

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."
- Aspects associated with the reduced-weight transfer cask designated as the OS197L.

This request for additional information (RAI) identifies additional information needed by the Nuclear Regulatory Commission (NRC) staff in connection with its review of the amendment. The requested information is listed by section number and/or page number in TN's Safety Analysis Report (SAR) and associated documentation. 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 SAR and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

TECHNICAL SPECIFICATIONS – GENERAL

- 1-1 Technical Specifications 4.3.3(8), 4.3.3(9), 4.3.3(10) and 4.3.3(11) (former pages 4-26 and 4-27(added with December 21, 2007 responses to RAI #1)). These TS appear to have been removed without any specific discussion or justification. It is unclear whether they were removed purposefully with the August 14th responses to RAI #2, or inadvertently removed as a result of changed TS pages. (The subject TS were on pages that are now part of the ASME Code alternatives section. It is possible that a new page 4-32 could contain these TS, but was not provided with the August 14th responses to RAI #2.) Either provide the appropriate changed page(s), or provide the justification for removing the conditions from the TS. (See also RAIs 1-2, 2-1, 5-4, 5-7, 5-11, Q-3, Q-17, Q-35, and Q-38.)

It is inappropriate to remove conditions from the TS without explicitly providing an adequate justification.

- 1-2 Technical Specifications 5.5 Concrete Testing for HSM-H (former page 5.5-1). This TS appears to have been removed without any specific discussion or justification. It is

Enclosure

unclear whether it was removed purposefully with the responses to RAI #1 and RAI #2, or inadvertently removed as a result of changed TS pages. The TS go from 5.4 (pages 5-13 and 5-14) to 5.6 on page 5-15. In addition, TS 5.5 appears in the Table of Contents (page ii), which was unchanged with the RAI #2 update. Either provide the appropriate changed page(s), or provide the justification for removing the conditions from the TS. (See also RAIs 1-1, 2-1, 5-11, Q-3, Q-17, Q-35, and Q-38.)

It is inappropriate to remove conditions from the TS without explicitly providing an adequate justification.

CHAPTER 2 Structural Evaluation

- 2-1 Section W3.9. Provide analyses addressing the accidental drop for the OS197L TC supplemental shielding component, namely the top (outer) skid shielding, and include this analysis in the updated SAR. This component may be handled outside the fuel/reactor building.

The latest revision of this amendment in Section W3.9 indicates that the accidental drop of the top (outer) skid shielding is provided in Section W11.1.5. Reference to Section W11.1.5 is also made for the outer top shielding drop analyses on page 10-34 of the SAR (Tech Spec Bases). The staff could not locate this analysis in the current version of the application. (See also RAIs 5-11 and Q-38.)

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

- 2-2 Section W11.1.3. Provide the drop accident analysis for the OS197L TC and include a discussion of consequences subsequent to the accidental drop, as applicable, in the updated SAR.

The current revision of this amendment in Section W11.1.3 indicates that the discussion of the OS197L TC drop accident analysis is included in Section W3.1.3. The staff could not locate this analysis in the current version of the application.

This information is needed by the staff to confirm compliance with 10 CFR 72.236(l).

CHAPTER 5 Shielding Evaluation, and CHAPTER 8 Radiation Protection Evaluation

Certificate of Compliance

- 5-1 Provide suggested text to revise the CoC to acknowledge shielding as a design function of the TC, specify the maximum loaded weight (as opposed to a range) of the TC for each series (OS200, OS197, OS197L, etc.), and provide construction materials. In addition, in Section 3.d, add the trailer shielding for the OS197L.

This information is needed to provide an adequate description of the system to which the certificate applies. (See also RAI 5-14.)

Technical Specifications (TS)

- 5-2 Revise the TS so that in each place where Dry Storage Canisters (DSCs) are enumerated (2.1, 5.2.4(c), 5.2.4(e), 5.4.2, etc), all DSCs are included.

In the CoC the following DSCs are specified: 24P, 52B, 61BT, 32PT, 24PHB, 24PTH, 61BTH, and 32PTH1. In various parts of the TS, the following DSCs are included: 24P; 52B; 61BT; 32PT; 24PHB; 24PTH; 24PTH-S; 24PTH-L; 24PTH-S-LC; 24PTH-SLC; 61BTH; 61BTH, Type 1; 61BTH, Type 2; and 32PTH1. In the SAR the 24PT2 (S and L) is added. The CoC and TS need to include all the DSCs so that it is clear what fuel is allowed in each one and what conditions (e.g., dose rate limits) apply to each.

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-3 TS 1.1 Definitions (page TS 1-2). “TRANSFER OPERATIONS” – revise the following sentence as indicated below:

... TRANSFER OPERATIONS begin after the TRANSFER CASK has been placed horizontal on the transfer trailer (and for the OS197L, the supplemental trailer shielding has been put in place) ready for TRANSFER OPERATIONS and end when the TC is at its destination and no longer secured on the transfer trailer. ...

