November 26, 2012

Dr. Stefan Anton
Acting Licensing Manager
Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

SUBJECT: REVISED REQUEST FOR SUPPLEMEMTAL INFORMATION FOR THE HOLTEC INTERNATIONAL HI-STORM UMAX CANISTER STORAGE SYSTEM CERTIFCATE OF COMPLIANCE NO. 1040 (TAC NO. L24664)

Dear Dr. Anton:

This letter supersedes the NRC's letter to Holtec dated October 31, 2012.

By letter dated June 29, 2012, as supplemented July 16, 2016, Holtec International (Holtec) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for the HI-STORM UMAX Canister Storage System, Certificate of Compliance (CoC) No. 1040. The proposed application intends to provide an underground storage option compatible with the Holtec HI-STORM Flood/Wind (FW) System.

The NRC staff (staff) has reviewed your application and concluded that it does not provide technical information in sufficient detail to enable the staff to complete its detailed review and make an independent assessment regarding the acceptability of the proposed amendments in terms of regulatory requirements, and the protection of public health and safety, and the environment. Attached are the staff's request for supplemental information (RSI). The staff also included observations that may be asked at a later date. Responses to observations are not required for the staff to begin a detailed technical review. Observations are not the result of a detailed technical review and may be resolved once the staff begins a detailed review. These were discussed with you in October 18, and November 7, 2012, conference calls. Please provide your responses by December 6, 2012, or contact the NRC no later than November 26, 2012, to request an extension.

RSI

CoC-1 Provide a revised proposed CoC to clearly define the regulatory relationship of the HI-STORM FW Final Safety Analysis (FSAR) to the HI-STORM UMAX CoC.

The second paragraph of the proposed CoC states "The HI-STORM UMAX canister storage system is certified as described in the "UMAX" Final Safety Analysis Report (FSAR) supplemented by information on the MPCs and transfer cask in the HI-STORM FW FSAR (USNRC Docket 72-1032), and in the U. S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance

(CoC). MPC [multipurpose canister] -37, MPC-89 and HI-TRAC VW are also certified in Docket # 72-1032 and are fully described in the HI-STORM FW FSAR." If approved, the HI-STORM CoC No. 1040 will be a standalone CoC and should contain no reference to either Docket No. 72-1032 or CoC No. 1032 or the NRC staff's associated SER.

This information is needed to evaluate compliance with NUREG-1536, Revision 1, "Standard Review Plan for Spent Fuel Dry Storage Systems," and NUREG 1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance," guidance.

CoC-2 Provide a revised proposed CoC to clearly state the requirements of condition 9, "PRE-OPERATIONAL TESTING AND TRAINING EXERCISE."

If approved, the HI-STORM CoC No. 1040, will be a standalone CoC and should not contain references to any other CoC for a general licensee to use in lieu of the specific requirements of the condition.

This information is needed to evaluate compliance with NUREG-1536, Revision 1, "Standard Review Plan for Spent Fuel Dry Storage Systems," and NUREG 1745, "Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance," guidance.

1-1 Provide amended HI-STORM UMAX Final Safety Analysis (FSAR) sections to address the following staff comments.

a. Provide revised FSAR sections that clearly identify that the HI-STORM FW FSAR explicitly supports the HI-STORM UMAX CoC application.

HI-STORM UMAX FSAR Section 1 states that "this final safety analysis report (FSAR) describes the Holtec International HI-STORM UMAX Canister Storage System…" However, the HI-STORM UMAX FSAR primarily describes and addresses the underground storage portion of the system. As stated in the proposed CoC, the HI-STORM UMAX Canister Storage System CoC is supported by both the HI-STORM UMAX and HI-STORM FW FSARs. Each applicable section of the HI-STORM UMAX FSAR should clearly identify the structures and components of the HI-STORM UMAX Canister Storage System that are addressed in the HI-STORM FW FSAR. Along with these descriptions, the location of the specific normal, off-normal, and accident events with their applicable analyses must be clearly identified.

b. Provide documentation required to include the HI-STORM FW FSAR on NRC Docket No. 72-1040.

c. Provide clear guidance for the design and operational criteria of a forced helium dehydration system for the HI-STORM UMAX Canister Storage System.

The FSAR states that "Thus, the references to a FHD system in this FSAR imply that its design criteria must comply with the provisions in the latest revision of the HI-STORM 100 FSAR (Docket No. 72-1014)." The FHD system is an ancillary,

not important to safety system. However, if there are specific design requirements or operational restrictions necessary for its use to prevent damage to any HI-STORM UMAX systems, structures, or components these must be clearly identified in the HI-STORM UMAX Technical Specifications and not by reference to an FSAR.

This information is needed to evaluate compliance with NUREG-1536, Revision 1, "Standard Review Plan for Spent Fuel Dry Storage Systems," guidance.

Observations:

O-1 On FSAR drawing 8446, sheet 7, Item 40 is not shown on the drawing.

