



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

September 30, 2019

Ms. Kimberly Manzione
Licensing Manager
Holtec International
Holtec Technology Campus
1 Holtec Blvd.
Camden, NJ 08104

**SUBJECT: AMENDMENT NO. 3 TO CERTIFICATE OF COMPLIANCE NO. 1040 FOR THE
HI-STORM UMAX MULTIPURPOSE CANISTER STORAGE SYSTEM –
REQUEST FOR ADDITIONAL INFORMATION**

Dear Ms. Manzione:

By letter dated August 30, 2016 (Agencywide Document Access and Management System (ADAMS) Accession No. ML16250A404), as supplemented by letters dated September 9, 2016 (ADAMS Accession No. ML16258A219), November 4, 2016 (ADAMS Accession No. ML16313A170), March 3, 2017 (ADAMS Accession No. ML17067A058), August 4, 2017 (ADAMS Accession No. ML17229B194), February 1, 2018 (ADAMS Accession No. ML18036A222), May 23, 2018 (ADAMS Accession No. ML18150A340), and October 16, 2018 (ADAMS Accession No. ML18304A153), Holtec International (Holtec) submitted an application for amendment of Certificate of Compliance No. 1040 for the HI-STORM UMAX Multipurpose Canister Storage System. Holtec requested to include the NUHOMS® 24PT1-DSC canister for storage in the HI-STORM UMAX System, in support of a future site-specific license request for a Consolidated Interim Facility.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed your application and determined the need for a request for additional information (RAI) as identified in the enclosures to this letter. We request that you provide the response to the RAI within 30 days from the date of this letter. If you are unable to meet this deadline, please notify us in writing, within two weeks of receipt of this letter, of your new submittal date and the reasons for the delay.

Please reference Docket No. 72-1040, CAC No. 001208, and EPID: L-2017-LLA-0033 in future correspondence related to this licensing action. If you have any questions, please contact me at (301) 415-7465.

Sincerely,

/RA Yen Chen Acting for/

Pamela Longmire, Ph.D., Project Manager
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-1040
CAC No.: 001028
EPID: L-2017-LLA-0033

Enclosures:

1. RAI (Non-proprietary)
2. RAI (Proprietary)

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REQUEST FOR ADDITIONAL INFORMATION, DOCUMENT
DATE: September 30, 2019

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Request for Additional Information

Docket No. 72-1040
Certificate of Compliance No. 1040
Amendment No. 3 to the HI-STORM UMAX
Multipurpose Canister Storage System

STRUCTURAL

- RAI-1. See Enclosure 2.
- RAI-2. See Enclosure 2.
- RAI-3. See Enclosure 2.
- RAI-4. See Enclosure 2.
- RAI-5. See Enclosure 2.
- RAI-6. See Enclosure 2.
- RAI-7. See Enclosure 2.
- RAI-8. See Enclosure 2.
- RAI-9. See Enclosure 2.
- RAI-10. See Enclosure 2.
- RAI-11. Clarify how the maximum g-load sustained by the 24PT1-DSC canister in the HI-STORM UMAX Vertical Ventilated Module (VVM) ensures nuclear criticality safety has been achieved when compared to its original licensing basis.

Section I.3.7 of the final safety analysis report (FSAR) states in part:

The criticality safety of the stored 24PT1-DSC is ensured by demonstrating that the maximum g-load sustained by the Canister stored inside the HI-STORM UMAX VVMs is less than its licensing basis value. This conclusion satisfies the requirement of 10 CFR 72.124(a), with respect to structural margins of safety for SSCs [structure, system, and component] important to nuclear criticality safety.

However, it is unclear how g-loads alone are able to ensure that structural margins of safety for SSCs important to nuclear criticality since the boundary conditions of the 24PT1-DSC in its original NUHOMS® module are not like those in the HI-STORM UMAX. Specifically, the 24PT1-DSC canister in the NUHOMS® module lies on its side and is supported along its length continuously, where the 24PT1-DSC in the HI-STORM UMAX is oriented vertically and is constrained at its ends. Stresses in the 24PT1-DSC and its contents due to seismic loads will result in different safety margins for both scenarios which have not been described. Clarify the safety margins and

update the FSAR as necessary for the 24 PT1 in a vertical orientation in the HI-STORM UMAX VVM.

This information is needed to determine compliance with 10 CFR 72.124(a) and 10 CFR 72.236(l).

RAI-12. See Enclosure 2.

