February 19, 2013

Mr. Terry Sensue
Licensing Manager
Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

SUBJECT: FIRST REQUEST FOR ADDITIONAL INFORMATION, PART TWO, FOR THE HOLTEC INTERNATIONAL HI-STORM UMAX CANISTER STORAGE SYSTEM CERTIFCATE OF COMPLIANCE NO. 1040 - (TAC NO. L24664)

Dear Mr. Sensue:

By letter dated June 29, 2012, as supplemented July 16, November 20, 2012, and January 30, 2013, Holtec International (Holtec) submitted an application to the U.S. Nuclear Regulatory Commission 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 System.

The NRC staff (staff) has reviewed your application and has determined that additional information (RAI) is required to complete its detailed technical review. The RAIs are provided in the enclosure to this letter. We request that you provide the information by March 20, 2013. Please inform us in writing at your earliest convenience, but no later than March 1, 2013, if you are not able to provide the information by the requested date. You should also include a new proposed submittal date and the reasons for the delay to assist us in re-scheduling your review.

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

Enclosure: As stated

HOLTEC INTERNATIONAL

DOCKET NO. 72-1040

FIRST REQUEST FOR ADDITIONAL INFORMATION, PART TWO

RELATED TO THE HI-STORM UMAX CANISTER STORAGE SYSTEM APPLICATION

By letter dated June 29, 2012, as supplemented July 16, November 20, 2012, and January 30, 2013, 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 NRC staff (staff) has reviewed your application and has determined that additional information (RAI) is required to complete its detailed technical review.

RAI

Chapter 2 Principal Design Criteria Evaluation

2-1 Clarify if the assumed axial variation in the heat generation rate of the design basis fuel assembly bounds other axial distributions in terms of the maximum predicted peak cladding temperature.

Page 2-19 of the Final Safety Analysis Report (FSAR) states that the axial variation in the heat generation rate in the design basis fuel assembly is defined based on the axial burnup distribution. It also states that these distributions are representative of fuel assemblies with the design basis burnup levels considered. These distributions are used for analyses only, and do not provide a criteria for fuel assembly acceptability for storage in the HI-STORM UMAX Canister Storage System. Different distributions may negatively affect the thermal results possibly requiring new thermal analyses to demonstrate that thermal limits are not exceeded.

This information is needed to ensure compliance with 10 CFR 72.236(f).

Chapter 3 Structural Evaluation

3-1 Provide complete materials specifications (including design codes) for the subgrade material to be used between the Independent Spent Fuel Storage Installation (ISFSI) Pad and the Support Foundation Pad (SFP) and provide a complete structural analysis and design considering normal, off normal, and accident conditions.

FSAR Section 1.2.2 (f) indicates that the subgrade between the ISFSI Pad and the SFP can be "…suitable engineered fill or native soil". This statement is inconsistent with latter sections of the FSAR, most notably Table 2.3.2 that classifies this material as important to safety (ITS) and must remain structurally intact for shielding purposes. Given that the HI-STORM UMAX design also does not utilize a retaining wall of any kind to confine the subgrade material, the structural design of this component should be fully evaluated and documented, consistent with the design requirements for the HI-STORM 100U provided in CoC No. 1014, Amendment No. 7. The staff also identifies the following Technical Specification (TS) requirement in CoC No. 1014, Amendment No. 7:

"Excavation activities contiguous to a loaded ISFSI which contains a retaining Wall on the side facing the excavation can occur down to the depth of the bottom surface of the SFP of the loaded ISFSI considering that there may be minor variations in the depth due to normal construction practices. For all other excavation activities the site-specific seismic analysis performed to demonstrate the stability of the RPS boundary and structural integrity of the ISFSI structure shall be submitted to the NRC for review and approval prior to any excavation taking place."

The staff does not have reasonable assurance that this ITS component has been sufficiently evaluated and designed when considering normal, off-normal, and accident conditions.

