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

October 12, 2016

Ms. Kimberly Manzione
Licensing Manager
Holtec International
One Holtec Drive
Marlton, NJ 08053

SUBJECT: ACCEPTANCE REVIEW OF REQUEST FOR AMENDMENT NO. 12 TO CERTIFICATE OF COMPLIANCE NO. 1014 FOR THE HI-STORM 100 CASK SYSTEM – REQUEST FOR SUPPLEMENTAL INFORMATION

Dear Ms. Manzione:

By letter dated June 14, 2016, as supplemented July 22, 2016, 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.

The staff has performed an acceptance review of your application to determine if the application contained sufficient technical information to begin a detailed technical review. The staff has determined that the amendment application does not provide sufficient technical information to begin a detailed review and that supplemental information is needed. The information needed to continue our review is described in the enclosed request for supplemental information (RSI).

In order to schedule our technical review, responses to the enclosed RSIs should be provided by November 4, 2016. If the information described is not received by this date, the application may not be accepted for review. If you are unable to meet this date, please notify us at least one week in advance, of your new submittal date and the reasons for the delay.

Please reference Docket No. 72-1014 and CAC No. L25127 in future correspondence related to this licensing action. If you have any questions, please contact me 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.: 72-1014
CAC No.: L25127

Enclosure:
Request for Supplemental Information

Ms. Kimberly Manzione
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Enclosure:
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File location: G:\SFST\Cuadrado\Holtec\HI-STORM 100 Amd 12\HI-STORM 100 Amd 12 RSIs.docx
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OFC:	DSFM	DSFM	DSFM	DSFM	DSFM	DSFM
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Request for Supplemental Information

Docket No. 72-1014
Certificate of Compliance No. 1014
Amendment No. 12 to the HI-STORM 100 Multipurpose Canister Storage System

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Chapter 4 - Thermal Evaluation

4-1 Provide operational procedures for the cyclic vacuum drying system (VDS) and open loop low pressure drying (LPD) method.

The applicant proposed changes in the amendment application for (a) use of the cyclic VDS to perform vacuum drying of canisters with high burnup fuel or total decay heat exceeding threshold heat loads and (b) use of the open loop LPD method for non-cyclic drying of MPC-68M cavity. To justify the thermal features and the related model setup in the thermal review, the staff needs more information on both cyclic VDS and open LPD methods. Instead of short descriptions, the applicant should provide the details, such as specific thermal features and operational procedures for both cyclic VDS and open loop LPD.

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

4-2 Provide Figure 2.4.2 of Appendix B of the draft certificate of compliance for review.

The applicant stated in Note 2 to Table 2.4-3 of Technical Specifications Appendix B that an optional regionalized loading pattern for MPC-68M including damaged fuel and fuel debris is shown in Figure 2.4.2. However, Figure 2.4.2 is not provided in the proposed change pages of Appendix B.

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

Enclosure

Chapter 6 – Shielding Evaluation

6-1 Provide dose rate calculations for the 3-region loading pattern at the surface in comparison to the uniform loading scenario.

In Page 61 of the proposed FSAR Changed Pages (Attachment 5 to Holtec Letter 5014811), the applicant proposes the approval of an additional regionalized loading pattern for the MPC-68M canister, wherein the basket is segregated into three regions. The proposed minimum cooling time for the MPC-68M under this new loading pattern is 2.0 years. The applicant states that the surface dose rate results for this 3-region loading pattern are bounded by the dose rate from the uniform loading pattern. However, the application does not provide the dose rates calculations for the new loading pattern that would allow staff to confirm that these dose rates are bounded by the uniform loading pattern.

This information is necessary to determine compliance with 72.236(d).

Chapter 8 – Materials Evaluation

8-1 Provide supplemental information to support the material properties for MPC fabrication and closure welds constructed from UNS S32205 duplex stainless steel, including: (1) fracture toughness evaluation methods and acceptance criteria and (2) corrosion resistance. Section 1.A.1 of the proposed amendment states; “The duplex stainless steel is deemed to be extremely resistant to stress corrosion cracking (SCC) in marine environments.” Information provided in the proposed amendment does not acknowledge that the microstructural stability of duplex stainless steels are sensitive to a number of factors, nor does it describe processes, controls and testing to ensure the corrosion resistance and mechanical properties will not be significantly altered by fabrication and welding.