The proposed wording is not consistent with the definition of “LOADING OPERATIONS” provided on the preceding page.

- 5-4 TS 4.4 TRANSFER CASK Design Features (page TS-33). TS 4.4.1 (restriction of use to sites with limited crane capacity) was removed without any specific discussion or justification. Reinstatement the condition or provide the justification for removing the condition that staff had previously indicated should be included in the TS.

It is inappropriate to remove conditions from the TS without explicitly providing an adequate justification.

- 5-5 TS 5.2.4d Radiation Protection Program (page TS 5-7, last paragraph). Revise the first sentence to read as follows: “If the required limits are not met, any available commercial decontamination technique may be used on the entire length of the DSC outer surface to reduce the DSC surface contamination levels to below the required limits.”

This revision is needed to ensure there is no confusion with respect to the extent of the DSC surface that needs to be decontaminated in the event contamination levels are found to be above the specified levels.

- 5-6 TS 5.2.4e Radiation Protection Program (page TS 5-7). Verify and justify (by providing a citation in the RAI response to the appropriate table in the SAR) the values specified in

the dose rate limits tables. **(Note that this information was requested in RAI #2 as part of RAI 5.8, but was not satisfactorily addressed in the August 14th response.)**

The values in the TS need to have a clear link to analytical results. For example, in the non-OS197L table, an appropriate value for the axial surface dose rate for the 24P would seem to be 40 or 50 mrem/hour based on Table 7.3-2. If some other table (or text) justifies a higher value, please provide that citation in the RAI response. Similarly, in the OS197L table, an appropriate value for the axial surface dose rate would appear to be in the range of 120 to 130 mrem/hour based on Table M.5-5 which is cited in Section W.5.1.3 as bounding for both DSCs. In addition, based on Table W.5-3 or Table W.5-13, an appropriate value for the radial decontamination area surface dose rate limit would appear to be at most 60 mrem/hour. Based on these spot checks, all values in these tables need to be justified with respect to a value in an appropriate reference in the SAR.

This information is requested to satisfy the requirements of 10 CFR 72.236.

5-7 TS 5.4 HSM or HSM-H Dose Rate Evaluation Program (pages TS 5-13 through 14).

- a) Replace the end shield wall dose rate limit and measurement in TS 5.4.1 and TS 5.4.2 that was removed in this revision.
- b) Simplify the measurement process – specify the number and location of measurements, then compare each measurement to established limits. This may entail adding a separate dose rate limit for the bird screens.
- c) Confirm the values in the dose rate limit table in TS 5.4.2 and justify in the RAI response by providing a supporting citation in the SAR for each value. Do this for all the values, including those that will be added based on the items above in this RAI.

Information was deleted from the TS without a justification being provided. Staff has reviewed the proposed method for verifying the TS compliance and determined that a method that directly compares measured to calculated dose rates is preferable. The dose rate values in the TS need to be easily traceable to values in the Updated Final Safety Analysis Report (UFSAR).

Updated Final Safety Analysis Report

- 5-8 Section 1.3.2.1 On-Site TC (page 1.3-3). What is meant by the following statement (about three-fourths of the way down the page)? “In addition, the licensee may also elect to utilize a future transfer cask having a gross weight of about 113.4 Te (125 tons) which can be used on-site under 10CFR72, but is also suitable for future off-site shipment of intact NUHOMS[®] canisters under 10CFR71.” Note that the current review is for use under 10 CFR Part 72, only.

- 5-9 Section 3.1.2.1 Handling and Transfer Equipment – On-Site Transfer Cask (page 3.1-4). In the last paragraph, revise the third sentence to encompass the OS197L transfer cask for which the existing wording is not correct. One possible solution would be to modify the sentence so that it reads something like: “The cask provides ... the cask; the exception to this being the OS197L transfer cask which requires supplemental shielding to provide an equivalent level of protection.”

The SAR needs to be clear on the limitations and restrictions of the OS197L TC design.

- 5-10 Section B.10.5.2.4d Maximum DSC Removable Surface Contamination, BASES (page 10-31). Add a sentence to the second paragraph to clarify the extent of decontamination needed in the unlikely event that removable contamination above the specified level is found in the area surveyed. One possible wording could be: However, in the unlikely event that contamination is found that exceeds the specified levels, the entire length of the DSC surface needs to be decontaminated.

This revision is needed to ensure there is no confusion with respect to the extent of the DSC surface that needs to be decontaminated in the event contamination levels are found to be above the specified levels.

- 5-11 Missing Section W.11.1.5 (RAI #1 responses, page W.11-4).

- a) B.10.5.3.4 Supplemental Shielding Drop onto OS197L TC (BASES) (page 10-34). This paragraph refers the reader to Section W.11.1.5; however, there is no Section W.11.1.5 in the submittal. Please revise to refer to the appropriate section, or provide the information if not already included.
- b) W.3.9 Structural Evaluation of OS197L TC Supplemental Shielding Components (page W.3-4). The last paragraph in this section refers the reader to Section W.11.1.5; however, there is no Section W.11.1.5 in the submittal. Please revise to refer to the appropriate section, or provide the information if not already included.
- c) See also RAIs 2-1 and Q-38.

