HOLTEC INTERNATIONAL

DOCKET NO. 72-1014

SECOND REQUEST FOR ADDITIONAL INFORMATION

RELATED TO THE HI-STORM100U SYSTEM

By submittal dated April 27, 2007, Holtec International (Holtec) requested approval of an application for proposed amendment #6 to the Hi-Storm 100 system spent fuel storage cask design. The amendment proposes revisions to the Holtec Hi-Storm 100 Certificate of Compliance (CoC), technical specifications (TSs), and Final Safety Analysis Report (FSAR). The amendment application was supplemented on June 12, and July 14, 2008, in response to the U. S. Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) dated February 28, 2008. Additionally, the staff met with Holtec to discuss the RAI responses on March 27, and April 28, 2008.

This second request for additional information (RAI) identifies additional information needed by the staff in connection with its review of the Hi-Storm 100U amendment application. The requested information is listed by chapter number and title in the applicant's proposed FSAR. 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 FSAR and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

General Comments

G-1 Make the following changes to the proposed TSs and the associated FSAR sections to correct inconsistencies:

a. TS Appendix B, Table 2.1-1, III.A.1.e.i (currently the first e) should be changed to III.A.1.d.i and the burnup units should read as "(MWd/MTIHM)."
b. TS Appendix B, Table 2.1-1, III.A.1.e.i (currently the second e), "6X6b" should be "6x6B."
c. The accuracy of notes indicating overpacks without shield shells have higher density concrete should be verified (e.g., see FSAR pages 1.2-20 and 9.1-9).
d. On page 2.1-9 of the FSAR, the definition of q for equation j, at the end, should read "or 2.1.9.1.2 (kW)."
e. Table 2.1.24, in "Other Limitations," does not list the correct allowable locations of neutron source assemblies (NSAs); the other tables for PWR MPCs should also be verified to list the correct allowable locations of NSAs – the TS descriptions are correct.
f. Table 5.1.9 is missing the footnotes.
g. The accuracy of the footnotes for class 14x14E assemblies on FSAR pages 6.1-10 and 6.1-18 should be verified.

h. Clarify the last sentence of the third paragraph of FSAR Section 6.2.4.1 that damaged BWR fuel assemblies or fuel debris may also be stored in the MPC-68 or MPC-68F
i. TS Appendix B 3.4.9 should have attached at the end the words "and must be evaluated to determine the applicable Quality Assurance Category."
j. TS Appendix B, Section 2.4 should include the decay heat limits for damaged fuel and fuel debris for each of the MPCs, as is indicated to be so per the respective entries in Table 2.1-1 of Appendix B for each MPC; Table 2.4-1 includes limits for only intact fuel assemblies.
k. TS Appendix B Table 2.1-1, IV.A.1.g and V.A.1.g should be modified to remove the two instances of "and DFC" in each statement unless intact fuel is to be/can be loaded into the MPC in damaged fuel canisters.

These items were found in a review of material submitted in response to question G-1 of the previous RAI. The FSAR should be internally consistent and consistent with the proposed CoC and TSs to ensure proper understanding of the design and the supporting analyses. With regard to item j, the staff notes that the decay heat limits for damaged fuel and fuel debris previously differed from the limits for intact fuel. If the limits are to be the same, the basis for this change should be provided.

This information is needed to confirm compliance with 10 CFR 72.236(a), (c), and (d).

G-2 Verify that all proposed CoC, TSs, and FSAR changes proposed in the current amendment request are properly marked and justified.

The staff noted that a few items are new to the proposed CoC and TSs. Examples of these items include the addition of the text "for aboveground systems only" to Condition 10.j of the proposed CoC, the addition of the definition of "Support Foundation" to the proposed TSs, Appendix A definitions, and the change of the page number of TS Appendix B, Section 3.4 (changed from 3-13 to 3-15). The nature of the changes should be described and justified or the change revised with appropriate bases provided.

This information is needed to confirm compliance with 10 CFR 72.244.