This information is needed to ensure compliance with 10 CFR 72.212(b)(5)(ii).

Chapter 4 Thermal Evaluation

4-1 Provide the uncertainty of the computational fluid dynamics (CFD) results associated with the modeling errors for normal conditions of storage or justification for why it is not required.

FSAR Section 4.4.2 describes a grid sensitivity analysis and grid convergence index (GCI) calculation for normal conditions of storage. However, modeling uncertainty errors are not provided. Modeling errors that should be considered include errors associated with the boundary conditions (e.g., heat transfer coefficient), fuel effective thermal conductivity, and porous media flow resistance factors.

This information is needed to ensure compliance with 10 CFR 72.236(f).

4-2 Clarify why a permissible limit of 1058°F for off-normal events is used to evaluate the effect of wind on predicted peak cladding temperature (PCT).

A steady state sustained wind speed of 1 to 10 miles per hour (mph) appears to be a normal site condition. Therefore, it appears that the normal permissible temperature (752°F) should be used for normal wind conditions. Page 11.1-1 of HI-STORM 100 FSAR Revision 1 states that off-normal operations, as defined in accordance with ANSI/ANS-57.9, are those conditions which, although not occurring regularly, are expected to occur no more than once a year. It appears from this definition that a sustained wind speed in the range of 1 to 10 mph is much more frequent than that and should be considered normal occurrence.

This information is needed to ensure compliance with 10 CFR 72.236(f).

4-3 Provide additional CFD calculations to demonstrate that adding the increase in air inlet temperature caused by horizontal wind to the maximum temperature does not result in the same predicted peak cladding temperature or provide justification that they are not required.

FSAR page 4-36 states that the maximum air inlet temperature increase reported in Effect #2 (increase of air inlet temperature because of horizontal wind) is added to the PCT and HI-STORM UMAX component temperatures reported for Effect #1 (decrease in the ventilating air flow because of horizontal wind). This approach assumes a linear increase in the PCT that may result in under-predicted temperatures.

This information is needed to ensure compliance with 10 CFR 72.236(f).

4-4 Explain why for the calculation of the GCI, the apparent order ‘p’ is larger than the theoretical one.

Appendix H to Holtec Report HI-2114807 provides the calculation of the GCI. An apparent order ‘p’ larger than the theoretical order is obtained in this calculation, which does not appear to be possible and could be an indication of problems with the grids used to perform the CFD calculations.

This information is needed to ensure compliance with 10 CFR 72.236(f).

4-5 Provide justification why for the proposed CoC Condition No. 9 an adequate thermal test is not needed to determine the air mass flow rate.

Due to the unique design of this overpack, high heat load, and high burnup fuel, an adequate thermal test should be performed for this design to experimentally determine the air mass flow rate to validate the analytical techniques described in the FSAR.

This information is needed to ensure compliance with 10 CFR 72.11 and 10 CFR 72.236(f).

Chapter 5 Shielding Evaluation

5-1 Provide an explanation why dose rates in FSAR Table 4 at points N, O, P, and Q decrease from location N toward location O, with respect to the inlet duct.

FSAR Figure 3 of the report, “SHIELDING ANALYSIS OF THE HI-STORM UMAX HOLTEC REPORT NO. HI-2125194,” shows specific points at which the dose rates were calculated along the lid and the ISFSI surface of overpack. [FSAR Table 4 for multipurpose canister (MPC)-32 and MPC-37 for design basis Zircaloy clad fuel assemblies list in FSAR Figure 3, that include point N, O, P, and Q.] The results from FSAR Table 4 show the dose rates at locations N, O, P, and Q are decreasing with respect to inlet duct. Furthermore, dose rates for dose location N for both MPCs are greater than the dose rates at the point Q close to inlet duct. It is not clear to the staff why the calculated doses at the points further away from the inlet duct are greater than at the point closest to the inlet duct. In addition, it is also not apparent to the staff why the dose rate at point N, which has the highest dose rate, is much greater than point M even though the two points are in very close proximity to one other. Provide an explanation for the results provided in Figure 3 and Table 4, specifically in regards to the points in question.