The submittal needs to be complete.

- 5-12 Appendix W – General. For each section that consists of the statement “**No change,**” provide the section (presumably in the main body of the SAR) that is being referenced.

This was addressed for the operations section in the August 14th response to RAI #2, question 5.25, but was not specifically requested for the entire appendix. However, since more instances of this ambiguous reference have been noted, the information is now being requested for all of Appendix W.

- 5-13 Section W.1.1, Introduction, Section W.1.2.2 (pages W.1-2 and W.1-3). Remove the phrase “any alternate suitable targeting system,” or specify how those alternate targeting systems can be verified to be suitable.

This information is requested to satisfy the requirements of 10 CFR 72.236(d).

- 5-14 Section W.1.1, Introduction (page W.1-2). The last sentence of the second to last paragraph states, “[t]he OS197L TC can be configured to meet a gross weight limit of 85 tons.” Clarify this sentence to indicate the empty weight (in tons), the nominal loaded weight (in tons), and the applicable 85-ton configuration.

This information is needed to provide an adequate description of the system to which the certificate applies. (See also RAI 5-1.)

- 5-15 Table W.1-2, OS197L TC UFSAR Sections Affected (page W.1-8). Provide a revised page W.1-8.

Given that Chapter 10 of the UFSAR was changed in response to the RAIs, it seems reasonable to assume that the corresponding table on page W.1-8 would be changed; however, a revised table was not provided.

- 5-16 Chapter W.5. Submit the shielding calculation(s) that document(s) the evaluation(s) done for this chapter. At a minimum, this should include calculations NUH06L-0503 and NUH06L-0504.

There are several aspects of the shielding evaluation that are not adequately/clearly explained in Chapter W.5. For example, it is not clear that the openings in the decontamination area shield or the vents in the transfer trailer shielding were incorporated into the shielding models. There is not sufficient justification for the assertion that the dose rate distribution above the DSC is the same as (or bounded by) that in Appendix M. Also, given that the maximum gamma and neutron dose rates may not occur at the same location and Chapter W.5 does not contain the dose rate distributions, it is difficult for staff to verify the maximum reported dose rates.

This information is necessary to complete the review.

- 5-17 Section W.5.1.2, Bounding Dose Rates as a Function of Distance (pages W.5-4, W.5-38, and W.5-40). Confirm what is plotted in Figure W-5-2 and revise the text, referenced table, and figure, appropriately.

The last paragraph indicates that the plotted values in Figure W.5-2 for the case “*Below Cask Support Skid when Cask is on Trailer with Inner and Outer Trailer Top Shielding*” come from Table W.5-14. However, Table W.5-14 indicates that its data represents the configuration “Prior to Installation of Outer Top Trailer Area Shielding.”

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-18 Section W.5.2, Source Specification (pages W.5-6 and W.5-7). Present a more illustrative example to support the assertion made regarding the bounding primary gamma source term in the 1.0 to 1.66 MeV and 2.0 to 3.0 MeV ranges.

The UFSAR states: "Consider a set of burnup and enrichment combinations with cooling times greater than a certain value in an FQT for a given decay heat restriction. The bounding primary gamma radiation source occurs at the lowest enrichment, and the lowest burnup combination of that set." The applicant's example set selection on page W.5-7 uses a burnup enrichment combination at cooling times exceeding 10.0 years. However for the FQT referenced, W.2-8, this threshold would include all the fuel presented in that table. Since this comparison varies burnup, enrichment and cooling time, it is not immediately clear how this set selection follows the guidance in NUREG-1536 SRP for Dry Cask Storage which states: "the shielding source term ... should be based on the lowest enrichment (for a given burnup)."

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-19 Section W.5.4, Shielding Evaluation (page W.5-14). Provide a representative input file in Chapter W.5 for the model used in the shielding evaluation.

This information is needed for staff to properly assess the method used in the shielding evaluation.

- 5-20 Section W.5.4.6.1, Source Term Assumptions (page W.5-17, second bullet). Revise the SAR here, and in other locations as needed, to correctly reflect the current operations. Further, determine whether the assertion made is still valid, and if so, provide the appropriate justification.

This write-up contradicts the August 14th response to RAI #2, question 5-15. The RAI response indicates water no longer needs to be drained from neutron shield; however, the SAR text contradicts this. (See also RAIs 5-24, 5-25, 5-28, 8-1, and Q-29.)

- 5-21 Section W.5.4.7, Summary of the Calculational MCNP Models (page W.5-18, first paragraph). Review and revise the next-to-last sentence of this paragraph to take into account the data in Tables W.5-8 and W.5-11. Further, review the last sentence and revise as needed.

