10 CFR 72.104(b) and 72.236(d).

Note: RAI 8-3 applies to the base SAR Chapter 5, “Operation Systems”

8-3 Clarify statements in the SAR “dry unloading” or “removal of fuel “outside the fuel reactor building.” Revise the procedures for unloading the DSC to clarify which actions may be performed outside the fuel/reactor building. Justify how these operations meet the dose requirements of 10 CFR 72.104 and 10 CFR 72.106.

There are multiple locations in the UFSAR pages submitted with this application where the following statement appears relating to removal of fuel from a DSC: "If the work is performed outside the fuel/reactor building, a tent may be constructed over the work area which may be kept under a negative pressure to control airborne particulates." There is no clear indication of what portion of the work is considered appropriate for being performed in a tent outside of the fuel/reactor building.

This information is needed to confirm compliance with 10 CFR 72.104(b) and 72.236(d).

Note: RAI 8-4 applies to the base SAR Chapter 7, “Radiation Protection”

8-4 Explain Transnuclear’s commitment to an ALARA policy for the NUHOMS system, and how it influenced the proposed design features and operating procedures of the OS197L transfer cask system.

The ALARA policy should consider the design, planned operations, and implementation at the general licensee. The ALARA statements in Chapter 7 (Radiation Protection) of the Updated Final Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel seem to focus on a general licensee's ALARA program without commenting on Transnuclear’s ALARA policy. Statements regarding ALARA in calculation NUH06L-0500 (Proprietary) also require the same explanation.

This is needed to show compliance with ALARA requirements in 10 CFR Part 20, 10 CFR 72.104(b), and consistent with the guidance in Regulatory Guide 8.8, “Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable.”

8-5 Explain how ALARA was applied to the design of the OS197L transfer cask system (i.e., the transfer cask plus all the supplemental shielding for the decontamination area and the transfer trailer) for normal and off-normal operations. Clarify the specific ALARA considerations and other operational criteria that were applied when evaluating comparable design alternatives of the OS197 transfer cask for use by general licensees.

From the review of Appendix W and calculation NUH06L-0500, it is not clear where and how ALARA was considered in the design process, when comparing different 75-ton transfer cask designs that resulted in different dose fields. The application of ALARA principles should consider many factors as defined in 10 CFR 20.1003, and be consistent with the guidance in Regulatory Guide 8.8.

This information is necessary to verify compliance with 10 CFR 72.11 and 72.236.

8-6 Explain and justify how the dose rates for the TC on the transfer trailer were calculated. Provide additional dose evaluations for the inner supplemental shield and transfer trailer as appropriate.

From the review of Appendix W and calculation NUH06L-0500, it is not clear how these doses were assessed. Since the transfer cask can have only the inner supplemental top shield (at least for some period of time), there needs to be an assessment of the potential dose rate with only the inner shield installed. The model(s) for assessing the dose rate for the TC on the transfer trailer need to take into account the (apparent) lack of shielding beneath the TC. If there is a limited time assumed between the time when the transfer trailer is moved outside and when the outer shield is placed, this needs to be incorporated into the proposed technical specifications.

This information is needed to confirm compliance with 10 CFR 72.236(d) which requires that sufficient shielding be provided to meet the requirements of 10 CFR 72.104 and 10 CFR 72.106. Specifically, 10 CFR 72.104(a) gives specific limits on the annual dose to any individual beyond the controlled area boundary. 10 CFR 20.1201 specifies the occupational dose limits.

Note RAI 8-7 through RAI 8-10 apply to SAR appendix W Chapter 8, “Operating Procedures”

8-7 Clarify the meaning of the phrase "if selected" with respect to the inner and outer shields on the skid. If there is some expectation that either (or both) of these shields may be optional, revise the proposed technical specifications to include a clear statement of the criteria that would govern their use. If these shields are both required, clarify the wording in Chapter W.8 (and elsewhere as necessary).

On Pages W.8-8 and W.8-13 (and possibly in other locations), the phrase "if selected" is used with respect to the inner and outer shields on the skid. There are no apparent criteria for either of these shields being optional.

This information is necessary to confirm compliance with 10 CFR 72.236.

8-8 Provide a complete set of operating procedures for both loading and unloading operations that are specific to the unique operations of the OS197L transfer cask system.