G-3 Verify the consistency of the proposed CoC, TSs, and FSAR changes proposed in the current amendment request.

The staff noticed that some of the information submitted in response to question G-1 of the previous RAI does not appear to be internally consistent. In particular, there were some items that had been a part of Amendment 4, the focus of which was a version of the HI-STORM 100 system specific to Indian Point Unit 1 (IP 1), that were removed from the proposed CoC, TSs, and FSAR, while others were retained. For example, the Amendment 4 version of the TS definition of Transport Operations was retained; however, this definition differs from how it appears in Amendment 5, which is the basis amendment for the current application. Also, notes regarding IP 1 are included in the technical drawings for the 100 S Version B overpack; however, notes for IP 1 are removed from the drawings for the MPC enclosure vessel and the MPC-32 fuel basket assembly. The basis for the removal or retention of various items associated with Amendment 4 should be explained and properly justified.

This information is needed to confirm compliance with 10 CFR 72.244.

Chapter 2.I Principal Design Criteria

2-1 Provide detailed discussion describing how any alternative materials procured in accordance with ISO materials standards would comply with all the material property and quality (QA/QC) requirements of the ASME Code (the code of construction for the 100-U).

FSAR supplemental page 2.I-2 references the use of ISO standards for substitute materials for important to safety (ITS) components. Although the use of foreign standards is not precluded, the use of ISO materials standards (or any foreign standard) requires additional discussion/information demonstrating that the proposed material standard(s) comply with all of the material property and QA/QC requirements of the governing construction code (the ASME Code in the case of the 100-U design). Absent a specific foreign material specification or grade, the staff is unable to make a regulatory finding regarding the acceptability of a foreign material for an ITS component.

For containment or confinement boundary components, ASME Code materials are always preferred. Specific alternatives may be reviewed for acceptance. For other ITS components, ASME or ASTM materials are preferred. Specific alternatives may be reviewed for acceptance. ITS materials must meet all the property and quality (QA/QC) requirements of the governing construction code.

This change is necessary for compliance with 10 CFR 72.122(a).

2-2 Clarify FSAR page 2.3-14 to specify that U.S. national standard (e.g. ASME, ASTM) material specifications will be used for ITS components.

Use of foreign materials specifications is generally not acceptable unless a detailed discussion shows how a specific material complies with the governing construction code.

This change is necessary for compliance with 10 CFR 72.122(a).

Chapter 3.I Structural Evaluation

3-1 Revise the stress analysis of the MPC confinement boundary in Calculation-07 of Calculation Package HI-2053389 to incorporate an evaluation of the maximum stresses occurring in the Multi-Purpose Canister (MPC) shell during the seismic event.

Calculation-07 evaluates the Cavity Enclosure Container (CEC) outer shell and the MPC shell. For the CEC evaluation it is stated that "The maximum stress (19.87 ksi) is smaller than the yield strength of the material (37.15 ksi), indicating that the structural integrity of the CEC shell is not compromised…." For the MPC shell neither the maximum stress nor the maximum stress intensity is evaluated. Instead, an estimate of an average maximum primary stress intensity (2 x 5.32 ksi = 10.64 ksi) resulting from the MPC shell acting in a beam-like fashion is derived from the colors on a stress contour plot (Calculation-07, Figure 7) and compared to the Level D allowable primary stress intensity (36.8 ksi, FSAR Table 3.I.7). This calculation needs to be carried a step further to include an evaluation of the maximum stress intensity acting on the confinement boundary. The maximum stress intensity should be compared to the appropriate allowable stress or an acceptance criterion that would demonstrate that the structural integrity of the confinement boundary is maintained.

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

3-2 For the LS-DYNA seismic model, provide a convergence study to demonstrate that the maximum stresses in the MPC shell elements in the vicinity of the impact with the MPC Guide Ribs are reasonably accurate.