The next-to-last sentence of this paragraph contains the phrase "all dose rate components" to justify the use of only the 32PT DSC analyses. However, examination of Tables W.5-8 and W.5-11 shows that dose rates for the 61BT exceed those for the 32PT near the top of the TC. The discussion should take this into account. In addition, in the last sentence of the first paragraph, the word "satiations" seems out of place. Perhaps "situations" was intended.

- 5-22 Section W.5.4.7, Summary of the Computational MCNP Models (page W.5-18, second paragraph). Review the figures cited in this paragraph, determine what figures were intended to be cited, and revise this paragraph accordingly.

In roughly the middle of the paragraph Figures W.5-1 and W.5-2 are cited as showing the quarter symmetry of the MCNP model. It does not appear that Figure W.5-2 is the correct figure to reference here. In the last sentence of the second paragraph, an incorrect figure appears to be referenced. Figure W.5-1 shows the shielding configuration. Figure W.5-2 has plots of dose rates and appears to be the correct figure to cite here.

- 5-23 Section W.5.4.7, Summary of the Computational MCNP Models (page W.5-18, numbered list item number 2). Revise this paragraph as needed so that it correctly reflects operational conditions and distinguishes between modeling assumptions and actual conditions as appropriate.

This item states that the DSC is assumed to be dry when placed in decontamination area shield – then further states that this is the expected configuration. This contradicts operating procedures on page W.8-16 that indicate the DSC contains water when lifted from pool.

- 5-24 Section W.5.4.7, Summary of the Computational MCNP Models (page W.5-19, numbered list item number 6). Revise this paragraph as needed to provide a clear, error-free description of the configuration modeled.

This discussion contains several ambiguous, unclear, or incorrect sections. For example, the first sentence presumably indicates the shielding model has 2.5 inches of shielding above the top half (radially) of the TC and 5.5 inches of supplemental shielding in the sides of the transfer trailer; however, this is unclear. It seems that this configuration applies to the last row of Table W.5-3, but that is not actually stated. At the end of the third line the text “at the bottom of the cask” is ambiguous. If the intent is to indicate that the model did not consider any shielding located underneath the cask (in its horizontal orientation on the trailer), then it should be more clearly stated. There is a reference to filling the neutron shield with water, but the August 14th responses to the RAIs indicate the neutron shield will not be drained. Also, this paragraph cites Figure W.5-7, but there is no such figure in the application. (See also RAIs 5-20, 5-25, 5-28, 5-30, 8-1, Q-29, and Q-33.)

- 5-25 Section W.5.4.8.3, Removable Two Piece Neutron Shield Dose ... (page W.5-21). Revise the discussion in the last paragraph of this section, citing appropriate sources.

The last paragraph of this section contains a flawed/misleading discussion of the dose rate effects of the seam in the neutron shield. Dose rates on the bare cask surface are compared to values from Table W.5-12 which is characterized (in this paragraph) as having no water in the neutron shield. However, the heading of Table W.5-12 clearly states that it is for normal conditions with water in the neutron shield. It appears that the appropriate values for comparison can be found in the fourth configuration presented in Table W.5-4. (See also RAIs 5-20, 5-24, 5-28, 8-1, and Q-29.)

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-26 Section W.5.4.9, Accident Models (page W.5-22). Review all cited tables for correctness of entries and correct any entries found to be in error, including those mentioned below. When citing sections in the SAR, provide citations to specific sub-sections or tables, not general citations to entire sections.

In the third bulleted item in the discussion of Table W.5-4, Tables W.5-7 and W.5-8 are cited. Several values in these three tables that appear to be identical are not equal. The discussion following the bulleted list cites Section M.5 as the source for the UFSAR values, but Table W.5-4 cites Table M.11-2.

- 5-27 Section W.5.4.10.2, Cask Decontamination (page W.5-23). Revise this discussion to take into account the fact that the OS197L sits inside a supplemental shield structure and discuss the operational differences that will affect how decontamination tasks are accomplished. Also, justify the use of Table W.5-8 dose rates and the assertion that the use of the axial dose rates from Appendix M is conservative.

While the radiation fields outside the OS197L supplemental shielding may be comparable to or bounded by those associated with the OS197, the OS197L is not accessible for decontamination in the same manner as the OS197 since the OS197L sits inside the supplemental shielding. This discussion needs to take this into consideration. Additionally, it is not apparent that it is appropriate to use Table W.5-8 exclusively in this discussion when Table W.5-11 has much higher dose rates at the top of the TC. A justification also needs to be provided to support the assertion that the axial dose rates from Appendix M bound those expected from the configuration in Appendix W. **Note that this information was requested in RAI #2 as part of RAI 5.32, but was not satisfactorily addressed in the August 14th response.**

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-28 Section W.5.4.10.4, TC Placement in the Transfer Trailer (page W.5-24). Revise this section, and the rest of Appendix W, to correctly reflect the status of the neutron shield with respect to whether or not it contains water.

