UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 1, 2022

Denise Elisio
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Holtec International
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1 Holtec Blvd.
Camden, NJ 08104

SUBJECT: AMENDMENT NO. 16 TO CERTIFICATE OF COMPLIANCE NO. 1014 FOR THE HI-STORM 100 MULTIPURPOSE CANISTER STORAGE SYSTEM – REQUEST FOR ADDITIONAL INFORMATION FIRST BATCH

Dear Denise Elisio:

By letter dated March 9, 2021 [Agencywide Documents Access and Management System (ADAMS) Accession No. ML21068A360] and supplemented by letters dated August 11, 2021 (ML21223A045), and January 28, 2022 (ML22028A372), Holtec International (Holtec) submitted to the U.S. Nuclear Regulatory Commission a request to amend the Certificate of Compliance No. 1014 for HI-STORM 100 Multipurpose Canister Storage System. By a letter dated February 17, 2022 (ML22048C222), Holtec requested to separate the portion implementing Graded Approach (ML19353D337) from the Amendment No. 16 application.

The NRC staff reviewed your application and determined the need for additional information. Due to resources and schedules, we will issue staggered requests for additional information (RAIs). The enclosure to this letter contains RAIs for all disciplines except structural, shielding, and materials. We plan to issue the second batch of RAIs in August 2022. We request that you provide the responses to these RAIs within 30 days from the date of this letter. If you are unable to meet this deadline, please notify us in writing, within two weeks of receipt of this letter, of your new submittal date and the reasons for the delay.

Please reference Docket No. 72-1014, CAC No. 001028 and EPID No. L-2021-LLA-0039 in future correspondence related to this licensing action. If you have any questions, please contact me at 301-415-1018.

Sincerely,

Signed by Chen, Yen-Ju
on 07/01/22

Yen-Ju Chen, Sr. Project Manager
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-1014
CAC No.: 001028
EPID No.: L-2021-LLA-0039

Enclosure:
RAI First Batch

SUBJECT: AMENDMENT NO. 16 TO CERTIFICATE OF COMPLIANCE NO. 1014 FOR THE HI-STORM 100 MULTIPURPOSE CANISTER STORAGE SYSTEM – REQUEST FOR ADDITIONAL INFORMATION FIRST BATCH, DOCUMENT DATE: July 1, 2022

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**ADAMS Accession Number:** ML22167A120 (Ltr and Enc)

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**Request for Additional Information**
**Docket No. 72-1014**
**Certificate of Compliance No. 1014**
**Amendment No. 16 to HI-STORM 100**
**Multipurpose Canister Storage System**

The staff identified additional information needed in connection with its review of the application of Amendment No. 16 to the Certificate of Compliance (CoC) No. 1014 for HI-STORM 100 Multipurpose Canister Storage System as provided in the request for additional information (RAI) discussed below. Each question describes information needed by the staff to complete its review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 72.

## Thermal RAI

**RAI 4-1** (A) Justify the use of concrete conductivity of 1.50 Btu/hr-ft-°F for the HI-STORM 100 unventilated with high density concrete (UVH) overpack and (B) describe how conduction test is determined and performed at the site for using a higher concrete conductivity (>1.50 Btu/hr-ft-°F) for the UVH overpack.

The applicant listed a minimum concrete conductivity of 1.50 Btu/hr-ft-°F in the proposed final safety analysis report (FSAR) table 1.D.1 for the UVH overpack and stated in Note 3 of table 1.D.1 that "the listed value of thermal conductivity is a lower bound and is considered to be acceptable *a' priori* as in most cases it would likely be exceeded. A higher conductivity of plain concrete may be used in a site-specific safety qualification if supported by appropriate conduction tests."

(A) A concrete conductivity of 1.05 Btu/hr-ft-°F (FSAR Revision 20 [ADAMS Accession No. ML20167A018] table 4.2.2) was used for the ventilated overpack. Justify the use of the concrete conductivity of 1.50 Btu/hr-ft-°F for the UVH overpack. Using a higher concrete conductivity (≥1.50 Btu/hr-ft-°F) for the UVH overpack is considered less conservative for analysis.

(B) Describe how the conduction test is determined and performed at the site for using a higher concrete conductivity (>1.50 Btu/hr-ft-°F) for the UVH overpack.

The staff needs this information to determine compliance with 10 CFR 72.236(f).

