



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

November 30, 2017

Ms. Kimberly Manzione, Licensing Manager  
Holtec International  
Holtec Technology Campus  
One Holtec Boulevard  
Camden, NJ 08104

SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION – AMENDMENT NO. 3  
TO CERTIFICATE OF COMPLIANCE NO. 1008 FOR THE HI-STAR 100 CASK  
STORAGE SYSTEM

Dear Ms. Manzione:

By letter dated September 25, 2015, as supplemented on January 15, and April 29, 2016, Holtec International (Holtec) submitted a request to the U.S. Nuclear Regulatory Commission (NRC or staff) to amend Certificate of Compliance No. 1008 for the HI-STAR 100 Cask Storage System.

The staff has determined that further information is needed to complete its technical review. The staff's second request for additional information is in the enclosure. Your response should be provided by December 29, 2017. If you are unable to meet this deadline, please notify NRC staff, within two weeks of receipt of this letter, of your new submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 72-1008 and EPID No. 001028/07201008/L-2017-LLA-0027 (formerly CAC No. L25060) in future correspondence related to this request. If you have any questions regarding this matter, I may be contacted at (301) 415-0606.

Sincerely,

**/RA/**

Jose R. Cuadrado, Project Manager  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No.: 72-1008  
EPID No.: 001028/07201008/L-2017-LLA-0027

Enclosure:  
Second Request for Additional Information

SECOND REQUEST FOR ADDITIONAL INFORMATION – AMENDMENT NO. 3 TO  
 CERTIFICATE OF COMPLIANCE NO. 1008 FOR THE HI-STAR 100 CASK STORAGE  
 SYSTEM, DOCUMENT DATE: November 30, 2017

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**ADAMS Accession No. ML17333A130**

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## **Second Request for Additional Information**

### **Docket No. 72-1008 Certificate of Compliance No. 1008 HI-STAR 100 Cask Storage System Amendment No. 3**

By letter dated September 25, 2015, as supplemented on January 15, and April 29, 2016, Holtec International (Holtec) submitted a request to the U.S. Nuclear Regulatory Commission (NRC or staff) to amend Certificate of Compliance (CoC) No. 1008 for the HI-STAR 100 Cask Storage System.

This request for additional information (RAI) identifies additional information needed by the NRC staff in connection with its review of the amendment application. The requested information is listed by topic and/or page number in the application and associated documentation. NUREG-1536, Revision 1, "Standard Review Plan for Dry Cask Storage Systems" was used by the staff in its review of the application.

Each individual RAI section describes information needed by the staff to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

#### **4.0 Thermal Evaluation**

- 4-1** Provide additional justifications, more specific incorporation by reference, and/or thermal analyses that demonstrate how the thermal performance of the Multi-Purpose Canister (MPC) -68 canister bounds that of the MPC-32 canister when loaded in the HI-STAR 100 Cask Storage System in vertical and horizontal orientation for normal, off-normal, and accident storage conditions, and evaluate the resulting peak cladding temperature and structures, systems, and components' (SSCs) maximum temperatures, thermal stresses, and canister cavity pressures in Chapter 4 of the application.

In its response to the first RAI, the applicant provided additional descriptions of the HI-TRAC and HI-STAR 100 dimensions, design features, and heat transfer mechanisms and states that because the thermal analyses for the HI-STORM 100 Cask Storage System (CoC No. 1004) demonstrate that the MPC-68 bounds the MPC-32 in the HI-TRAC transfer cask, then a similar result will be expected for the HI-STAR 100 overpack and that the MPC-68 results will bound the MPC-32. However, the amendment application does not address the specific differences, if any, between the HI-TRAC and HI-STAR 100 thermal models used to calculate the maximum temperatures for the MPC-32 and MPC-68, respectively; nor does it provide sufficient description or references for how the thermal model of the HI-TRAC transfer cask [referenced from the HI-STORM 100 Final Safety Analysis Report (FSAR)] adequately considers normal, off normal, and accident conditions of storage for the MPC-32 in the HI-STAR 100 Cask Storage System. During the review of Holtec's application for Amendment No. 11 to the HI-STORM 100 System [Docket No. 72-1014, Agencywide Document Access and Management System (ADAMS) Accession No. ML16323A118], the staff raised similar questions concerning the assumption that the thermal model for the MPC-68 bounds the MPC-32, which resulted in the reduction of the MPC-32 canister decay heat. If the

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applicant chooses to provide additional justification or incorporation by reference to address the staff's request, it should ensure that the information provided is thoroughly discussed and/or properly referenced in its proposed FSAR. Alternatively, if the applicant chooses to provide additional thermal analyses to address the staff's request, the applicant should submit any associated input and output files with its response.

This information is necessary to demonstrate compliance with Part 72.236(f) of Title 10 of the *Code of Federal Regulations* [10 CFR 72.236(f)].

