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

May 15, 2019

MEMORANDUM TO: June Cai, Chief
Materials Rulemaking and Project Management Branch
Division of Rulemaking
Office of Nuclear Material Safety
and Safeguards

FROM: John McKirgan, Chief **/RA/**
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SUBJECT: USER NEED FOR RULEMAKING FOR AMENDMENT NO. 3 TO THE HOLTEC INTERNATIONAL STORAGE, TRANSPORT AND REPOSITORY (HI-STAR) 100 STORAGE SYSTEM

The following information is being provided to request rulemaking support for the following Division of Spent Fuel Management 10 CFR Part 72 licensing activity:

1. Changes to 10 CFR 72.214 rule text (changes appear in bold):

Certificate Number: 1008
Initial Certificate Effective Date: October 4, 1999
Amendment Number 1 Effective Date: December 26, 2000
Amendment Number 2 Effective Date: May 29, 2001
Amendment Number 3 Effective Date: TBD
SAR Submitted by: Holtec International
SAR Title: Final Safety Analysis Report on the HI-STAR 100 MPC [Multipurpose Canister] Storage System for Irradiated Nuclear Fuel
Docket Number: 72-1008
Certificate Expiration Date: October 4, 2019
Model Number: HI-STAR 100 (MPC-24, MPC-32, MPC-68, MPC-68F)

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2. Use the following text for the purpose and scope of the amendment:

By letter dated September 25, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15280A178), as supplemented by letters dated January 15 and April 29, 2016, December 15, 2017, July 2, 2018, and February 6, 2019 (ADAMS Accession Nos. ML16041A041, ML16133A518, ML17360A162, ML18183A447, and ML19037A152 respectively), Holtec International (Holtec) submitted an amendment request to the U.S. Nuclear Regulatory Commission (NRC) to amend the HI-STAR 100 (MPC-24, MPC-32, MPC-68, MPC-68F) Storage System for Irradiated Nuclear Fuel. Specifically, Holtec proposed the following changes:

a. Inclusion of multipurpose canister (MPC)-32 for storage of pressurized-water reactor (PWR) spent fuel in the Holtec International Storage, Transport and Repository (HI-STAR) 100 storage system,
b. Inclusion of the Metamic neutron absorber for MPC-32, MPC-24 and MPC-68.
c. Revise the confinement boundary criterion to be leaktight in accordance with Interim Staff Guidance (ISG) -18, Revision 1, “The Design and Testing of Lid Welds on Austenitic Stainless Steel Canisters as the Confinement Boundary for Spent Fuel Storage” (ADAMS Accession No. ML081220694).
d. Credit the soluble boron in criticality analyses for both the MPC-32 and MPC-24.
e. Designate the pocket trunnions as optional in the HI-STAR 100 design.
f. Incorporate standard system features and ancillaries such as the forced helium dehydration (FHD).
g. Allow for horizontal storage of the casks.
h. Update the permissible fuel cladding temperature limits under normal, accident, and short term operating conditions to be consistent with ISG-11, Revision 3, “Cladding Considerations for the Transportation and Storage of Spent Fuel” (ADAMS Accession No. ML033230244).”
i. Designate the cask transporter as single-failure-proof.
j. Include a summary of the quality assurance program from the HI-STORM UMAX SAR (Docket No. 72-1040) as it is applied to safety significant activities for the HI-STAR 100.
k. Provide updated drawings.
l. Revise the MPC design pressure for accident condition to be 200 psig.