Alteration of the microstructure in duplex stainless steels, particularly as a result of fabrication and welding processes, may result in reductions in corrosion resistance and mechanical properties (ASTM, 2014). The staff notes that duplex stainless steels are not immune from stress corrosion cracking (SCC) in marine environments. Operational experience has shown that SCC of welds in UNS S31803 can be susceptible to SCC at temperatures less than 100°C [212°F] (Leonard, 2003). A number of factors have been shown to affect the microstructure of welds in duplex stainless steels. Liou et al. (2002) showed that cooling rate and nitrogen content had a marked effect on the austenite to ferrite content. Fast cooling rates decreased the austenite content, and a weld microstructure with 70 percent ferrite was cited by Leonard (2003) as one of the factors that contributed to SCC of UNS S31803 in marine environments. Liou et al. (2002) also showed increased chloride SCC susceptibility when the austenite content decreased below 30 percent. Sieurin and Sandstrom (2007) compared time temperature transformation curves and critical cooling temperature curves for Type 2205 duplex stainless steels and concluded that, in order to avoid sigma precipitation and at the same time obtain a sufficient ferrite–austenite phase balance, the cooling rate should approximately be in the range 0.25–50K/second. In addition, Sieurin and Sandstrom (2007) stated that in order to avoid more than 1% σ (sigma) phase, the cooling rate from the solution treatment temperature should exceed 0.23K/second and the aging time at the most critical temperature 865°C [1590°F] must not exceed 134 seconds. Chen et al. (2002) showed significant decreases in impact energy for Type 2205 duplex stainless steel exposed to temperatures in the range of 800 to 950°C [1472 to 1742°F] for periods of 10 min or less corresponding to 5% σ (sigma) phase. Momeni and Dehghani (2010) showed that hot working strain rates can have a significant effect on σ (sigma) phase formation in Type 2205 duplex stainless steel.

This information is necessary to determine compliance with 10 CFR 72.236(b) and 10 CFR 72.158.

8-2 Provide supplemental information to support the physical properties of UNS S32205 duplex stainless steel at temperatures of −40°F including the design stress intensity in Table 1.A.1, Tensile Strength in Table 1.A.2, Yield Stresses in Table 1.A.3, Coefficient of Thermal Expansion in Table 1.A.4 and Thermal Conductivity in Table 1.A.5. Notes included in the tables indicate the sources of information; however, the information sources referenced do not contain physical property data at −40°F.

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

8-3 Provide supplemental information to FSAR Section 9.1 on the MPC Lid-to-Shell weld inspection for MPCs that are constructed using UNS S32205 duplex stainless steel. For multilayer PT examination, provide a justification for the maximum weld deposit thickness for PT examination that is supported by the maximum allowable flaw size and fracture toughness acceptance criteria for fabrication and closure welds in MPCs constructed using UNS S32205 duplex stainless steel.

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

8-4 Provide supplemental information consistent with the information described in the ASME B&PV Code, Section II, Part D, Mandatory Appendix 5, “Guidelines on The Approval of New Materials under the ASME Boiler and Pressure Vessel Code,” to support the requested licensing action which includes an exception to the ASME code to allow the use of UNS S32205 duplex stainless steel for construction of an ASME Section III Class 1 components (MPC). As noted in the proposed amendment, Type 2205 duplex stainless steel is included in ASME code case N-741 for ASME Section III Class 2 and 3 components. Code case N-741 has been accepted by the NRC in Regulatory Guide 1.84 Revision 36 (NRC, 2014).

Alternatively, the applicant may review the requirements of the ASME B&PV Code, Section II, Part D, Mandatory Appendix 7, “Guidelines for Multiple Marking of Materials.” The NRC staff notes that ASME code case N-635-1, which addresses the use of UNS S31803 duplex stainless steel for Section III Class 1, 2, and 3 components is also accepted in Regulatory Guide 1.84, Revision 36. UNS S32205 duplex stainless steel is similar but has additional compositional restrictions compared to S31803. If available, dual certified material (i.e., material with a certified material test report (CMTR) showing that the material meets both the compositional and physical property requirements of UNS S31803 and UNS S32205) may be an alternative to the requested exception to the

ASME code to permit the use of UNS S32205 that is dual certified as UNS S31803 which is covered by the accepted N-635-1 code case.

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

References:

ASTM A923-14, “Standard Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels, West Conshohocken, PA: ASTM International, 2014.

Chen, T.H., K.L. Weng, J.R. Yang, “The effect of high-temperature exposure on the microstructural stability and toughness property in a 2205 duplex stainless steel,” Materials Science and Engineering A. Vol. 338, pp. 259-270, 2002.

Leonard, A., “Review of external stress corrosion cracking of 22%Cr duplex stainless steel, Phase 1 – Operational data acquisition,” HSE RR 129, Her Majesty's Stationery Office, Norwich, UK. 2003.