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

Chapter 7 Confinement Evaluation

7-1 Provide justification why the proposed CoC No. 1040 and TS do not require the helium leak rate testing for the entire confinement boundary including the base material (with the exception of the lid to shell weld excluded by ISG-18) to justify the leak tight assumption provided in the HI-STORM FW FSAR.

The staff uses the Final Safety Analysis Report (FSAR) as a basis to make its safety determination for the confinement capabilities of the cask. The applicant states in the Certificate of Compliance (CoC) and the Technical Specifications (TS) Appendix A, Surveillance Requirement (SR) 3.1.1.3, that ANSI N14.5 is one of its bases for confirming that the MPC confinement boundary meets leak tight requirements. TS Appendix A - SR 3.1.1.3 reads as follows, "Verify that the helium leak rate through the MPC vent port confinement weld meets the leaktight criteria of ANSI N14.5-1997 and verify that the helium leak rate through the MPC drain port confinement weld meets the leaktight criteria of ANSI N14.5-1997."

However, in the FSAR, CoC, and TS of the HI-STORM UMAX, the applicant only indicates that the helium leakage rate testing is applied to the confinement welds (shell seam, drain/vent port cover welds, and baseplate to MPC shell weld), without addressing the helium leakage rate testing to the confinement base metals (lid, MPC shell, baseplate, vent and drain port cover plates, and closure ring) or to the entire confinement boundary (with the exception of the lid to shell weld excluded by ISG-18). The applicant's indication in FSAR, CoC, and TS is not in accordance with the guidance in ANSI-N14.5-1997.

The NRC's ISG-25, "Pressure and Helium Leakage Testing of the Confinement Boundary of Spent Fuel Dry Storage Systems," approved on August 18, 2010, provides guidance for evaluating the helium leakage testing. This applicant is required, through the helium leakage rate testing or the alternative approach, to ensure the confinement component(s) of the spent fuel storage cask are free of defects and will reasonably maintain confinement of radioactive material under normal, off-normal and credible accident conditions.

The applicant should revise the FSAR, CoC and TS to clarify the helium leakage rate testing applied to the entire confinement boundary (with the exception of the lid to shell weld excluded by ISG-18). The FSAR, CoC, and TS should be consistent.

This information is needed to evaluate compliance with 72.236(j) and (l).

Chapter 8 Materials Evaluation

8-1 Provide and discuss the performance and test properties requested in the attached Table.

The FSAR defines Controlled Low-Strength Material (CLSM) as a self-compacted, cementitious material used primarily as a backfill in place of compacted fill. Many terms are currently used to describe this material, such as flowable fill, unshrinkable fill, controlled density fill, flowable mortar, flowable fly ash, fly ash slurry, plastic soil-cement and soil-cement slurry (American Concrete Institute 229R-99). CLSM and lean concrete are also referred to as “Self-hardening Engineered Subgrade (SES).”

This information is needed to ensure compliance with 10 CFR 72.24(c)(3),and (4).

PERFORMANCE & MATERIAL TEST PROPERTIES:

PERFORMANCE PROPERTY	TEST PROPERTY
Corrosive Resistance	pH, Resistivity, Permeability
Flowability	Flow
Excavatability	Unconfined Compressive Strength
Permeability	Water Permeability Air Content
In-Place Density	Plastic Unit Weight
Strength	Unconfined Compressive Strength Penetration Resistance Ball Penetration
Thermal Conductivity	Plastic Unit Weight Moisture Conductivity Thermal Transmittance (U)
Thermal Insulating Value Acidity/ Alkalinity	Plastic unit Weight Moisture Content Thermal Resistance Value (R-Value) pH

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