The MPC shell elements use single point integration in the plane of the element with three integration points through the thickness. This is the lowest order of integration, and as such, the element can only develop a constant moment along its length. In addition the shell mesh in the vicinity of the Guide Ribs is very coarse. The coarseness of the mesh combined with single point integration may lead to a significant underestimate of maximum stresses. Accuracy of the results from a finite element model is essential to demonstrating the structural integrity of the confinement boundary during an accident event.

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

3-3 Revise the proposed TSs and FSAR to require a site specific seismic analysis for any construction activity involving excavation near an installed independent spent fuel storage installation (ISFSI) to verify that the stability of the Support Foundation, the ISFSI Pad and the soil within the Radiation Protection Space is bounded by the accident analysis in Chapter 11 (see question 11-1).

The HI-STORM 100 has structurally integral and secure shielding that remains integral with the system during all operational movements and under all accident conditions including any ISFSI site construction activities. Unlike the HI-STORM 100, the HI-STORM 100U has nonintegral shielding (soil) which is susceptible to being stripped from the system as a result of human error or a seismic event occurring during construction activities involving excavation near the installed ISFSI.

At an ISFSI site adjacent to an existing Vertical Ventilated Module (VVM) array, the FSAR calls for excavating the soil beneath the new Support Foundation down to bedrock and replacing the removed soil with engineered fill (FSAR page 3.I-21). For the VVM example array discussed in the FSAR, this would require a 30 foot deep excavation below the bottom of the Support Foundation, resulting in a total excavation depth of 50 feet, at a horizontal distance from the edge of the array that could be as little as the Radiation Protection Space distance. This constitutes a potentially large open pit excavation adjacent to an existing ISFSI site, where the consequences of soil instability and the resulting loss of shielding are significantly greater than they would be for an above ground ISFSI.

This information is necessary to ensure compliance with 10 CFR 72.236(b) and (g).

3-4 Revise the design of the CEC outer shell or the calculations performed to determine the stresses in the CEC shell due to subsurface lateral pressure caused by transporter loading and substrate overburden to ensure that the shell stresses are less than the Service Level A allowable values. (See evaluation beginning on FSAR page 3.I-12.) Transporter loading and soil overburden pressure are normal loading conditions (FSAR

Section 2.I.3). For Class 3 plate and shell structures the primary membrane plus bending allowable stress for Service Level A (normal conditions) is 26.3 ksi (FSAR Table 3.I.3 (b)). The allowable stress used in the evaluation of the CEC shell is 37.15 ksi, which is the yield stress.

The staff recognizes that Table 2.I.5 specifies the CEC shell material yield strength as the acceptance criteria for CEC loading by soil lateral pressure. However, due to the large uncertainty involving the calculation of lateral soil pressure and its effects on buried structures, and the fact that the CEC cannot be reliably inspected, the staff regards using the Service Level A stress limits to be more appropriate than the yield stress.

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

3-5 In Table 2.I.3, Item 12, Stress Analysis, Explanation and Applicability, the last sentence states "These conditions maybe, but are not required to be, invoked." Provide all instances where these conditions have **not** been invoked, and justify why the appropriate ASME Code paragraphs were not used.

VVM primary load bearing parts must be evaluated to appropriate standards and criteria.

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

3-6 FSAR Section 1.I.4 allows each VVM to potentially rest on its own Support Foundation "Padlet" rather than on a continuous reinforced concrete mat supporting all VVMs in an array. Provide clear wording in the FSAR, proposed CoC and TS to the effect that all VVMs in an array shall rest on a continuous reinforced concrete Support Foundation spanning the entire array.

The FSAR states that "The Support Foundation… must be designed… to minimize long-term settlement…" (FSAR page 1.I-5). The use of individual padlets, each to support a single VVM, works against this design requirement. Because VVMs may be either loaded or unloaded for long periods of time, the use of individual VVM padlets may lead to unacceptable differential settlement between adjacent VVMs. Such differential settlement can be completely avoided by using a continuous reinforced concrete Support Foundation. In addition, a continuous Support Foundation can span over potentially softer soil and provides added assurance against instability during construction activities associated with future ISFSI array construction. .