The current operating procedures for the OS197L appear to reference three sets of procedures (the OS197, the OS197L, and a canister). Cross referencing three different sets of procedures is unnecessarily complex and confusing and increases the risk of human error. The OS197L procedures should stand alone and not refer back to the

OS197. They may refer to DSC-specific procedures. Care needs to be taken to develop procedures that are clear with respect to any differences in decontamination process, welding, transfer cask lid or interim lid attachment or removal, and any other areas where differences between the OS197 and the OS197L are dictated due to either dose rates or the supplemental shielding required for the OS197L.

This revision is necessary for compliance with 10 CFR 72.11.

8-9 Reword the sentences containing the text "remote crane operation and/or an optical targeting system" wherever it appears with respect to OS197L operations (e.g., Pages W.8 4, W.8 5, W.8 7).

The use of "and/or" implies that remote crane operation is not required, or a remotely-used targeting system is not required. Both of these aspects of operation must be accomplished remotely when using the OS197L, and this is correctly reflected elsewhere in Appendix W.

This information is necessary for compliance with 10 CFR 72.11 and for internal consistency of the UFSAR.

CHAPTER 9 Technical Specifications and Operating Procedures

9-1 Change the table of contents for the technical specifications to be consistent with the contents contained in the technical specification.

The staff performed a check of the Amendment 11 TS Table of Contents versus the referenced TS LCO, Tables and Figures and identified several errors as well as inconsistencies. Examples of these errors and inconsistencies include the following:

a. Section 2, Functional and Operating Limits references Page 1.4-1; this should reference Page 2.1-1

b. Section 5, Administrative Controls, references Page 4.4-1; this should reference Page 5.1-1

c. The List of Tables index table descriptions do not match the full titles of the actual referenced tables; this is in contrast to the List of Figures where the index figure titles fully match the referenced figure, even in cases where the figure title is quite long.

d. TS Table index for Tables 1-2d through 2m all reference with/without CC's; the actual tables reference BPRAs, not CCs. Similarly, the index for Tables 1-5a through 5f should state "w/o CC's" in order to be consistent with previous tables and to match the actual tables' titles.

e. Tables on Pages T-11, 14, 18, 22, 27, 30, and 32 have the term "(concluded)". Should this be (continued)? If (concluded) is correct, then the staff believes that the preceding page(s) should be marked "(continued)" such as on page T-32?

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

9-2 The definition of Loading Operations and Storage Operations should be changed to be consistent with NUREG-1745.

TS Page 1.1-1 provides definitions of Loading Ops and Storage Ops that do not agree with those in NUREG-1745 in that the last sentence of the same definitions in the NUREG is missing. Also, there is no definition of INTACT FUEL unlike in the NUREG.

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

9-3 Change or justify the reason for the difference between the definition for Transfer Operations contained in Amendment 11 and the definition contained in NUREG-1745.

NUREG-1745 uses the term TRANSPORT OPERATION but TN uses the term TRANSFER OPERATIONS. Also, TN's definition is quite different than the one in NUREG-1745.

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

9-4 Change or justify the text associated with the term description to be consistent with NUREG-1745.

On Page 1.3-1 the text associated with the term DESCRIPTION, uses the word "facility" is several times; however, NUREG-1745 uses the term "cask system."

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

9-5 Change or justify the use of the term "perform" in example 1.3-2.

On Page 1.3-2, TN uses the term "perform" under REQUIRED ACTION column. NUREG-1745 uses the term "complete" which would appear to be the proper term. Same comment applies to Page 1.3-3 for example 1.3-3.

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

9-6 Clarify the phrase on Page 1.4-2 that "performance of the Surveillance initiates the subsequent interval"

It is unclear to the staff if the time clock for the subsequent interval begin at the time that the previous surveillance commenced or when it was completed and signed off as acceptable.

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

9-7 Justify why the example on Page 1.4-4 is needed.

The example on Page 1.4-4 is not contained in NUREG-1745.

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

9-8 Clarify or justify the wording in LCO 3.0.2.

LCO 3.0.2 refers to “except as provided in LCO 3.0.5.” However, LCO 3.0.5 states it is not applicable to a spent fuel storage cask. If so, then why is it referenced by LCO 3.0.2?

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

9-9 Clarify or justify the wording in LCO 3.1.1.