RAI-13. See Enclosure 2.

RAI-14. See Enclosure 2.

RAI-15. Describe the structural performance of the 24PT1-DSC when subjected to a seismic analysis that utilizes three components rather than two.

In Section 2.4.3 of the application, the applicant states that it has chosen to comply with Section 3.7.1 of the NUREG 0800 to perform the seismic evaluation of the UMAX system with the 24PT1-DSC canister. Specifically, the applicant states that it has used five time histories that have two components only (one vertical and one horizontal). However, for nonlinear analyses, Section 3.7.1 of NUREG-0800 states that time histories should have one vertical component and two horizontal components. These three components should be statistically independent (further details can be found in Section 3.7.1 of NUREG-0800). Therefore, clarify how two lateral components can be replaced by one, and describe how results (safety margins) will be impacted by the use of one lateral component rather than two as stated in Section 3.7.1 of NUREG 0800. Update all seismic analyses and calculations using three components as necessary.

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

RAI-16. Justify how the top seismic restraint assembly and divider shell appurtenance assembly will restrain the 24PT1-DSC canister in the UMAX VVM when subjected to seismic loads.

The top seismic restraint assembly and divider shell appurtenance assembly, transfer lateral/vertical loads to the 24PT1-DSC canister when it is in the UMAX VVM and subjected to seismic loadings. Full contact between these components has been assumed throughout the seismic event. Some calculations which consider contact/friction forces have been provided to support the design of the top seismic restraint assembly system, but they do not consider the full dynamic interaction between the cavity enclosure container (C.E.C.) of the UMAX VVM, the 24PT1-DSC, and the top seismic restrain system. Dynamic seismic analyses conducted in LS-DYNA do not include the top seismic restraint assembly or the divider shell appurtenance assembly explicitly.

Staff is concerned that the calculations provided do not consider gaps forming between the top seismic restraint assembly, the C.E.C., and the 24PT1-DSC during a seismic event which could allow the 24PT1-DSC to be subjected to pounding. A query of the output files indicates that the diameter of the C.E.C. itself "expands" and "contracts" during the seismic analyses, which could imply that the top seismic

restraint assembly is not in contact with the 24PT1-DSC. Similar findings have been noted with regards to the divider shell appurtenance assembly.

Note that the canister and the C.E.C. of the UMAX VVM most likely are not uniformly round due to manufacturing, and that as the system continues to cool, additional gaps could form between the top seismic restraint assembly and/or divider shell appurtenance assembly, the C.E.C., and the 24PT1-DSC canister as a function of time. Gaps formed by manufacturing and potentially non-uniform expansion should be considered in the evaluation of the top seismic restraint assembly and the divider shell appurtenance assembly. Update the LS-DYNA models and supporting details in the FSAR as necessary.

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

RAI-17. See Enclosure 2.

RAI-18. See Enclosure 2.

RAI-19. See Enclosure 2.

SHIELDING

RAI-20. Provide an analysis to demonstrate the dose rates for the HI-STORM-UMAX with the 24PT1-DSCs meets the regulatory requirements.

The applicant stated in the SAR that “[s]ince the determination of off-site doses is necessarily site-specific, more detailed dose assessment may be prepared by the licensee as part of implementing the HI-STORM UMAX System in accordance with 10 CFR 72.212.”

In accordance with the requirements of 10 CFR 72.236(d), the applicant is required to demonstrate that the design is capable of meeting the regulatory requirements. The staff needs this information to determine if the request meets the regulatory requirements of 10 CFR 72.236(d), 10 CFR 72.104 and 72.106.

CRITICALITY

RAI-21. Provide justification to support the assumption that the 24PTH1-DSC will remain dry in the proposed storage configuration or provide an evaluation to show the proposed system will remain subcritical under flooding conditions.

The applicant needs to provide justification that the 24PTH1-DSC canister system meets the criticality safety requirements for underground storage in the HI-STORM UMAX system. The applicant provided no analysis to address the likelihood of water entering into the 24PTH1-DSC during underground storage. The proposed HI-STORM UMAX amendment has no discussion or analysis that addresses water intrusion into the 24PTH1-DSC. The safety basis submitted by the applicant, and stated throughout Supplement I.6, is that the 24PTH1-DSC is only analyzed for dry conditions, which they believe leads to a sufficient margin of safety to address uncertainties in their approach.

This information is needed to evaluate compliance with 10 CFR 72.124(a) and 72.236(c).