**RAI 4-2** Justify in the application: (A) the different temperature limits for overpack inner shell and remainder of the overpack steel structure ONLY under long-term normal condition of storage and (B) the temperature limit of the multipurpose canister (MPC) baseplate is changed from 400°F (Amendment No. 15, FSAR Revision 22 [ML21221A329]) to 440°F in the proposed FSAR table 2.2.3 for long-term normal condition of storage.

(A) The proposed FSAR Table 2.2.3 shows that both overpack inner shell and remainder of the overpack steel structure share the same temperature limits of 700°F, 800°F, and 450°F for short-term events, off-normal condition, and

accident condition, respectively, but have different temperature limits for long-term normal condition (475°F for overpack inner shell and 400°F for remainder of the overpack inner shell) while both components are made of steel. Justify the different temperature limits used for overpack inner shell and remainder of the overpack steel structure under long-term normal condition of storage.

(B) Justify the temperature limit of the MPC baseplate is changed from 400°F (Amendment No. 15) to 440°F in the proposed FSAR Table 2.2.3 for long-term normal condition of storage while the temperature limits remain unchanged for off-normal and accident conditions of storage.

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

**RAI 4-3** Demonstrate the initial backfill pressure limits for MPC helium and annulus air pressure, shown in the proposed FSAR table 4.IV.1.3, are adequate for heat removal for MPC-32M and MPC-68M stored in HI-STORM UVH overpack.

The applicant provided initial backfill pressure limits for MPC helium and annulus air, in the proposed FSAR table 4.IV.1.3, for MPC-32M and MPC-68M stored in the UVH overpack. The applicant needs to provide derivations (e.g., calculations) in the application to demonstrate the initial backfill pressure limits in the proposed FSAR table 4.IV.1.3 are adequate for heat removal for the UVH overpack.

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

**RAI 4-4** Provide information to Questions (A) and (B) below for using nitrogen (or another non-oxidizing gas) for backfill gas within MPC and annulus of the UVH overpack.

The applicant stated, in the proposed FSAR section 8.IV.1.7, step 7, that evacuate air within the MPC and the annulus of the UVH overpack and replace air with dry nitrogen (or another non-oxidizing gas) using couplings provided in the small penetrations in the cask body. The applicant provided the description of the UVH overpack annulus evacuation system and the nitrogen (or another non-oxidizing gas) backfill system in the proposed FSAR table 8.IV.1.6. The applicant also stated, in FSAR section 8.IV.1.7, step 7, that the target fill pressure of the non-oxidizing fill gas shall be as indicated in table 4.IV.1.3.

(A) Nitrogen (or another non-oxidizing gas) has different material properties from helium (e.g., viscosity, thermal conductivity, etc.), and the difference in properties may cause changes in flow pattern and heat removal capacity within the MPC. With differences existing in material properties between helium and nitrogen (or another non-oxidizing gas), justify the target backfill pressure limits of the non-oxidizing fill gas remain the same as the backfill pressure limits for the helium, as indicated in table 4.IV.1.3, set for the MPC and the annulus for MPC32M and MPC-68M stored within the UVH overpack.

(B) Clarify whether the annulus of the UVH overpack can be filled with the air when the MPC is backfilled with nitrogen (or another non-oxidizing gas) for storage.

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

**Operating Procedure**

**RAI 8-1** Revise the proposed FSAR section 8.IV.1.7 to provide clear step-by-step instructions on the installation of lid studs, washers, and hex nuts after the lid is placed on top of the gasket, prior to movement of the storage cask to the ISFSI pad.

In HI-STORM 100 Amendment No. 16 proposed FSAR, section 8.IV.0, "Introduction," states:

> "The operations associated with the use of the HI-STORM 100 UVH system, are like the operations for the standard HI-STORM 100 system. The following sections describe those operations that are, in any respect, unique to the HI-STORM 100 UVH system and thus supplement the information presented in Chapter 8. Where practical, the section numbers used below directly reference the corresponding sections in Chapter 8. For example, Section 8.IV.3.5 supplements the operations described in Subsection 8.3.5. The guidance provided in this supplement shall be used along with the operations procedures provided in Chapter 8 to develop the site-specific operating procedures for the HI-STORM 100 UVH."