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

3-7 Provide reinforced concrete design criteria in Table 2.I.1

Design criteria for unreinforced concrete has been specified in Table 2.I.1, however no design criteria has been specified for reinforced concrete. This information is necessary to ensure compliance with 10 CFR 72.236(b).

3-8 Provide a complete listing in the FSAR of all HI-STORM 100U components that are important to safety (ITS).

Table 2.I.8 provides only a partial list of ITS components. HI-STORM 100U components missing from this table include: the Support Foundation, the ISFSI Pad (consisting of the VVM Interface Pad and Top Surface Pad) and the lateral subgrade.

This information is necessary to ensure compliance with 10 CFR 72.24(c)(3).

3-9 Provide the minimum steel reinforcement requirements for the Support Foundation based on the seismic analyses that have been performed and the structural criteria to minimize long-term settlement. Also, provide the minimum steel reinforcement requirements for the VVM Interface Pad and Top Surface Pad necessary to safely carry the loaded transporter.

10 CFR 72.24 states that "The minimum information to be included in the SAR must consist of the following:

> (c) The design of the ISFSI in sufficient detail to support the findings in 72.40,including:…
>
> (2) the design bases and the relation of the design bases to the design criteria;
>
> (d) an analysis and evaluation of the design…"

10 CFR 72.3 defines design bases as "that information that identifies the specific functions to be performed by a structure, system, or component of a facility or of a spent fuel storage cask and the specific values or range of values chosen for controlling parameters as reference bounds for design."

In this regard a reinforced concrete pad or foundation slab constitutes a design when the thickness, concrete strength and reinforcement have been specified.

Regarding the Support Foundation, two additional points need to be made.

> (1) In Holtec's June 12, 2008 response to RAI-3.12 it is stated that "The Support Foundation is characterized as an 'interfacing SSC' in Supplement 3.I, and historically detailed design of an interfacing SSC is not the purview of the FSAR." The staff takes exception to this statement. The Support Foundation is a HI-STORM 100U component that is important to safety. In 10 CFR 72.236(b) it is stated that "Design bases and design criteria must be provided for structures, systems and components important to safety."
>
> (2)Holtec's response also states that "The Support Foundation structural analysis performed by the general licensee follows the same methodology applied to above ground ISFSI pads by Holtec International but is not a part of the FSAR…" The staff takes exception to this statement as well. The staff agrees that the design of ISFSI Pads for stand alone storage casks, such as the HI-STORM 100, is not a part of the FSAR. However, in the HI-STORM 100U FSAR the "ISFSI Pad, " the Support Foundation, is an essential component of the HI-STORM 100U design that is important to safety and is a part of the FSAR.

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

3-10 Provide specific values or ranges of values in proposed CoC Section 3.4, Site-Specific Parameters and Analyses, for all the parameters involved in the seismic evaluations completed for an isolated HI-STORM 100U VVM analyses in the FSAR, that must be verified by a potential user of the HI-STORM 100U System to determine whether their proposed site characteristics are encompassed by these values.

10 CFR 72.24 states that "The minimum information to be included in the SAR must consist of the following:

(c) The design of the ISFSI in sufficient detail to support the findings in 72.40, including:
(2) the design bases and the relation of the design bases to the design criteria;
(d) an analysis and evaluation of the design…"

10 CFR 72.3 defines design bases as "that information that identifies the specific functions to be performed by a structure, system, or component of a facility or of a spent fuel storage cask and the specific values or range of values chosen for controlling parameters as reference bounds for design."

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

3-11 Revise proposed CoC Section 3.4, Site-Specific Parameters and Analysis, Items 6(c) and 7 to change the shear wave velocity from 500 fps to 800 fps to reflect the actual shear wave velocity of the soil below the Support Foundation that was used in the seismic analyses.