RAI-22. See Enclosure 2.

RAI-23. See Enclosure 2.

RAI-24. See Enclosure 2.

RAI-25. Provide criticality safety features for the surrogate model used in the criticality safety analysis presented in the FSAR.

In Section I.6.6 of the SAR, the applicant asserts that the 24PTH1-DSC in the HI-STORM UMAX system is in full compliance with the criticality requirements of 10 CFR Part 72 and NUREG-1536. The structures, systems, and components important to criticality safety that are part of the 24PTH1-DSC canister are not described in sufficient detail by the applicant, neither in the supplemented FSAR nor the references provided. The use of a surrogate model to estimate the criticality safety of the material to be stored lacks the specificity of dimensions, tolerances, fuel geometry, neutron absorbing materials, material densities, and moderation that are necessary to perform an accurate analysis. As a result, staff is unable to evaluate their effectiveness when applied to the HI-STORM UMAX system. Based on the absence of detailed information regarding the criticality safety features of the 24PTH1-DSC, staff is unable to determine if there is reasonable assurance that the HI-STORM UMAX system will allow for the safe storage of spent nuclear fuel.

This information is needed by the staff to determine compliance with 10 CFR Part 72.

QUALITY ASSESSMENT

RAI-26. Clarify (provide) the basis and evaluation as to why the technical specification (TS) requirement for and of a fuel removal procedure are not provided in the HI-STORM UMAX TS.

Page 5-1 of the Standardized Advanced NUHOMS® TS states the requirement for a fuel removal procedure and then lists, at a minimum, what it shall include. However, the HI-STORM UMAX TS provided in this application do not contain similar requirements to ensure the same level of rigor and protection of personnel that is provided in the fuel removal procedure. Holtec stated in its response to NRC's Request for Supplemental Information Observation (O-6) that HI-STORM UMAX certificate of compliance (CoC) Condition 8 of proposed Amendment No. 3 had been revised to require a procedure for fuel unloading from the welded TN NUHOMS® 24PT1-DSCs (canisters) following storage in a HI-STORM UMAX System. Upon NRC review of the proposed Condition 8, no requirement for a fuel unloading procedure had been added.

This information is needed to determine compliance with 10 CFR 72.234(f).

RAI-27. Explain the planned process and actions that will be taken when a TN NUHOMS® 24PT1-DSC reaches the original licensed life of 20 years and is being stored in a HI-STORM UMAX system VVM.

Section I.10.1.1.1 states, in part, that 24PT1-DSC canisters in use for longer than 20 years are not permitted to be stored in the HI-STORM UMAX per this FSAR. This restriction of not permitting storage over 20 years vs. just stating the licensed and design life of a system is a change from the current HI-STORM UMAX FSAR design bases and introduces a new requirement. However, no process, actions, or controls are explained in the application to describe what occurs to a 24PT1-DSC canister stored in a HI-STORM UMAX system when it reaches its original licensed life of 20 years to ensure continued safe storage. Therefore, the NRC requests additional information on what are the planned actions, process, and/or controls at 20 years if 24PT1 DSCs are being stored in the HI-STORM UMAX system. Given the fact that there are 24PT1-DSC canisters currently loaded under CoC No. 1029, there is the potential that this scenario could occur if they were transferred into the HI-STORM UMAX storage system before they reached their original licensed life of 20 years.

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

- RAI-28. Provide the fabrication, inspection, test, and maintenance and repair program for the NUHOMS® transfer cask, including the routine and annual inspection requirements.

Supplement I.10 describes the fabrication, inspection, test, and maintenance programs for the 24PT1-DSC canister, HI-STORM UMAX, and chain hoist assembly (CHA-90) but is silent on these programs for the NUHOMS® transfer cask. The NUHOMS® transfer cask is considered important to safety equipment as described in the Advanced NUHOMS® FSAR, Section 2.5.

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

- RAI-29. Provide the important to safety classifications for all transfer equipment used during the transfer of the 24PT1-DSC canister from the Advanced Horizontal Storage Module to the HI-STORM UMAX VVM.

Section I.2.5 describes the important to safety classifications for the CHA, top seismic restraint assembly (TSRA), VVM pedestal, and Divider Shell Appurtenance, but not for all the transfer equipment used. Specifically, important to safety classifications were not provided for the NUHOMS® transfer cask, NUHOMS® transfer trailer/skid, NUHOMS® ram assembly, mating collar, and tilting frame.

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