Request for Supplemental Information
Docket No. 72-1014
Certificate of Compliance No. 1014
Amendment No. 11 to the HI-STORM 100 Multipurpose Canister Storage System

By letter dated January 29, 2016 (Agencywide Document Access and Management System (ADAMS) Accession No. ML16029A528), as supplemented February 16, 2016 (ADAMS Accession No. ML16069A246), Holtec International (Holtec) submitted an amendment request to the U.S. Nuclear Regulatory Commission (NRC) to revise Certificate of Compliance (CoC) No. 1014 for the HI-STORM 100 Multipurpose Canister Storage System. In a letter dated April 22, 2016 (ADAMS Accession No.: ML16113A394), Holtec modified the amendment request to remove the proposed changes #2 and #3 which are related to the hydrostatic and helium leak tests.

The requested information is listed by chapter number and title in the applicant's safety analysis report (SAR). NUREG-1536, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility — Final Report," was used by the staff in its review of the application. Each question describes information needed for the staff to begin a detailed review.

Chapter 3 – Structural Evaluation

3-1 Provide Revised Supplement Number 56, "MPC-68M Lift Lugs" in support of HI-STORM FSAR Proposed Revision 13.

Holtec Report No: HI-2012787 (Rev. 19), Table 12.0, "List of Supplements," indicates that Supplement No. 56, "MPC-68M Lift Lugs" was revised for Proposed Rev. 13 of the HI-STORM 100 FSAR. The weight of the fuel assemblies for the MPC 68-M is increased from 730 lb. to 830 lb. The demonstration of the adequacy of the capacity of the lifting lugs for this added weight has not been included in the "Structural Calculation Package for the MPC."

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

Chapter 4 - Thermal Evaluation

4-1 Demonstrate that the proposed change #5, "To evaluate mixture of low enriched CILC fuel and normal fuel," is thermally bound by previously analyzed contents and structures, systems, and components important to safety, and that they are within their operating temperature range.

The change did not appear to be addressed in the thermal chapter of the application.

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

4-2 Demonstrate that the proposed change #8, "to increase the burnup limit to accommodate non-fuel hardware (NFH) consisting of NSA in combination with other

control components," is thermally bound by previously analyzed contents and structures, systems, and components importation to safety, and that they are within their operating temperature range.

The change did not appear to be addressed in the thermal chapter of the application.

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

4-3 Describe in the thermal chapter of the application how the previous steady state and transient thermal analyses for normal, off-normal, and accident conditions are bounding for the inclusion of the thoria rod canister, as well as per thoria rod, as they relate to proposed changes #9, "Expand the allowable contents for the MPC-68M to include the thoria rods/canister," and #10, "Add a second permissible composition for thoria rods for all MPC-68 models." Alternatively, provide steady state and transient thermal analyses for normal, off-normal, and accident conditions that consider the cask decay heat distribution with the inclusion of the thoria rod canister.

The relatively lower decay heat of the thoria rod canister (less than or equal to 115 watts) may allow relatively higher decay heat fuel assemblies to be loaded in the cask. This could change the cask decay heat distribution and may result in higher predicted fuel and component temperatures. The application has not clearly described the thermal analysis of any potential changes in cask decay heat distribution, or how the previous analysis bounds any potential changes in cask decay heat distribution due to the relatively lower decay heat thoria rod canister. In addition, it has not been addressed if the predicted fuel or component temperatures are bounding for the decay heat per thoria rod.

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

4-4 Provide the following information related to proposed changes #9 and #10, respectively:

a. provide experimental data or calculations that demonstrate the best estimate hoop stress that the thoria rod fuel cladding experiences during vacuum drying is bounded by the stresses expected in UO_2 rods for the fuel that is being loaded into the MPC-68M at the maximum temperature calculated in the HI-STORM 100 FSAR; and

b. provide the same information requested in part (a.) above for the second proposed composition for thoria rods for all MPC-68 models.