Specific changes to the TS are listed below:

a. Revise the TABLE OF CONTENTS page to reflect the addition of Section 2.3, “SFSC Criticality Control,” deletion of Sections 3.1, “Training Program,” 3.2, “Pre-Operational Testing and Training Exercise,” and 3.3, “Special Requirements For First Systems In Place,” and the changes to the page numbers.
b. Change the following definitions:
   - Revise definition for DAMAGED FUEL ASSEMBLY under TS 1.1 from “DAMAGED FUEL ASSEMBLIES are fuel assemblies with known or suspected cladding defects, as determined by a review of records, greater than pinhole leaks or hairline cracks, missing fuel rods that are not replaced with dummy fuel rods, or those that cannot be handled by normal means. Fuel assemblies which cannot be handled by normal means due to fuel cladding damage are considered FUEL DEBRIS” to read “DAMAGED FUEL ASSEMBLIES are fuel assemblies with known or suspected cladding defects, as determined by a review of records, greater than pinhole leaks or hairline cracks, empty fuel rod locations that are not filled with dummy fuel rods, missing structural components such as grid spacers, whose structural integrity has been

impaired such that geometric rearrangement of fuel or gross failure of the cladding is expected based on engineering evaluations, or that cannot be handled by normal means. Fuel assemblies which cannot be handled by normal means due to fuel cladding damage are considered FUEL DEBRIS."

- Revise definition for DAMAGED FUEL CONTAINER (DFC) under TS 1.1 from "DFCs are specially designed enclosures for DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS which permit gaseous and liquid media to escape while minimizing dispersal of gross particulates. DFCs authorized for use in the HI-STAR 100 design are shown in Figures 2.1.1 and 2.1.2 of the Final Safety Analysis Report (SAR) for the HI-STAR 100 Cask System," to "DFCs are specially designed enclosures for DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS which permit gaseous and liquid media to escape while minimizing dispersal of gross particulates."
- Add a new definition "ZR" under TS 1.1 as "ZR means any zirconium-based fuel cladding or fuel channel material authorized for use in a commercial nuclear power plant reactor."

c. Make the following changes to TS 2.1.2 for incorporation of FHD, as discussed in Change Nos. 3 and 6, above:
   - Revise CONDITION A of limiting condition for operation (LCO) 2.1.1 from "MPC cavity vacuum drying pressure limit not met" to "MPC cavity vacuum drying pressure or demoisturizer exit gas temperature limit not met."
   - Revise TS surveillance requirement] (SR) 2.1.1.1 from "Verify MPC cavity vacuum drying pressure is within the limit specified in Table 2-1 for the applicable MPC model" to "Verify MPC cavity has been dried in accordance with the applicable limits in Table 2-1 for the applicable MPC model."
   - Revise TS SR 2.1.1.3 from "Verify that the total helium leak rate through the MPC lid confinement weld and the drain and vent port confinement welds is within the limit specified in Table 2-1 for the applicable MPC model" to "Verify that the helium leak rate through the MPC vent and drain port cover plates (confinement welds and the base metal) meets the leaktight criteria of [American National Standards Institute] ANSI N14.5-1997." The corresponding FREQUENCY was revised from "During LOADING OPERATIONS" to "Once, prior to TRANSPORT OPERATIONS."

d. Under Table 2-1, "MPC Model-Dependent Limits," make the following changes for incorporation of FHD and horizontal storage orientation, as discussed in Change Nos. 6 and 7, above:
   - Revise item 1.a. for MPC Model MPC-24 from "MPC Cavity Vacuum Drying Pressure" to "MPC Cavity Vacuum Drying Pressure OR FHD gas temperature," and add the LIMITS value for FHD gas temperature as ≤ 21 °F [fahrenheit] for ≥ 30 min.[minutes].
   - Revise item 1.c., "MPC Helium Backfill Pressure[1]," LIMITS from "≤ 22.2 psig [pounds per square inch gauge]" to "≤ 22.2 psig (Vertically-Oriented System) and 40.8 psig +/-2 psi [pounds per square inch] (Horizontally-Oriented System)."
   - Delete item 1.e. (MPC Helium Leak Rate for MPC-24).
   - Revise item 2.a. for MPC Model MPC-68 from "MPC Cavity Vacuum Drying Pressure" to "MPC Cavity Vacuum Drying Pressure OR FHD gas temperature," and add the LIMITS value for FHD gas temperature as ≤ 21 °F for ≥ 30 min.
   - Revise item 2.c, "MPC Helium Backfill Pressure[1]," LIMITS from "≤ 28.5 psig" to "≤ 28.5 psig (Vertically-Oriented System) and 40.8 psig +/-2 psi (Horizontally-Oriented System)."
   - Delete item 2.e. (MPC Helium Leak Rate for MPC-68).
   - Revise item 3.a. for MPC Model MPC-68F from "MPC Cavity Vacuum Drying Pressure" to "MPC Cavity Vacuum Drying Pressure OR FHD gas temperature," and the LIMITS

value for FHD gas temperature was added as ≤ 21 °F for ≥ 30 min.