This write-up contradicts the August 14th response to RAI #2, question 5-15: SAR text indicates the neutron shield is empty, and later that the neutron shield is to be filled after the TC is placed on the trailer – However, the RAI response indicates water no longer needs to be drained from neutron shield. Determine which approach is correct and ensure it is correctly implemented throughout the SAR. (See also RAIs 5-20, 5-24, 5-25, 8-1, and Q-29.)

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-29 Tables W.5-3 and W.5-4 (pages W.5-29 and W.5-30). For each configuration presented in these tables, provide the source of the data presented, similar to what is done in the first row.

This is needed to enable staff to identify and confirm the data presented.

- 5-30 Table W.5-3 footnote 3, and Table W.5-4 footnote 4 (pages W.5-29 and W.5-30). Revise these footnotes to clarify what configuration is represented by the reported values. If the reported dose rates do not reflect those expected at distances out to the side of the transfer trailer, then state this clearly.

It is unclear if the values presented in the last row of Table W.5-3 (and the next-to-last row of Table W.5-4) are meant to represent dose rates out to the side of the 5.5 inches of shielding in the trailer sides, or above the 2.5 inches of shielding over the TC. (See also RAI 5-24.)

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-31 Table W.5-4 (page W.5-30). Confirm the values presented in the last row of this table. Revise this table (and/or other tables) as necessary, or justify the different values presented.

Three of the four total dose rate values for the bare cask in the last configuration in this table do not agree with the dose rates in Table W.5-7 from which they presumably were taken.

- 5-32 Tables W.5-6, W.5-7, W.5-9, W.5-10, W.5-12, W.5-13, and W.5-14 (pages W.5-32, W.5-34, W.5-36, W.5-37, and W.5-38). Explain the method used to determine the relative error for the total dose rates (neutron plus gamma).

It is not apparent what method was used to determine these relative error values, and it does not appear that a standard error propagation method was used. **Note that this information was requested in RAI #2 as part of RAI 5.58, but was not satisfactorily addressed in the August 14th response.**

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 5-33 Calculation NUH06L-0503

Update the responses to questions in the March 27th RAI that indicated that calculation NUH06L-0503 had been revised in response to the RAI. **(See August 14th responses to RAI #2, questions 5.28, 5.29, and 5.31.)**

These questions relate to TN calculation NUH06L-0503. Each response began with "Calculation NUH06L-0503 is revised to provide guidance to the general licensee during off-normal conditions such as crane malfunction, by including a sample calculation." When staff requested a copy of the revised calculation, TN indicated that the 0503

calculation had only been revised to add a reference to another calculation, NUH06L-0506, which was later provided.

CHAPTER 8 Radiation Protection Evaluation

- 8-1 Section W.8.1.1, Preparation of the TC and DSC, Step 18.b (page W.8-14). Revise this step to be consistent with the commitment made in the August 14th response to RAI 5.15.

In the response to RAI 5.15, the applicant stated that the neutron shield would contain water at all times. Step 18.b appears to contradict or put qualifications on this commitment. (See also RAIs 5-20, 5-24, 5-25, 5-28 and Q-29.)

This information is requested to satisfy the requirements of 10 CFR 72.236.

- 8-2 Section W.8.1.2, DSC Fuel Loading (page W.8-14). Revise the note at the beginning of this section to make it clear that both remote crane operations and remote targeting are required with the OS197L system.

The note at the beginning of this section contains the phrase “**or other mitigating ALARA practices**” [emphasis added]. This SAR needs to be clear that both remote crane operations and remote targeting are needed with the OS197L system. **Note that this should have been corrected as part of the August 14th response to question 5.43 in the March 27th RAI.**

- 8-3 Section W.8.1.3, DSC Drying and Backfilling (page W.8-17). Revise step 4 to include a statement to indicate that the entire DSC length must be decontaminated if the top 12” is found to be contaminated above the stated levels.

This revision is needed to ensure there is no confusion with respect to the extent of the DSC surface that needs to be decontaminated in the event contamination levels are found to be above the specified levels.

- 8-4 Section W.8.4.1.1, Functional Description (page W.8-26). Expand the description of the OS197L transfer system to include the supplemental shielding.

The description given in the first paragraph of this section does not make it apparent that the OS197L TC includes the supplemental shielding for the decontamination area and the transfer trailer as part of the transfer system.

This information is requested to satisfy the requirements of 10 CFR 72.236.

CHAPTER 9 Acceptance Criteria and Maintenance Program

- 9-1 Section W.9, Acceptance Criteria and Maintenance Program (page W.9-1). Specify the locations in the UFSAR where the acceptance criteria and maintenance requirements pertaining to the OS197L are found.

The text in this section is similar to the “No change” statements in other sections. If this section is referring to other parts of the UFSAR, it should indicate the specific sections that are being cited.