O-2 On FSAR drawing 8446 sheet 7, refer to note 21 for Item 40; should be note 20 for Item 40.

2-1 Provide an evaluation to justify Holtec's conclusions in the FSAR, Section 2.0.5, that "The MPCs provide criticality control for all design basis normal, off-normal and postulated accident conditions."

The referenced FSAR for the HI-STORM FW indicates that once established, the integrity of the MPC Confinement Boundary is maintained during all credible off-normal and accident conditions, and thus, the MPC cannot be flooded. However, there is no evaluation presented, especially during the initial 40-year storage period, that would demonstrate the double contingency principle for criticality safety for a below ground system such as UMAX as stated in 10 CFR 72.124. As stated in 10 CFR 72.124(a) "Spent fuel handling, packaging, transfer, and storage systems must be designed to be maintained subcritical and to ensure that, before a nuclear criticality accident is possible, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. Two unlikely events need to be identified and the system has to be designed in order to be subcritical given one unlikely event occurs.

4-1 Include the effective thermal properties (limiting effective thermal conductivity, effective density, and effective heat capacity) of the rodded region for the design basis fuel assemblies, as stated in FSAR Table 2.1.4.

FSAR Table 2.1.4 states that for the thermal-hydraulic criterion, the design basis fuel assemblies are the GE-12/14 10x10 (BWR fuel assembly) and the Westinghouse 17x17 OFA (PWR fuel assembly). However, FSAR Chapter 4 does not include the effective thermal properties used to perform the thermal evaluation of HI-STORM UMAX System.

NUREG-1536, Revision 1, Section 4.5.4.2, states that the reviewer should verify that the material compositions and thermal properties are provided for all components used in the calculational model that the thermal properties used in the safety analysis are appropriate, and that potential degradation of materials over their service life has been evaluated. Temperature and anisotropic dependencies of thermal properties should be considered. If regional thermal properties are determined from a combination of individual materials, the manner in which these effective properties are calculated should

be fully described and justified. If the thermal model is axisymmetric or three-dimensional, the longitudinal thermal conductivity should generally be limited to the conductivity of the cladding (weighted by its fractional area) within the fuel assembly. Gaps between fuel pellets and cracks in the pellets themselves can result in a considerable uncertainty regarding the contribution of the fuel to longitudinal heat transfer. High-burnup effects should also be considered in determining the fuel region effective thermal conductivity.

Provide the calculation package and all analysis files generated as a result of the calculation of the effective thermal properties.

5-1: Provide an explanation why at point 2 the surface dose rates in FSAR Tables 5.1.1 and 5.1.2 are greater than the dose rates at 1 meter from the overpack with respect to dose rates at the surface of over pack.

FSAR Figure 5.1.1, "HI-STORM UMAX MODULE CROSS SECTIONAL VIEWS WITH DOSE POINT LOCATIONS," shows the locations at which the dose rates were calculated. FSAR Table 5.1.1 for multipurpose canister (MPC) -32 and FSAR Table 5.1.2 for MPC-37 for design basis Zircaloy clad fuel, show the dose rates at the surface of the overpack and 1 meter from the overpack for 5 points from FSAR Figure 5.1.1. The dose rates at dose locations 1, 3, 4, and 5 are smaller at 1 meter with respect to the overpack surface as expected for both MPC-32 and MPC-37, but the dose rates for dose location 2 for both MPCs at 1 meter are greater than the dose rates at the surface of overpack. It is not clear to the staff why the calculated dose at a point that is further away from the cask surface is greater than that at the cask surface. The staff requests the applicant provide an explanation for these results. In addition, it is not clear to the staff if the dose rate at distance greater than 1 meter from the surface point 2 could be even higher and at what distance from the outlet duct the maximum dose rate is located. The applicant needs should provide the MCNP model input and output files to assist the staff to understand the calculated results.

6-1: Provide an evaluation to justify Holtec's conclusions in the FSAR, Section 2.0.5, that "The MPCs provide criticality control for all design basis normal, off-normal and postulated accident conditions."

The staff finds that underground storage of the HI-STORM MPCs within the HI-STORM UMAX vertical ventilated module (VVM) provides the possibility of water intrusion in the interstitial space between the VVM and the MPC. It is not clear to the staff how the applicant has evaluated the effect of this water moderation in determining maximum k_{eff}. Additionally, it is not clear to the staff how the applicant has evaluated the effect of underground storage in soil on maximum k_{eff}.

The NRC is still evaluating the proposed certification approach of using references to multiple FSARs to form the basis for a single CoC approval, as well as the practicality and NRC oversight of general licensees using this proposed type of CoC. Therefore, the staff may have additional supplemental information requests on this matter in the future. Please reference Docket No.

72-1040 and TAC No. L24664 in future correspondence related to this licensing action. If you have any questions, please contact me at (301) 492-3325.

Sincerely,

/RA/

John Goshen, P.E., Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-1040

TAC No.: L24664

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