- Revise item 3.c, "MPC Helium Backfill Pressure[1]," LIMITS from "≤ 28.5 psig" to "≤ 28.5 psig (Vertically-Oriented System) and 40.8 psig +/-2 psi (Horizontally-Oriented System)."
- Delete item 3.e. (MPC Helium Leak Rate for MPC-68F).
- Add item 4., for MPC Model MPC-32.
- Revise Footnote 1 from "Helium used for backfill of MPC shall have a purity of ≥ 99.995%" to "Helium used for backfill of MPC shall have a purity of ≥ 99.995%. The backfill pressure for horizontally-oriented systems is a reference pressure at a reference temperature of 70 °F, and the backfill procedure shall compensate for actual conditions."

e. Incorporate change 9 above, by revising TS LCO 2.1.3 b from "The OVERPACK is lifted with lifting devices designed in accordance with ANSI N14.6 and having redundant drop prevention design features." to "The OVERPACK is lifted with lifting devices designed to be single failure proof in accordance with NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36" and having redundant drop prevention design features."

f. Make the following changes to TS 2.1.4:
   - Revise TS 2.1.4 title from "Fuel Cool-Down" to "MPC Cavity Reflooding."
   - Revise TS LCO 2.1.4 from "The MPC exit gas temperature shall be ≤ 200 °F" to "The MPC cavity pressure < 100 psig."
   - Revise APPLICABILITY of TS LCO 2.1.4 from "UNLOADING OPERATIONS prior to flooding" to "UNLOADING OPERATIONS prior to and during re-flooding."
   - Revise NOTE under ACTIONS of TS LCO 2.1.4 from "Separate Condition entry is allowed for each SFSC" to "Separate Condition entry is allowed for each MPC."
   - Revise CONDITION A of TS LCO 2.1.4 from "MPC exit temperature not within limit" to "MPC cavity pressure not within limit."
   - Revise REQUIRED ACTION A.1 of TS LCO 2.1.4 from "Establish MPC helium gas exit temperature within limit" to "Stop re-flooding operations until MPC Cavity pressure is within limit."
   - Revise COMPLETION TIME for A.1 of TS LCO 2.1.4 from "Prior to initiating MPC re-flooding operations" to "Immediately."
   - Revise REQUIRED ACTION A.2 of TS LCO 2.1.4 from "Ensure adequate heat transfer from MPC to the environment" to "Ensure MPC vent port is not closed or blocked."
   - Revise COMPLETION TIME for A.2 of TS LCO 2.1.4 from "24 hours" to "Immediately."
   - Revise TS SR 2.1.4.1 SURVEILLANCE from "Verify MPC helium gas exit temperature within limit" to "Ensure via analysis or direct measurement that MPC cavity pressure is within limit."
   - Revise TS SR 2.1.4.1 FREQUENCY from "Prior to initiation of MPC re-flooding operations" to "Prior to initiation of MPC re-flooding operations. AND Once every 1 hour thereafter when using direct measurement."

g. Make the following changes to TS 2.2.1:
   - Revise SURVEILLANCE of TS SR 2.2.1.1 from "Verify average surface dose rates of OVERPACK containing fuel assemblies are within limits. OVERPACK dose rates shall be measured at locations shown in Figure 2.2.1-1" to "Verify average surface dose rates of OVERPACK containing fuel assemblies are within limits. OVERPACK dose rates shall be measured at the top and sides of the overpack."
   - Revise the first NOTE of TS SR 2.2.1.1 from "SR 2.2.1.1 shall be performed after the MPC has been vacuum dried" to "SR 2.2.1.1 shall be performed after the MPC has been dried."

