Public Meeting with Holtec on June 7, 2017

Meeting Handout for
Amendment 11 to Certificate of Compliance No. 1014 for the
HI-STORM 100 Canister Storage System
Docket No. 72-1014
Summary of Technical Issues

Technical Issues in Thermal Analysis

Holtec proposes to reduce the surveillance frequency for loaded casks that have a threshold decay heat of 19kW for the MPC-68 and 16kW for the MPC-32. Currently, the ventilated cask design has a surveillance frequency requirement of 24 hours to verify that the inlet and outlet vents are not blocked, with an additional 8 hours for recovery. This ensures that the required passive convective cooling mechanism is operating as designed. As currently approved, this system can remain in an accident condition (100% blocked vents) for a period not to exceed 24 hours with the requisite accident temperature limit of 570°C (1058°F) for the fuel cladding.

The proposed surveillance frequency requested in this amendment is 30 days for the threshold decay heat identified above, with 24 hours for recovery. The technical approach employed by Holtec is to define this 30 day period as an accident condition with the associated accident limits (570°C, 1058°F) for peak cladding temperatures remaining as defined in ISG 11 rev.3.

Holtec reported that their steady state thermal analysis has demonstrated that the peak cladding temperatures remain below the normal temperature limit of 400°C (752°F), with some other cask components exceeding their normal condition temperature limits. The NRC has identified technical issues with Holtec's thermal analysis that indicate the reported results for peak cladding temperature may be unconservative.

Safety Basis:

Cladding Integrity – Cladding Integrity must be maintained to meet 72.236 (b), 72.236 (c), and 72.236 (l), and 72.236 (m).
Design Criteria – Temperature Limits
Criticality – In general, assumes intact assemblies
Confinement – Cladding integrity performs a confinement function
Retrievability – Performed on a per assembly basis for intact fuel

Regulatory Basis:

10 CFR 72.236 (b), 72.236 (c), 72.236 (l), and 72.236 (m).

Staff Technical Position

The intent of the thermal evaluation is to ensure that the fuel temperatures do not exceed values whereby the fuel cladding can no longer render its intended function. For thermal events that occur frequently, the temperature limit for the fuel cladding has been established as 400°C (752°F) because test data has indicated that gross rupture of the cladding will not occur below this limit, regardless of duration. For temporary, very short duration events (~24 hours) where the fuel cladding temperature exceeds the 400°C (752°F) limit, the fuel cladding may reach temperatures up to, but should not exceed 570°C (1058°F).

Scope of Review

A defined accident duration of 30 days (with recovery period) and specification of an accident temperature limit or limits that apply to all authorized fuel types.

Holtec would need to provide:

(a) An evaluation which demonstrates that the MPC-32 and MPC-68 are safe at normal, off normal and accident conditions. At a minimum, this should include a revision to the MPC-68 thermal analysis provided to include the proper solar insolation values referenced in the FSAR, if this thermal analysis will be relied upon to demonstrate safety.
(b) An evaluation of internal pressure considering 100% fuel rod rupture, with 100% of the fill gas and 30% of the fission gas products concurrently with credible accident conditions.
(c) Material performance data or other technical argument that demonstrates that no loss of safety function occurs during the accident duration and at accident temperature limits for all Important to Safety components.

Reference

ISG-11, Rev.3.

<u>Technical Issues in Shielding Analysis</u>

This is from NRC's request for additional information (RAI) dated November 17, 2016 (ML16323A118), RAI 5-1.

Include in the TS the range of burnup, enrichment, cooling times, UO_2 mass, and specific power corresponding to the radiation source terms and dose rates for which the storage system is designed, if equation for calculating burnup limits as a function of cooling time for ZR clad fuel and Tables 2.4.3 and 2.4.4 as described in Section 2.4.3 of the CoC No. 1014 are proposed to be deleted.

In Sections 5.2.5.1 and 5.2.5.2 of the FSAR, the applicant referenced Section 5.2.5.3 to state that the "allowable burnup limits in Section 2.1.9 of the FSAR were calculated for different array classes rather than using the design basis assembly to calculate the allowable burnups for all array classes." The applicant also stated that "design basis assembly has the highest neutron and gamma source term of the various array classes for the same burnup and cooling time. In order to account for the fact that different array classes have different allowable burnups for the same cooling time, burnups which bound the 14x14A array class (PWR) and 9x9G array class (BWR) were used with the design basis assembly for the analysis in this chapter because those burnups bound the burnups from all other PWR and BWR array classes." Also, the applicant stated that "**this approach assures that the calculated source terms and dose rates will be conservative.**" However, the applicant has proposed to delete the equation for calculating burnup limits as a function of cooling time for ZR clad fuel and Tables 2.4.3 and 2.4.4 as described in Section 2.4.3 of the CoC No. 1014 without providing in the TS the range of burnup, minimum enrichment, cooling times, UO_2 mass, and specific power corresponding to the radiation source terms and dose rates for which the storage system is designed. Provide a justification for the removal of the burnup equation and Tables 2.4.3 and 2.4.4 considering that the burnup calculation is an important method used by the General Licensees to ensure compliance with the requirements in the CoC for heat load, burnup, and enrichment.

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