CHAPTER 10 Radiation Protection

- 10-1 Section W.10.2, Inspection of Decontamination Shield Openings... (page W.10-4). Review, and revise as necessary, the dose rates and dose estimates in this section. Justify the chosen dose rates. Also, justify the assertion that the dose rate at the top of the OS197L TC (outside the decontamination area shield) drops below 100 mrem/hour for distances greater than 10 cm. Specify where in Section W.5 each of these results is located. Provide the supporting calculation document if needed.

An examination of Tables W.5-8 and W.5-11 indicates that (for short distances) dose rates increase as distance from the side of the TC increases, calling into question whether the use of the bare cask surface dose rates is conservative. Additionally, the dose rates at the level of the top openings appear to significantly exceed the chosen value, especially for the 61BT DSC. Further, it is not clear that Section W.5 supports the assertion that the dose rate at a distance of 10 cm outside the decontamination area shielding at the level of the top openings is below 100 mrem/hour. There is no indication that the model of the decontamination area shielding was sufficiently detailed to include the top and bottom openings. Further, this paragraph was not revised from the previous submittal, even though the projected dose rates changed significantly due to the limitations of the OS197L contents.

This information is requested to satisfy the requirements of 10 CFR 72.236.

The following RAIs reflect staff Quality Assurance concerns and questions.

In the March 27th RAI, in addition to the technical issues, staff identified numerous quality-related problems. In the August 14th response to RAI #2, question 5.55, TN indicated “[t]he revised Chapter W.5 is reviewed for elimination of typos and editorial inconsistencies.” Despite this, staff noted a large number of editorial problems in the current submittal; quality-related RAIs are included here. Collectively, these quality-related problems are of concern to the staff. TN is requested to document these quality-related problems in their corrective action system, identify the cause of these conditions, and identify the corrective action(s) taken to prevent repetition. In addition, TN should justify that the Quality Assurance program satisfies the requirements of 10 CFR 72.152 for Document Control, and 10 CFR 72.146 for Design Control.

- Q-1 Document Quality. The requirements in 10 CFR 72.146(b) state that the applicant shall establish measures for the identification and control of design interfaces and for coordination among participating design organizations. These measures must include the establishment of written procedures among participating design organizations for the

review, approval, release, distribution, and revision, of documents involving design interfaces. The requirements in 10 CFR 72.146(b) further state that, for the verifying or checking process, the licensee shall designate individuals or groups other than those who were responsible for the original design, but who may be from the same organization. The applicant shall apply design control measures to items such as the following: criticality physics, radiation, shielding, stress, thermal, hydraulic, and accident analyses; compatibility of materials; accessibility for in-service inspection, maintenance, and repair; features to facilitate decontamination; and delineation of acceptance criteria for inspections and tests. In addition, the requirements in 10 CFR 72.152 state that the applicant shall establish measures to control the issuance of documents such as instructions, procedures, and drawings, including changes, which prescribe all activities affecting quality. These measures must assure that documents, including changes, are reviewed for adequacy, and are approved for release by authorized personnel.

The applicant should demonstrate that appropriate design control measures have been established and that all values and analyses associated with the thermal and containment design (not limited to these RAIs) are accurate and reliable.

This information is required by the staff to determine compliance with 10 CFR 72.146 and 72.152.

- Q-2 TS Table of Contents (pages iv, v and vi). With the replacement of pages v and vi, according to RAI #2 responses, pages iv and v no longer align. (Page iv ends with Table 1-3f; page v begins with Table 1-5d.

Provide up-to-date Table of Contents pages for the TS.

- Q-3 TS Section 4.3 Storage Location Design Features (page 4-25). Existing page 4-25, from the responses to RAI #1, was not replaced with the responses to RAI #2. This page appears to be out of place, as it is within the ASME Code Alternatives section (pages 4-6 to 4-29). In addition, this page appears to be replaced by RAI #2 changed page 4-30. (See also RAIs 1-1, 1-2, 2-1, 5-11, Q-17, Q-35, and Q-38.)

Provide actual replacement page for 4-25.

- Q-4 TS 5.2.4a Radiation Protection Program (page TS 5-5). In item number 2 in the third paragraph, delete the word "rate."
- Q-5 TS 5.2.4d Radiation Protection Program – contamination limits (page TS 5-7). In the second paragraph, insert a period between "TC" and "Decon as necessary." It appears that punctuation is missing.
- Q-6 TS, Table 1-1I PWR Fuel Specification (page TS T-13). Numbers in second column do not align with criteria in first column.
- Q-7 TS, Table 1-6d (page TS T-80). Revise the footnote to this table to refer to the notes on the preceding page in the Technical Specifications, instead of the page in the UFSAR.

- Q-8 Section 4.7.3.3 Transport Cask Lifting Yoke, and text just preceding (page 4.7-7). Determine whether the use of the term “transport cask” in the heading of this section, at the end of the preceding paragraph, and elsewhere in the UFSAR is as intended.

There are specifications in the UFSAR for the transfer cask and associated equipment. If the term “transport cask” is used interchangeably with “transfer cask,” the UFSAR should make that clear.