- Delete Figure 2.2.1-1, “OVERPACK Surface Rate Measurement Locations” and provide description of the location for the dose rate measurements.

h. Incorporate change 4, above by adding TS 2.3, “SFSC CRITICALITY CONTROL,” addressing the boron concentration limits.
i. Delete TS 3.1, TS 3.2, and TS 3.3. Technical Specifications 3.2 and 3.3 were moved to the certificate of compliance.

Holtec requested the following changes to Appendix B of Certificate of Compliance (CoC) 1008, “Approved Contents and Design Features for the HI-STAR 100 Cask System:”

a. Delete the duplicative definitions and add a reference to Appendix A for definitions in Section 1.0.
b. Delete TS 1.1.2, “Preferential Fuel Loading,” and incorporate preferential loading condition for Thoria rod canisters in Table 1.1-1.
c. Delete a sentence in TS 1.2, “Functional and Operating Limits Violations,” associated with the reporting requirements contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, Section 72.75.
d. Add a reference to Section II of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code in Section 1.3.2.
e. Incorporate horizontal storage in change 7 above, by adding inequality equation as item 4, and renumber the rest of the items in Table 1-4.
f. Incorporate METAMIC neutron absorber in change 2 above by adding the METAMIC minimum ^{10}B loading in the Boral neutron absorbers in Subsection 1.5.1.1 for MPC-24, and in Subsection 1.5.1.2 for MPC-68F.
g. Incorporate changes 1 and 2 for MPC-32 and METAMIC neutron absorber, above, by adding new Subsection 1.5.1.3 for MPC-32 providing information for minimum fuel cell pitch and minimum ^{10}B loading in the Boral and Metamic neutron absorbers.
h. Make the following changes to Table 1.1-1
   - Revise Table 1.1-1, “Fuel Assembly Limits,” item II. A. 1. d. i. to include fuel assembly array/class 7x7A decay heat for Zr clad for MPC Model MPC-68 allowable contents.
   - Revise Table 1.1-1, item II. A. 1. e. i. to include fuel assembly array/class 7x7A post-irradiation cooling time and an average burnup per assembly for Zr clad for MPC Model MPC-68 allowable contents.
   - Revise Table 1.1-1, item II. A. 2. to include fuel assembly array/class 6x6B for [Boiling Water Reactor] BWR DAMAGED FUEL ASSEMBLIES as authorized contents in the MPC-68 contents.
   - Add Table 1.1-1, item IV. A. for MPC-32 allowable contents.
i. Revise Table 1.1-2, “PWR Fuel Assembly Characteristics.”.
j. Revise Table 1.1-4 to include the MPC-32.
k. Incorporate change 1 for MPC-32, above, by revising Table 1.1-5, “Fuel Assembly Cooling and Average Burnup,” to include the MPC-32.
l. Revise Table 1.3-1, “List of ASME Code Exceptions for the HI-STAR 100 Cask System,” to include additional components.

3. The proposed CoC and TS, and preliminary safety evaluation report (SER) have been placed in ADAMS (see references below) and are available for your use in the rulemaking package. The Division of Spent Fuel Management will designate these documents as Official Agency Records after the Executive Director for Operations has approved the package (ADAMS Package Accession No. ML19137A299).

The Office of the General Counsel has reviewed this memorandum with its referenced documents and has no legal objection to its contents.

Docket No. 72-1008

Enclosures:
1. Proposed CoC No. 1008, Amendment No. 3
2. Proposed TS Appendix A
3. Proposed TS Appendix B
4. Preliminary SER

SUBJECT: USER NEED FOR RULEMAKING FOR AMENDMENT NO. 3 TO THE HOLTEC INTERNATIONAL STORAGE, TRANSPORT AND REPOSITORY (HI-STAR) 100 STORAGE SYSTEM, DOCUMENT DATE: May 15, 2019

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