- 4-2** Provide additional discussion, descriptions, more specific incorporation by reference, or thermal analyses, to address how the physical attributes of the horizontal emplacement structure affects the thermal performance characteristics of the HI-STAR 100 Cask Storage System when emplaced in a horizontal orientation, for normal, off-normal, and accident conditions.

In its first RAI, staff sought additional design information for the emplacement structure to be used to maintain the cask in a horizontal orientation. In its response, Holtec stated that it considers the proposed horizontal emplacement structure as not important to safety because it has analyzed the effect of cask drops from a height higher than the proposed height of the horizontal emplacement structure. However, in its response, Holtec does not discuss or evaluate the effects that this horizontal emplacement structure may have on the thermal performance of the cask or if it presents unique boundary conditions that need to be considered.

The staff needs additional information, either through design drawings, detailed descriptions, incorporation by reference, or thermal analyses, to verify that the boundary conditions accorded by the horizontal emplacement structure do not affect the thermal performance characteristics of the HI-STAR 100 in storage. The applicant should ensure that the most bounding MPC type is addressed. Because the horizontal emplacement of the HI-STAR 100 System has not been previously discussed or analyzed by the applicant, the method by which a HI-STAR 100 cask system would be placed on a storage pad at an independent spent fuel storage installation or interim storage facility is not known. The means of emplacement are an important element in determining off-normal and accident conditions that could occur during the movement of the HI-STAR 100 cask system to its storage configuration. Postulated off-normal and accident conditions (including a fire during the movement evolution, or a seismic event during storage, for example) would be different for a cask being placed in a horizontal vs. a vertical storage configuration. The off-normal and accident conditions that could occur during the emplacement of the HI-STAR 100 cask system in a horizontal storage configuration should be considered and analyzed to demonstrate that the cask maintains its safety functions under these conditions. The emplacement structure, and its effect on the cask system, should also be considered in these analyses. If the applicant chooses to provide additional justification or incorporation by reference to address the staff's request, it should ensure that the information provided is thoroughly discussed and/or properly referenced in its proposed FSAR revision. Alternatively, if the applicant chooses to provide additional thermal analyses to address the staff's request, the applicant should submit any associated input and output files with its response.

This information is necessary to demonstrate compliance with 10 CFR 72.236(f)

- 4-3** Provide more detailed and specific references to the thermal analyses from the HI-STAR 100 Transportation Cask System Safety Analysis Report (SAR), including the specific chapters, sub-sections, or revision numbers) that will be used to demonstrate that the HI-STAR 100 Cask Storage System in a horizontal orientation meets the applicable limits and addresses the peak cladding temperature, SSCs maximum temperatures, thermal stresses, and canister cavity pressures; and provide additional discussions, within the HI-STAR 100 Cask Storage System FSAR, that explain how the referenced analyses are applicable to the horizontal storage configuration during normal, off-normal, and accident conditions of storage

In its application and RAI response, the applicant seeks to incorporate by reference the thermal analyses from the SAR for the HI-STAR 100 Transportation Cask System. However, the applicant does not provide the specific version or revision of the HI-STAR 100 Transportation Cask System SAR that it seeks to incorporate by reference, nor does it reference the specific sub-sections, chapters, or supplemental analyses that it intends to rely on to demonstrate compliance with 10 CFR Part 72 storage requirements. The applicant needs to provide clear and specific discussions, explanations, and/or justifications, within the HI-STAR 100 Storage Cask System FSAR, that discuss how these referenced transportation thermal analyses are applicable to the horizontal storage configuration, and specifically indicate which portions of the thermal analyses from the transportation SAR are used to support the analysis of normal, off-normal, and accident conditions of storage, which address the peak cladding temperature, SSCs maximum temperatures, thermal stresses, and canister cavity pressures. In addition, the applicant should ensure that the thermal analyses adequately consider the effects of the horizontal emplacement structure (see RAI 4-2).

This information is necessary to demonstrate compliance with 10 CFR 72.236(f).

- 4-4** Provide discussion and results of the thermal analysis in Section 4.4.1.1.7 of the FSAR that addresses the thermal interaction among casks in an array that ensures the cask array pitch or center-to-center spacing is bounding for all cask contents/MPCs, considers the most bounding combination of vertical and/or horizontal cask orientation, and provides justification for the most bounding combination of vertical and/or horizontal cask orientation.

In its RAI response, the applicant stated that it would conduct site-specific analyses for any horizontal cask arrays. However, the applicant did not describe the thermal interaction among casks in an array for the most bounding combination of vertical and/or horizontal cask orientation in Section 4.4.1.1.7, "Heat Rejection from Overpack Exterior Surfaces," of the HI-STAR 100 Cask Storage System FSAR. It is not clear if both horizontally and vertically oriented casks will be mixed, if the calculated cask array pitch (12 feet) is bounding for any combination of cask orientations, or if the minimum spacing is bounding for any type of canister models (e.g. MPC-24, MPC-32, and MPC-68).

This information is necessary to demonstrate compliance with 10 CFR 72.236(f).