- Q-9 Chapter 7, Radiation Protection (page 7.1-1). Revise the wording in the first sentence on this page so that it makes sense. It appears that the words “and transfer in the standardized cask, OS197 or OS197H TCs” got inserted after “-52B” when they should have been inserted after “Model 102.”
- Q-10 Section W.1.2.2, Operational Features (page W.1-3). At the end of the second paragraph in Section W.1.2.2, Technical Specification “5.3.2.4.a” should be “5.2.4.a.”
- Q-11 Section W.1.4, Generic Cask Arrays (page W.1-4). Revise this section to clarify what is not being changed. Cite the specific section to which this refers.
- Q-12 Table W.1-1, Comparison of Key Parameters... (page W.1-6). The “OS197L TC” column of the “Top Cover Assembly” row has a reference to the use of the interim aluminum cover. Based on information in the RAI response, it appears this note should be deleted.
- Q-13 Table W.1-2, OS197L TC UFSAR Sections Affected (page W.1-7). In the last column of the last row delete “needs to be.”
- Q-14 Figure W.1-1, OS197L Configuration (page W.1-9). Is “LIGHT” or “LIQUID” the correct word in the label on the neutron shield assembly?
- Q-15 Section W.2.1, Spent Fuel To Be Stored (page W.2-1). Near the end of the second line in the first paragraph of Section W.2.1, delete the word “are.”
- Q-16 Notes for Tables W.2-7 and W.2-8 (page W.2-12). Correct the fifth bulleted item as needed.

The enrichment limitations state that “fuel with an initial enrichment less than 21.01 and greater than 5.0 wt % U-235 is unacceptable for storage.” The first number in the range limitation seems to be a typo since 21.01 is already greater than 5.0.

- Q-17 Pages W.3-6 to W.3-12. The List of Changed CoC, Technical Specifications and UFSAR Pages Associated with Amendment 11, Revision 2 for RAI #2 does not specify that these pages should be removed with the change; however, page W.3-6 appears to be extraneous given changed page W.3-5.

Clarify which of these pages are integral to Chapter W.3, and provide new/revised pages as appropriate. In addition, provide revised list of changed pages indicating deletions as appropriate. (See also RAIs 1-1, 1-2, 2-1, 5-11, Q-3, Q-35, and Q-38.)

- Q-18 Section W.5.1.2, Bounding Dose Rates as a Function of Distance (page W.5-3). The second paragraph states three shielding configurations are presented in the plot. However, the first item contains two shielding configurations. Revise this paragraph to clearly describe the number of shielding configurations considered.
- Q-19 Section W.5.2.1, Methodology for Determination of Bounding ... (page W.5-9), and Section W.5.2.3, Bounding Radiological Sources...(page W.5-13). It appears that Tables K.2-11 and M.2-5 ["M.2.5" in SAR text] have been duplicated in Appendix W as Tables W.2-4 and W.2-7, respectively. Given that, it would seem that it would be better to refer to the version of each table that has been specifically modified for Appendix W instead of referring back to the original tables.
- Q-20 Section W.5.2.2.1, Bounding Radiological Sources for FAs in ... (page W.5-10). The words "...on the surface of the cask containing a 32PT DSC at NC" appear a little beyond halfway down the paragraph. Define "NC." This term is not in the list of abbreviations.
- Q-21 Section W.5.2.2.1, Bounding Radiological Sources for FAs in ... (page W.5-11), and Section W.5.2.2.2, Bounding Radiological Sources for FAs in ... (page W.5-12). On these pages there are five instances of the U content of 32PT design basis fuel assembly being specified as 0.475 **kg** instead of 0.475 **MT** per fuel assembly. Correct these and ensure there are no other instances of this (or any similar) error.
- Q-22 Section W.5.2.4, Spectral Distributions of Neutron Source Terms ... (page W-5-13). The reference number cited [5.20] is incorrect. It appears that "5.20" should be "5.2." Correct this. In addition, provide the page number and/or section number in this reference where this information is found.
- Q-23 Section W.5.4.2, Spatial Source Distribution (page W.5-15). Revise the section number for the referenced section. The section cited, W.5.2.4, is incorrect. Section W.5.2.4 deals with the neutron spectrum. The correct section to cite appears to be W.5.2.5 which does deal with axial peaking.
- Q-24 Section W.5.4.6.1 Source Term Assumptions, first bullet (page W.5-17). Revise the section number for the referenced section. The section cited, W.5.2.3, is incorrect. Section W.5.2.3 deals with bounding sources. The correct section to cite appears to be W.5.2.4 which does deal with the neutron spectrum.
- Q-25 Page W.5-20.
In the first paragraph, "on an around" should be "on and around"

In the third paragraph, “and he other” should be “and **the** other”

In the fifth paragraph, “shells is modeled” should be “shells **are** modeled.” Also, “neuron shield” should be “**neutron** shield.”