The HI-STORM 100 FSAR, Table 4.III.5, "Maximum MPC-68M Temperatures Under Vacuum Drying Scenarios," shows that the maximum temperature calculated during vacuum drying is 754°F which exceeds the limit of 752°F in ISG-11, Rev. 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel." The 752°F limit was based on the stresses expected to be experienced in UO_2 based fuel. It is not clear to the NRC staff if the cladding stresses expected to be experienced in the thoria rods is bounded by that in the UO_2 rods. If the stress is greater in the thoria rods compared to the UO_2 rods, the temperature limit may be lower than 752°F. A higher short-term temperature limit may be used for low burnup thoria rod fuel if it is shown that the best estimate hoop stress that the thoria rod fuel cladding experiences is bounded by the

stresses expected in UO_2 rods at the maximum temperature calculated in the HI-STORM 100 FSAR.

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

4-5 Provide the following information related to proposed change #4, "To provide more options on surveillance requirements and actions to be taken in the event of Overpack vents blockage when containing a loaded MPC":

a. Provide justification for the ambient temperature used in the thermal analysis or modify the thermal analysis to use an ambient temperature that is bounding for all cask locations, and considers seasonal extreme hotter temperatures that are justified for the surveillance frequency.

The application does not address an ambient temperature that is bounding for all cask locations and considers the seasonal extreme temperatures given the proposed surveillance frequency.

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

4-6 Demonstrate that operating procedures:

a. address that the revised monitoring frequency is applied only to casks with less than 19kW decay heat, and

b. address that the potential scenario where the revised monitoring frequency is applied to casks with greater than 19 kW decay heat does not cause the fuel cladding, or structures, systems, and components (SSCs) important to safety to exceed normal conditions temperature limits.

Related to proposed change #4, the application does not address that the 30-day surveillance frequency could be applied to the incorrect cask (i.e. one with a decay heat higher than 19kW). These types of errors may be challenging to detect and could result in fuel cladding temperatures exceeding the normal conditions 752°F fuel cladding temperature limit or SSCs important to safety exceeding the normal conditions temperature limits.

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

4-7 Clarify in Section 4.6.2.4 of the application that the 100% blocked vent analysis at 19kW is for normal conditions and, in addition, include the normal conditions temperature limits in Table 4.6.9 of the application. Section C.2.1 of the application should also demonstrate that the normal conditions limits should not be exceeded.

It has not been clearly stated that the 100% blocked vent analysis and associated temperature limits (e.g., 752°F for the fuel cladding and normal conditions limits for SSCs important to safety) is for normal conditions considering the length of the surveillance period.

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

4-8 Revise Section 11.2.13.2 of the application to address that surveillance of casks is mandatory.

The application should clearly address the surveillance requirements of SSCs that are important to safety.

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

4-9 Provide justification and additional description for each of the following changes in the FSAR regarding how the models will be used to evaluate the event using site-specific conditions:

a. Section 4.5.2, “Time-to-Boil for a Water-Filled MPC,” - “An alternate method using the FLUENT thermal model described in Section 4.5.1 can be adopted to evaluate the time for water within the MPC to boil using site-specific conditions.”
b. Section 4.6.2.1(a), “HI-STORM Fire” – “An alternate method using the FLUENT thermal model described in Section 4.4 can be adopted to evaluate HI-STORM site-specific fire accident event similar to that described in Section 4.6 of HI-STORM FW FSAR.”
c. Section 4.6.2.1(b), “HI-TRAC Fire,” – “An alternate method using the FLUENT thermal model described in Section 4.5 can be adopted to evaluate HI-TRAC site-specific fire accident event.”
d. Section 4.III.5.2, “Maximum Time Limit During Wet Transfer Operations” – “An alternate method using the FLUENT thermal model described in Section 4.III.5.1 can be adopted to evaluate the time for water within the MPC to boil using site-specific conditions.”
e. Section 4.III.6.2(a)(i), “HI-STORM Fire” – “An alternate method using the FLUENT thermal model described in Section 4.III.4 can be adopted to evaluate HI-STORM site-specific fire accident event similar to that described in Section 4.6 of HI-STORM FW FSAR.”
f. Section 4.III.6.2(a)(ii), “HI-TRAC Fire,” – “An alternate method using the FLUENT thermal model described in Section 4.III.5 can be adopted to evaluate HI-TRAC site-specific fire accident event.”

   It is not clear how the thermal models will be used to evaluate the fire or time-to-boil using site-specific conditions. In addition, these changes were not included in the summary of proposed changes.

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