LCO 3.1.1 contains the statement “Helium shall be used for drainage of bulk water from the DSC.” This would seem to imply that other media could be used to perform non-bulk drainage of water. Also, the term “bulk water” is undefined. To clear up any confusion, the staff suggests this be reworded as “Helium shall be used for all drainage of water from the DSC.”

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

9-10 Clarify or justify the wording associated with “CONDITION” and the REQUIRED ACTION A.1.2 found on Page 3.1-2.

On Page 3.1-2 under CONDITION, it appears that a note that is included in subsequent LCOs, see 3.1.2 for example, is missing.

With regard to REQUIRED ACTION A.1.2, if the inability to obtain the required vacuum pressure is indeed the result of a leak in the weld, then once the vacuum system is secured, the DSC is now at a lower pressure than ambient pressure and air will start being drawn into the DSC. This will expose hot dry fuel elements to air. This is an undesirable condition. Given that the completion time is 30 days, perhaps consideration should be given to requiring the DSC be filled with helium to at least ambient pressure while weld repair is pursued so as to preclude drawing air into the DSC upwards of 30 days.

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

9-11 Clarify and justify the DSCs that are applicable to the proposed LCO 3.1.2 on Page 3.1-3. Clarify how this LCO is applied to canister design variations with new model designations, that may have been added by Transnuclear or the general licensee to the FSAR under 10 CFR 72.48 change authority.

On Page 3.1-3 when the LCO refers to DSCs such as the 24P, 52B, 61BT, 32PT, 24PTH,61BTH, etc..., does this include all of the various subtypes as well such as 24-PTH-S-LC, 61-BTH Type 1 or 61-BTH Type 2 for example?

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

9-12 Clarify and justify the required actions in proposed LCO 3.1.4 on page 3.1.8.

The required action for B.1 appears to require further detail on additional actions. The additional actions after unloading the DSC should be clarified to address temporary placement of the DCS into a transfer cask (for a certain amount of time), or transfer of the DSC back to the fuel handling building.

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

9-13 Specify the year for the ASME code reference contained on Page 5.2-3.

On Page 5.2-3 under 5.2.4.b) reference is made to ASME Code Article NB-5000. The year is missing in this reference and should be specified.

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

9-14 Specify how often the HSM-H concrete testing is expected to be performed and identify the components that exceed 350°F in proposed technical specification 5.5.

There should be a clarification on how often testing is performed and for which modules, such every module or batches of modules. The staff believes that this technical specification requirement should be more specific as this is an attribute that clearly needs to be reviewed by the NRC inspectors.

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

9-15 Correct reference on Page T-2.

On Page T-2 under specifications for burnup, it refers to Figure 1.1. There is no such figure. The staff believes the correct reference should be to Table 1-2b.

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

9-16 Justify or correct the wording on Page T-8.

Regarding Page T-8, Page 4-2 for the 32PT DSC refers to Basket Type A, B, C or D. Table 1-1h on Page T-8 makes no reference to the 4 basket types. This seems inconsistent with the way that Table 1-1k is laid out with regard to the 61BT DSC with Basket Type A, B or C.

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

9-17 Justify or correct the wording on Page T-35.

Regarding Page T-35, Table 1-1ff refers to Basket Types 1A or 2B through 1E or 2E. The table on Page 4-2 for the 32PTH should be modified to reflect the 1 or 2 option just as that table does for the 24PTH DSC.

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

9-18 Justify or correct the wording on Page F-15, F-16, F-18, F-20, F-21, F-22, F-23, and F-24 that refers to Note 2 on these pages.

On Page F-15 where is the (2) superscript on this page that refers one to Note 2? Same comment on F-16 for Notes 1,2 and 3. Same comment for Note 1 on F-18, F-20, F-21, F-22, F-23, and F-24.

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

9-19 Provide a cross reference and a draft Certificate of Compliance to demonstrate how Amendment 10 technical specifications 1.1.3, 1.1.4, and 1.1.6 are to be incorporated into the Amendment 11 CoC.