The minimum information to be included in the FSAR must consist of "an analysis and evaluation of the design…" [72.24(d)]. The shear wave velocity of the soil below the Support Foundation used in the analysis was 800 fps and constitutes the design that was evaluated.

This information is necessary to ensure compliance with 10 CFR 72.24(d).

3-12 Provide an evaluation of the increase in internal pressure (if any) based on the increased temperatures in Section 4.I of the FSAR. Evaluate the stresses on the MPC confinement boundary.

An evaluation does not appear in the FSAR, and is needed to verify the integrity of the confinement system with increased internal pressures.

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

Chapter 5.I Shielding Evaluation

5-1 Justify the use of a different source term for the dose evaluations for streaming from the empty VVM and the impressed current cathodic protection system (ICCPS) test station.

The applicant's response to question 5-2 of the previous RAI demonstrated that fuel with a burnup of 69,000 GWd/MTU and 5 years of cooling yielded the bounding dose rates for the 100U overpack. However, in responding to questions 10-3 and 10-4 of the previous RAI, regarding streaming from an empty neighboring VVM and through the

ICCPS test station, fuel of a different burnup and cooling time was used for the source term. The shielding evaluation should be based upon analyses that use the bounding source term for the analyzed conditions to demonstrate that the system design basis meets the regulatory safety requirements. Staff recognizes that different source terms (i.e., fuel with different burnup values and cooling times) may be bounding in some conditions and not in others. However, it is not clear that the source term for the empty VVM and ICCPS is bounding for these cases.

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

5-2.1 Provide updated figures for proposed Section 5.I of the application.

The applicant's response to question 5-4 of the previous RAI indicates that the Section 5.I figures were modified; however, the figures were not included with the updated application.

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

Chapter 8 Operating Procedures

8-1 Provide a proposed TS stating that the fuel be maintained under water or shielded from the atmosphere by an inert gas during loading/unloading operations.

FSAR sections 8.1.5 and 8.3.3 describe loading/unloading operations and contain a caution about maintaining the fuel under water or in an inert atmosphere. This caution should be stated in the proposed TSs and a note added to the FSAR language to indicate this is a TS requirement.

This change is necessary to comply with 10 CFR 72.122(h)(1).

8-2 Provide a comment in FSAR sections 8.1 and 8.3 specifying that hydrogen monitoring during all lid welding or cutting operations is a TS requirement. This is an editorial change, as hydrogen monitoring is already a TS requirement, but no mention is made in FSAR Chapter 8.

This change is necessary for compliance with 10 CFR 72.120(d).

Chapter 9 Acceptance Criteria and Maintenance

9-1 Revise proposed TSs and FSAR Tables 2.0.1, 2.2.15, and 9.1.4 to require a fabrication-shop performed helium leakage rate test of the canister shell.

A shop helium leak test (per ANSI 14.5) will be performed to reasonably ensure that the confinement boundary is free of any through wall flaws that could cause leakage in excess of the design basis and to meet the leakage acceptance criteria associated with the field pressure test. The Helium leak test should be conducted to the leak tight criteria of ANSI 14.5. Otherwise in accordance with ISG-5, Rev.1, a dose calculation based on a higher leakage rate must be performed to demonstrate compliance with Part 72 dose limits

A dose limit calculation is required by 10 CFR 72.126(d), which states, in part: “Analyses must be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in 10 CFR 72.104. Analyses of design basis accidents must be made to show that releases to the general environment will be within the exposure limits given in 10 CFR 72.106.” However, the staff position is that performance of a helium leakage rate test, per ANSI N14.5, to “leak-tight” (10E-7) criteria is an acceptable alternative to performing the dose limit calculations required by 72.126(d), 72.236(d),(j), and (l).

Note: The staff finds that due to the reduced ability to perform a volumetric examination of the various lid closure welds, both a Code pressure test and helium leakage rate test to 10E-7 is required for the lid closure welds.