The proposed FSAR section 8.IV.1.7, "Placement of HI-STORM 100 UVH into Storage," states that it shall incorporate the following instructions as additional steps to the generic guidance in section 8.1.6 (should be 8.1.7) on loading operations for unventilated cask models in the official HI-STORM 100 FSAR revision 23 (ML22108A277).

- The proposed FSAR section 8.IV.1.7 step 1 states, "Before installing the Closure Lid on the cask body, the lid gasket is placed on the top of the cask's top ring."
- The proposed FSAR section 8.IV.1.7 step 3 states, "Place cask lid on top of the gasket."
- The proposed FSAR section 8.IV.1.7 step 5 states, "After the cask is placed in its storage location on the ISFSI pad install lid studs, washers, and hex nuts onto the cask."
- The proposed FSAR section 8.IV.1.7 step 6 states, "Tighten lid hex nuts to the point of contact with the washer. Then loosen nut to provide a nominal axial gap of 0.5 inches."

In the official HI-STORM 100 FSAR revision 23, the existing section 8.1.7, "Placement of HI-STORM into Storage," step 18.a states: "Remove the alignment device." Step 18.e states: "Install the HI-STORM lid and the lid studs and nuts or lid closure bolts. See Table 8.1.5 for bolting Requirements." Step 18.i states: "Secure HI-STORM to the transporter device as necessary." Step 20 states: "Transfer the HI-STORM to its designated storage location at the appropriate pitch."

It is clear from the existing instruction in FSAR section 8.1.7, steps 18.a, 18.e, 18.i and 20, that a ventilated overpack lid must be mechanically fastened down (attached) to the overpack body prior to transferring the HI-STORM 100 to its storage location at an ISFSI. However, it is not clear whether the cask lid for the UVH is to be mechanically fastened down (attached) to the overpack body after placing the lid on

top of the gasket prior to transferring the MPC loaded HI-STORM 100 UVH to its storage location at an ISFSI. The proposed FSAR section 8.IV.1.7 step 5 only states that after the UVH cask is in its storage location on the ISFSI pad to install the lid studs, washers, and hex nuts onto the cask.

With the lid resting on the UVH cask without fastening it to the cask during cask transport is an unanalyzed condition. The UVH cask cannot be transported to its final location on a ISFSI pad after the stack up operation and having its lid placed on the top of the gasket without being mechanically fastened (attached) to the UVH cask. If a transport trailer is used to transport a MPC loaded UVH cask, the cask lid must first be mechanically attached to the UVH cask. Provide clear new step-by-step instructions in FSAR section 8.IV.1.7 that after the lid is placed on the top of the gasket, how will the lid studs, washers, and hex nuts be installed and the lid hex nuts hand tightened to contact the washers. Only after the UVH cask is at its final ISFSI location shall the nuts be loosened to provide a 0.5-inch axial gap.

If a Vertical Cask Transporter (VCT) is used to transport a MPC loaded UVH cask, revise the proposed FSAR section 8.IV.1.7 to provide procedural steps on how to attach the VCT special lifting devices so that the mechanical connection does not crush the gasket under the lid. If a VCT is used for transport, only after the UVH cask is at its final location on the ISFSI pad and the VCT special lifting devices removed, invoke new section 8.IV.1.7 steps 5 and 6.

This information is needed to determine compliance with 10 CFR 72.234(f).

**Editorial Changes**

Consider the following editorial changes to the HI-STORM 100 Amendment No. 16 proposed FSAR:

A) In section 8.IV.1 paragraph, change “Subsection 8.1.1 through 8.1.5” to “Subsection 8.1.1 through 8.1.6.”
B) In section 8.IV.1.7 first paragraph change “Section 8.1.6” to “Section 8.1.7.”
C) Table 8.IV.1.8 should reference main table 8.1.8 instead of table 8.2.3.
D) The paragraph in section 8.IV.4 should reference section 8.4 instead of section 8.3.
E) The first sentence of the section 8.IV.5 paragraph should read: “When the MPC is received from transport and transferred to a HI-STORM 100 UVH Overpack the procedures from Section 8.5 are used.” The current statement is incorrect.
F) The paragraph in section 9.IV.2 should reference Supplement IV, not #I.
G) The sentence in section 9.IV.2.3 should read: “The HI-STORM 100 UVH does not have vents and will not have the option of a monitoring system which must be maintained.”

HI-STORM 100 Amendment 16 RAI First Batch DATE July 1, 2022

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**ADAMS Accession No.: Ltr ML22167A120**

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