TN's Amendment 11 application contains a cross-reference table between the proposed Amendment 10 and proposed Amendment 11. The Amendment 11 application also includes a partial markup of the Amendment 10 CoC showing changes associated with Amendment 11. The cross reference table notes that TS 1.1.3, "Quality Assurance," TS 1.1.4, "Heavy Loads," and TS 1.1.6, "Preoperational Testing and Training Exercise," have been deleted from the Amendment 11 TSs and placed in the CoC. TN's Amendment 11 application does not contain a markup for how these TS items have been addressed in the CoC. While the QA TS may have a reference to an existing CoC condition it is not clear that all attributes in the old TS are covered by the CoC condition. In addition, the proposed CoC Conditions for replacement of TS 1.1.4 and TS 1.1.6 were not provided in the Amendment 11 application.

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

Note: RAIs 9-20 through RAI 9-26 are associated with the thermal review of the technical specifications

9-20 Provide a detailed definition for Independent Spent Fuel Storage Installation (ISFSI) that conforms to the definition given in NUREG-1745 Page 1 of 32 or justify why this language is not included.

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

9-21 Provide the criterion for the 30 days COMPLETION TIME for the CONDITION, "If the required vacuum pressure cannot be obtained" contained in Section 3.1 Fuel Integrity (Page 3.1-2) (see also RAI 9-10).

The criterion for 30 days COMPLETION TIME for the CONDITION, "If the required vacuum pressure cannot be obtained" should be provided. This information should also be captured in the Technical Specification Bases for this TS.

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

9-22 Provide the criterion for selection of 14 days COMPLETION TIMES for Condition A, "The required backfill pressure cannot be obtained or stabilized." Refer to Section 3.1.2 DSC Helium Backfill Pressure (Page 3.1-3)

The criterion for selection of 14 days COMPLETION TIMES for Condition A, “The required backfill pressure cannot be obtained or stabilized,” should be provided. This information should also be captured in the Technical Specification Bases for this TS.

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

9-23 Explain in TS Bases document, why 24 PHB DSC is not included in the LCO 3.1.3. Refer to Section 3.1.3 Time Limit for Completion of DSC Transfer (24PTH, 61BTH, Type2 or 32 PTH1 DSC Only) (Page 3.1-5, 3.1-6).

Explain in TS Bases document, why 24 PHB DSC is not included in the LCO 3.1.3.

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

9-24 Provide in the TS bases what the basis is for the 24 hours limit on COMPLETION TIME for LCO 3.1.4 “The air temperature rise is greater than the above specification.” Refer to Section 3.1.4 HSM Maximum Air Exit Temperatures with a Loaded DSC (Page 3.1-8)

For cases A.2 and B.1 the COMPLETION Time is 'Determined by the analysis'. Please specify a time for completion of analysis.

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

9-25 Provide in the TS Bases document the detailed TS Bases for various items 1 through 10 under Section 4.3.3. Refer to Section 4.3.3, “Site Specific Parameters and Analyses” (Pages 4-5, 4-6)

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

9-26 Include detailed sections on “Cask Loading, Unloading, and Preparation Program” and “ISFSI Operations Program” as specified in NUREG-1745. Refer to Section 5.0 Administrative Control (Page 5.1-1)

NUREG-1745 states that the Standard TS include sections on Cask Loading, Unloading, and Preparation Program (under 5.1.2) and ISFSI Operations Program (Under 5.1.3). These specific sections are missing from the proposed Standard Technical Specifications associated with Amendment 11.

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

Note: Question 9-27 applies to SAR appendix W Chapter W.8, “Operating Procedures”

9-27 Provide a discussion in the SAR regarding expectations for the remote handling equipment design and reliability.

The reliability and operation of the remote handling device are crucial to worker safety from an ALARA perspective, and to safety of the cask system. TN should consider providing a discussion in the SAR regarding a description of the design and operational criteria that is expected of the remote handling devices associated with the lifting and

manipulation of the 75-ton cask system. TN should also consider operational parameters for the handling device that are being assumed in the dose analyses for an event in which the remote handling system "hangs" and the canister has to be recovered. (See also RAI 5-9(g) and 5-42).

In addition, the potential frequency of malfunctions is not clear for remote handling operations of the OS197L TC at any potential general licensee, and should be considered an off-normal event in accordance with Design Event criteria in ANSI/ANS 57.9. This is important because one primary bases for safety during this handling phase of the storage canister relies on distance between individuals and the bare transfer cask. This premise may not be true during recovery from an anticipated occurrence, malfunction, or other event with the remote handling equipment.

This information is needed to assess compliance with 10 CFR 72.11 and 10 CFR 72.236(d).