This change is necessary for compliance with 10 CFR 72.126(d), 72.104, 72.106, 72.236(d),(j), and (l).

Chapter 10.I Radiation Protection

10-1 Clarify the portion of FSAR Table 10.3.3c, referred to in part of the response to question 10-2 of the previous RAI.

In partial response to question 10-2 of the previous RAI regarding occupational dose incurred with installation of the Hi-Storm 100U overpack lid, the applicant modified Section 10.I of the application. The modification references Table 10.3.3c of the FSAR; however, it is not clear what portion of the table is referred to as the basis for determining operation duration, and hence the estimated occupational dose, for the Hi-Storm 100U overpack lid installation.

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

10-2 Justify the determination made in Section 10.I of the application regarding dose rates from the test station for the ICCPS.

In Section 5.I of the application, the applicant provided the dose rate calculated for the ICCPS surface and stated in Section 10.I of the application that this result indicated that streaming from the test station is not a concern. However, there are several assumptions included in the analysis and evaluation that are not explained nor justified as part of the evaluation. For example, it is not clear that the selected burnup and cooling times result in a bounding source for this location. There does not appear to be details in the application regarding the size (area) of the test station through which streaming occurs, including any limits on the test station size.

Additionally, it is not clear where the test station is located in relation to the loaded VVM and whether or not the analyzed position is bounding, from a shielding or a dose rate perspective, with regard to the possible positions of the test station in relation to the VVM. For example, if the calculated dose rate is for a test station that is about 1 meter from the VVM lid, then the contribution to worker dose, for activities involving the test station, would be significant; the dose rate would be nearly double versus activities at the same distance from the VVM lid away from the test station. Even near the VVM lid, the dose rate for the test station is greater than 10% of the inlet vent dose rate. In either case, the FSAR should convey, to the user, the need to be aware that dose rates for activities near to/involving the ICCPS test station will be noticeably higher than for activities in similar locations relative to the VVM, but away from the test station.

This information is needed to ensure compliance with 10 CFR 72.104, 72.236(d) and 10 CFR 20.1101.

Chapter 11.I Accident Analysis

11-1 Revise the Chapter 11 accident evaluations to address all accident scenarios currently analyzed for storage conditions (including seismic) occurring with construction and excavation activities taking place next to an array of loaded VVMs. Also provide the necessary modifications to the technical evaluations and analyses (e.g., structural, shielding, etc.) that support, or are impacted by, the accident evaluations. (See also question 3-3.)

Section 1.I.1 of the application indicates that an ISFSI using the Hi-Storm 100U design may be expanded to increase the number of storage modules as the need arises. This expansion requires the excavation of soil adjacent to an existing array of VVMs and further construction activities to install additional modules. The accident evaluations in the currently proposed SAR do not address accidents at an ISFSI using the Hi-Storm 100U system with these activities occurring next to the array of loaded VVMs. The occurrence of these activities next to an array of already installed (and loaded) VVMs results in additional conditions that must be considered as part of the accident evaluations for the Hi-Storm 100U system, due to its unique design. Necessary modifications to other technical analyses and evaluations that support, or are impacted by, the accident evaluations (such as shielding and structural) should also be provided. These analyses and evaluations should consider the current design basis accidents and phenomena and any other accidents unique to construction and excavation activities near an operating ISFSI of Hi-Storm 100U VVMs.

The staff notes that in response to the initial RAI (question 11-1) regarding this issue, the applicant only performed a tornado missile analysis and deferred all else to the site's 72.212 evaluation. The staff finds this response insufficient. The 72.212 evaluation is not used to perform new accident analyses; the evaluation is used to show that the site parameters are "enveloped by the cask design bases considered" in the certificate holder's FSAR referenced by the proposed CoC and the related NRC SER; and to establish that conditions in the proposed CoC and 72.104 have been met. Thus, the applicant should demonstrate that the system design meets the accident dose limits in 72.106(b), providing a bounding analysis for which this compliance can be demonstrated. Conditions that maximize accident consequences should be properly addressed, such as the minimum distance between the loaded VVMs, and the site of the excavation and construction activities to add new VVMs. Any assumptions used in the evaluations and analyses should be adequately justified. Any equipment or engineered features relied upon in the evaluations should be identified as Important To Safety (ITS) and, along with any assumed parameter limits relied upon in the evaluations, need to be included in the conditions of the certificate or the technical specifications.