Reword the second and last sentences in the last paragraph on this page to be clearer. This may be as simple as moving “bounding” from behind to in front of “results,” but the current wording in this paragraph is unclear.

- Q-26 Section W.5.4.10.3, Welding Operations (page W.5-23). Revise this paragraph to correctly reflect expected conditions. If any conditions are assumed for ease of analysis, be sure to distinguish between what is expected and what is assumed.

In this paragraph, the SAR states that the DSC is dry – this is inconsistent with discussions of operations in Chapter W.8. This may be meant to indicate that the DSC is **assumed** to be dry for dose rate calculations, or it may be a carry-over from an earlier version. If the DSC is dry at this point in the operation, then the operations section needs to be revised.

- Q-27 Section W.5.4.10.2, Cask Decontamination (page W.5-23). In the last sentence of this paragraph, the word “is” is used twice. In both instances, the correct verb would be “**are**.”

- Q-28 Section W.5.4.10.4, TC Placement in the Transfer Trailer (page W.5-24). The first paragraph of this section cites Figure W.5-7. There is no such figure in Section W.5. Correct this here and anywhere else it occurs.

- Q-29 Section W.5.4.10.5, Cask Transfer to ISFSI Operations (page W.5-25). Review the citations to various tables and sections. Revise as necessary.

The citation to Table W.5-9, appears to be incorrect. Table W.5-9 has dose rates for the bare OS197L TC. The correct table to cite appears to be W.5-4 which has a set of entries for a shielded OS197L without water in the neutron shield. (See also RAIs 5-20, 5-24, 5-25, 5-28, and 8-1.)

- Q-30 Tables in Appendix W. The tables in Appendix W that present dose rates by component (i.e., gamma and neutron) plus total should have the same footnote that similar tables in other appendices have; specifically, “Gamma and Neutron dose rate peaks do not always occur at same location; therefore, the total dose rate is not always the sum of the gamma plus neutron dose rate.”

- Q-31 Table W.5-3, Summary On OS197L TC Normal... (pages W.5-29 and W.5-30). The title of this table should probably read, “Summary **Of** OS197L....”

The heading in the 4.57 meters column is missing a closing parenthesis.

The text "Table W.5-14" that appears three times in the footnotes is in a different font (and size) than the rest of the footnote text.

In footnote 2 to this table, it seems that "OS197L" needs to be inserted between "bare" and "cask" to make this a clear statement. Revise this accordingly.

- Q-32 Tables W.5-3 through W.5-14 (pages W.5-29 through W.5-38). In these tables dose rates are presented with anywhere from two to seven significant figures. The large number of significant digits frequently used gives the impression that there is a level of certainty in the modeling results that is not warranted.
- Q-33 Table W.5-13, OS197L Radial Dose Rates with...(page W.5-37). The note following this table refers to Figure W.5-7. This figure is not included in the document. Correct this note by either including the figure, or citing the correct figure. (See also RAI 5-24.)
- Q-34 W.8.1.1, Preparation of the TC and DSC, Step 11 (page W.8-14). Revise this step to make its meaning clear.

This step contains the following text: "water from the fuel pool and equivalent source or demineralized water." It seems that this may have been meant to read as: "water from the fuel pool, an equivalent source, or demineralized water."

- Q-35 Page W.8-29. The List of Changed CoC, Technical Specifications and UFSAR Pages Associated with Amendment 11, Revision 2 for RAI #2 does not specify that this page should be removed with the change; however, page W.8-29 appears to be extraneous given changed page W.8-28. (See also RAIs 1-1, 1-2, 2-1, 5-11, Q-3, Q-17, and Q-38.)

Provide revised list of changed pages indicating deletions as appropriate.

- Q-36 Section W.10.1, Recovery/Repair Operations ...(page W.10-2). Revise step #5 to correctly reflect the expected steps.

Step 5 specifies that the worker stays on the cask top while it is lowered and tilted on its side. In addition to being very questionable with respect to safety, this is inconsistent with #5 on the next page that indicates that the distance between the worker and the cask is increasing at this point.

- Q-37 Section W.11.1.4, Loss of Neutron Shield (page W.11-2). Correct the description of the middle configuration in the provided table.

As submitted, the description of the second configuration in the table yields the same geometry as the bare cask in the third configuration listed. By referring back to Table W.5-4, it appears that the second configuration was meant to be with the inner supplemental shield, but without the outer shield.

Q-38 Pages W.11-3 to W.11-4. The List of Changed CoC, Technical Specifications and UFSAR Pages Associated with Amendment 11, Revision 2 for RAI #2 does not specify that page W.11-4 should be removed with the change; however, the transition between new page W.11-3 and RAI #1 page W.11-4 appears to indicate that something is missing here, or that page W.11-4 is no longer necessary.

Provide new/revised pages as appropriate. In addition, provide revised list of changed pages indicating deletions as appropriate. (See also RAIs 1-1, 1-2, 2-1, 5-11, Q-3, Q-17, and Q-35.) +