NON-PROPRIETARY REQUEST FOR SUPPLEMENTAL INFORMATION AND OBSERVATIONS
HI-STORM FLOOD/WIND CASK SYSTEM AMENDMENT REQUEST 10

Docket No. 72-1032
EPID: L-2024-LLA-002

Principal Design Criteria

RSI 2-1: Provide supplemental information to identify reference [5.3.1] added to final safety analysis report (FSAR) section 2.3.5.2, "Shielding," on FSAR page 2-118 and the Topical Report Methodology (HI-2210161, Revision 4) identified in FSAR table 2.3.3, "Design Objective Dose Rates for HI-STORM FW Overpack Surfaces using Topical Report Methodology (HI-2210161, Revision 4)." The application did not include revisions to the FSAR references for Chapter 2 or Chapter 5. HI-STORM FW FSAR Rev. 10 does not include references for FSAR Section 5.3, "Model Specifications."

This information is needed to satisfy the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72.236(b).

Structural

RSI 3-1: Submit revised tipover analyses of several fuel baskets for increased heat loads employing the coupled permanent deflection and stress limit acceptance criteria as defined in Amendment 7 of the FSAR.

Appendix E was added to revision 6 of report HI-2200503, "Analysis of the Non-Mechanistic Tipover Event of the Loaded HI-STORM FW Version E Storage Cask", to address increased heat loads from Proposed Change #2 of this amendment for the following basket types: MPC-37, MPC-37-CBS, MPC-89, and MPC-89-CBS. Section E.1 states that the LS-DYNA models employed for these analyses are the same as those described in previous sections of the calculation report. Section E.4 presents results that indicate the acceptance criteria is the "total" deflection and failure strain.

However, revision 9 of report HI-2200503 was submitted with Amendment 7 of the FSAR to present fuel basket analyses which employ some "enhanced" LS-DYNA models, the stress results of which are compared to a limit of 90 percent (%) of true ultimate stress, and also employs some unenhanced models, whose deflection results are compared to a permanent deflection limit. Appendix G of revision 9 of the report also identified the following fuel baskets as limiting for stresses in the Version E overpack: MPC-32L for friction-stir-welded baskets and MPC-37-CBS for the continuous basket shim type baskets. Figure G.1 of Appendix G indicates that the maximum basket temperature considered for the limiting analysis of the MPC-37-CBS basket was 360°C. As the maximum basket temperature shown in Figure E.1b for the high-heat-load analysis of the MPC-37-CBS basket is 380°C, the MPC-37-CBS stress results presented in Appendix G can no longer be considered to be the limiting case.

Therefore, the tipover analyses for fuel baskets under the high-heat-load conditions described in Appendix E of HI-2200503 must be performed to verify that the following baskets meet the coupled permanent deflection and stress limit acceptance criteria introduced in Amendment 7: MPC-37, MPC-37-CBS, MPC-89, and MPC-89-CBS.

This information is needed to satisfy the requirements of 10 CFR 72.236(b), (c) and (l).

RSI 3-2: Verify that the MPC-37-CBS and MPC-89-CBS fuel baskets should be included within the scope of the Amendment 10 review.

Holtec International (Holtec) indicated that these two baskets should not be included in the scope of review of Amendment 7 due to them being included in the Notice of Violation EA-23-044, dated January 30, 2024 (ML24016A190). Therefore, it is not clear to staff whether they should also be excluded from the review of Amendment 10.

This information is needed to satisfy the requirements of 10 CFR 72.244.

RSI 3-3: Submit the latest version of the FSAR table 1.0.1, as revised per Amendment 7.

Holtec letter 5018109, dated March 1, 2024, states that "changes associated with previous amendments, up to and including HI-STORM FW Amendment 7, are included but not marked as changes, since that license amendment request is under separate technical review." However, Attachment 3 to letter 5018109, the FSAR proposed revision 11 pages, do not incorporate the changes made to table 1.0.1 of the FSAR in Amendment 7.

This information is needed to satisfy the requirements of 10 CFR 72.236(b).

RSI 3-4: Provide the following supporting analyses or reference documents:

1) Supplement number 49 to Holtec Report HI-2094418, Latest Revision "HI-STORM FW Version E1 Overpack Lifting Analysis".
2) Supplement number 48 to Holtec Report HI-2094418, Latest Revision "HI-STORM FW Version E1 Lid Stress Analysis".
3) Holtec Report HI-2210622, "Structural Calculation Package for HI-STORM FW Version F System," Rev. 1.
4) Holtec Report HI-2146083, "Regulatory Guide 1.60 Time Histories Using EZ-FRISK," Revision 4.
5) Holtec Report HI-2146144, "Thermal Evaluation of HI-TRAC VW Covered by Temporary Shielding," Rev. 8.
6) Holtec Report HI-2156509, "Thermal Evaluation of HI-TRAC VW Inside a Pit," Revision 3.
7) Holtec Report HI-2145976, "Three Dimensional Thermal-Hydraulic Analyses for Palisades Site-Specific HI-STORM FW System," Revision 6.
8) Holtec Report HI-2156592, "Thermal Evaluation of HI-TRAC VW in the Horizontal Orientation," Revision 5.
9) Holtec Report HI-2200191, "Thermal Analysis of HI-STORM FW UVH and UVH125 Systems," Revision 3.