This information is needed to confirm compliance with 10 CFR 72.106(b), 72.236(b) and 72.236(d).

Chapter 12.I Technical Specifications

12-1 Revise the proposed TSs to address the following:

a. The dose rate limit in TS 5.7.4.c should be changed to "30 mrem/hr (gamma + neutron)" for the top of the underground overpack.
b. The commas before and after the phrase "containing the as-loaded MPC" should be removed in TS 5.7.6.b.
c. The phrase "can include a VVM" should be changed to "includes the VVM" in the definition of OVERPACK in TS Appendices A and B.

d. The definition of TRANSFER CASK in TS Appendix B should be changed to duplicate the definition as given in TS Appendix A (i.e. "a 125-Ton or a 100-Ton" should read as "the 125-Ton or the 100-Ton").
e. The definition of VERTICAL VENTILATED MODULE (VVM) should be changed to read "The VVM is a subterranean OVERPACK where …"
f. The OR statement for SR 3.1.2 of TS 3.1.2 in Appendix A should explicitly read that the 155°F and 137°F limits are for aboveground OVERPACKS.

The change requested in a. was agreed to in response to question 12-1 of the previous RAI but was not made in the associated proposed TS. The staff considers that the change requested in b. results in the clearest statement of the necessary action. The staff considers the change requested in c. results in the most accurate definition of OVERPACK in regards to the VVM. The change requested in d. was agreed to in response to question 12-3d of the previous RAI but was not made in the associated TS. The currently proposed definition of VVM is too generic versus the intended use in the amendment request and can include aboveground overpacks; the change requested in e. confines the scope of the definition to only the underground overpacks. The staff considers the change requested in f. is necessary for consistency and to clarify the applicability of the stated limits to the aboveground OVERPACKS only.

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

12-2 Justify the lack of a TS dose rate limit and associated measurements for the VVM Interface Pad (VIP) in the proposed TS 5.7, Radiation Protection Program (RPP).

In questions 12-4 and 12-5 of the previous RAI, the staff requested modifications of TS 5.7.3 and TS 5.7.4 to establish dose rate limits for locations/areas of the Hi-Storm 100U overpack that contribute significantly to public and occupational dose and are most indicative of overpack shielding effectiveness. As part of these questions, the staff indicated that different areas of the overpack should be evaluated. These areas included the VIP. However, the response to these questions did not evaluate the VIP. The VIP is a part of the shielding design of the Hi-Storm 100U system; therefore, some confirmation of its shielding effectiveness should be performed. It is not clear from the current application that the effectiveness of the as-fabricated VIP is ensured under the currently proposed TS 5.7, RPP, or by other means.

The degree of significance of the dose rates from the VIP on either public or occupational dose is also not clear. The significance to doses depends not only on the dose rate, but also on the extent of the surface area for which that dose rate is representative; the size (surface area) of the VIP is not clear from the descriptions in the application. The TS 5.7, RPP, should include appropriate dose rate limits and measurements that address these aspects of the Hi-Storm 100U system. The staff notes that the dose rate limits and measurements for other areas of the cask, such as at the inlet vents, may be used to capture the VIP; however, justification should be provided as to the adequacy of these measurements to capture the effects of the VIP. The staff also notes that surface dose rate criteria were not specified for the Hi-Storm 100U, different from the criteria in FSAR Section 5.1.1 for the aboveground overpacks. If different criteria are applied to the Hi-Storm 100U, this should be clarified as well.

This information is needed to confirm compliance with 10 CFR 72.126(a) and 72.236(d).