The applicant submitted the updated FSAR and supporting analyses with the amendment application. However, some of the conclusion statements made in the safety or supporting analyses rely on or reference information contained in the above listed documents that were not included with the application. The staff needs to review these documents to verify their relevance in determining structural integrity of the important to safety (ITS) storage casks and their components under the design loads.

For example, the FSAR Section 3.II.4.1 makes statement “The finite element analysis presented in Supplement 49 of [3.4.13] is valid for the base plate region of the FW Extended lower cask module since the base plate material, thickness, cavity diameter, and MPC loading are the same. The primary stress results corresponding to this base plate design are included in Table 3.II.4.1.” To verify this statement, the staff needs to review the analysis in Supplement 49 of Reference [3.4.13] which was not included with the application.

This information is needed to satisfy the requirements of 10 CFR 72.236(b), (c) and (l).

RSI 3-5: Provide safety analyses of the MPCs and fuel baskets for maintaining their structural integrity and safety functions in the installed position inside the FW Extended Configuration overpack on the storage pad.

As stated in the proposed FSAR HI-211480, Revision 11, Section 3.II.1, the applicant has provided the safety analysis of the Design Basis Loadings (DBLs) for the HI-STORM FW Extended Configuration, which is limited to ensuring that the structural response of the upper and lower cask modules remains acceptable under the design criteria and features unique to the Extended Configuration. It further states that as this supplement envisages no change to the MPCs or their contents or to the HI-TRAC transfer casks, all safety information on them in Chapter 3 remains fully applicable. While it is true that MPC and basket configurations and contents have not changed, under this amendment they are now installed in an Extended Configuration Overpack, which has been reanalyzed for DBLs. So, as a minimum, the structural responses of the MPC and baskets under the revised DBLs (e.g., seismic) should be evaluated to ensure that they are bounded by the existing analyses.

This information is needed to satisfy the requirements of 72.236(b), (c) and (l).

OFF-NORMAL AND ACCIDENT EVENTS

RSI 12-1: Provide an evaluation of the partial blockage of air vents as an off-normal condition in the design of the HI-STORM FW Extended System.

The proposed amendment addresses three off-normal operation events in the design of the HI-STORM FW Extended storage system, as detailed in section 12.II.1 of the proposed FSAR. However, there is no evaluation of the partial blockage of air vents (off-normal condition #3) included in the application to assure the safe operation of the storage system in such an event.

This information is needed to satisfy the requirements of 10 CFR 72.236(l).

Structural Observations:

3-1: Provide size of the FW Extended Configuration shell welds on Licensing Drawing 13425.

Additional Note 4 on Sheet 1 of Drawing 13425, Revision 0, indicates HI-STORM shell welds to be single- or double-sided partial penetration welds. However, the size of the welds is not specified. This note affects welds made on ITS components that are critical in maintaining structural integrity of the cask under design loads. The welds size should provide minimum effective throat equal to thickness of the base material. Therefore, the size of the shell welds should be specified on the licensing drawings.

This information is needed to satisfy the requirements of 10 CFR 72.236(b) thru (f)

3-2: Clarify the design code and edition for the FW Extended Configuration anchors embedment design.

In the proposed FSAR HI-211480, Revision 11, Section 2.II.0.1, the reinforced concrete pad on which the Extended Configuration cask is supported and anchored is designated as an ITS structure. Further, in the fourth bullet of FSAR Section 2.II.0.1, it is stated that the embedment design for the anchored FW Extended Configuration complies with either Appendix D to American Concrete Institute (ACI) 318 or Appendix B to ACI 349. For 10 CFR Part 72 ISFSI Concrete Storage Pads classified as important to safety, the NRC has accepted ACI 349 for design and ACI 318 for construction in NUREG-2215, “Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities.” Therefore, it appears to the staff that this statement in the fourth bullet need to be clarified to indicate that the embedment design for the anchored FW Extended Configuration complies with ACI 349 and not ACI 318. As indicated in the proposed SAR, design of the anchor embedment is the responsibility of the ISFSI owner which will most likely be a new design. So, it is not appropriate to reference Appendix B to ACI 349 which exists only in older editions before year 2006.

This information is needed to satisfy the requirements of 10 CFR 72.236(b) and (l).

3-3 Clarify scope of MPC-37 and MPC-89 specific versions in FSAR table 1.II.1.1, Principal Components subject to Certification associated with the HI-STORM FW Extended Configuration and table 2.II.1.1, HI-STORM FW Extended Configuration Compatible MPCs.

In the proposed FSAR HI-211480, Revision 11, table 1.II.1.1 identifies MPC-37 and MPC-89 as principal components associated with the HI-STORM FW Extended Configuration system without citing any specific version of the MPC and listed them as certified components based on Revision 0 Certificate of Compliance. However, the FSAR, table 1.0.1 identifies MPC-37 Standard version and MPC-89 Standard as well as CBS versions as HI-STORM FW system components. So, it appears to the staff that working in tandem with RSI 3-2 and 3-3, a clarification is needed as to which specific version of the MPC-37 and MPC 89 are included in the scope of the FW Extended Configuration and FSAR table 1.II.1.1 and table 2.II.1.1 need to be updated accordingly.

This information is needed to satisfy the requirements of 10 CFR 72.236(b).