



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

April 14, 2017

Mr. Ed Mayer, Program Director  
HI-STORE CISF  
Holtec International  
Holtec Technology Campus  
One Holtec Boulevard  
Camden, NJ 08104

SUBJECT: AUDIT REPORT FOR FEBRUARY 22-23, 2017, PRE-SUBMITTAL READINESS  
AUDIT OF HOLTEC INTERNATIONAL'S PROPOSED APPLICATION FOR A  
SITE-SPECIFIC INDEPENDENT SPENT FUEL STORAGE INSTALLATION  
LICENSE FOR THE HI-STORE CONSOLIDATED INTERIM STORAGE  
FACILITY

Dear Mr. Mayer:

On February 22-23, 2017, U.S. Nuclear Regulatory Commission (NRC) staff conducted a pre-submittal readiness audit to review the draft license application, safety analysis report, and environmental report for the proposed HI-STORE Consolidated Interim Storage Facility (CISF). The enclosed audit report describes the scope and purpose of the audit, identifies the audit team, and the staff's observations.

The audit took place at Holtec's Technology Campus, located at: One Holtec Boulevard, Camden, NJ 08104.

If you have any questions about this audit report, please contact Mr. Jose R. Cuadrado, at (301) 415-0606, or by email at [Jose.Cuadrado@nrc.gov](mailto:Jose.Cuadrado@nrc.gov).

Sincerely,

*/RA/*

John McKirgan, Chief  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No.: 72-1051  
CAC No.: L25079

Enclosure:  
As stated

AUDIT REPORT FOR FEBRUARY 22-23, 2017, PRE-SUBMITTAL READINESS AUDIT OF  
 HOLTEC INTERNATIONAL'S PROPOSED APPLICATION FOR A SITE-SPECIFIC  
 INDEPENDENT SPENT FUEL STORAGE INSTALLATION LICENSE FOR THE HI-STORE  
 CONSOLIDATED INTERIM STORAGE FACILITY \_\_\_\_\_

DISTRIBUTION:

**(closes CAC No. L25079)**

MLayton    AHsia    MRahimi    YDiaz    JMcKirgan    SEverard    JBorowsky  
 JWis    ZLi    EGoldfeiz    JCaverly    JChang    JTapp    JGwo    JIreland  
 G:/SFST/Cuadrado/Holtec/Holtec ICSF/Audit Report Pre-submittal HI-STORE.docx

**ADAMS Package No. ML**

<b>OFC:</b>	DSFM		DSFM		DSFM	
<b>NAME:</b>	JCuadrado		WWheatley		JMcKirgan	
<b>DATE:</b>	4/12/17		4/12/17		4/14/17	

OFFICIAL RECORD COPY

**Audit Report for Pre-submission Audit of Holtec International's Proposed License  
Application for the HI-STORE Consolidated Interim Storage Facility in Lea County, NM  
February 22-23, 2017**

**A. Location**

The pre-submission readiness audit was held on February 22-23, 2017, at the address below:

**Holtec International Technology Campus  
2500 Broadway  
Camden, NJ 08104**

**B. Background**

On August 3, 2015, Holtec International submitted a letter of intent to file an application for a site-specific license for the HI-STORE Consolidated Interim Storage Facility (CISF) in an undeveloped and isolated patch of land in Southeast New Mexico, owned by the Eddy-Lea Energy Alliance. In its letter, Holtec stated that it intends to use the HI-STORM UMAX Canister Storage System, currently certified for general license use by Part 50 and Part 52 licensees under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, as the dry cask storage system to be used at the proposed CISF. By letter dated September 20, 2016, Holtec stated that it intends to submit the license application for the HI-STORE CISF by March 31, 2017. Holtec intends to initially apply for authorization to store up to 5,000 metric tons of spent nuclear fuel, with plans to subsequently amend the license in phases to expand the facility up to a maximum of 100,000 metric tons.

NRC staff has held several pre-application meetings with Holtec to discuss the details of the proposed facility. The first pre-application meeting with NRC staff was held on December 9, 2015. Subsequent pre-application meetings were held on April 4, 2016, to discuss a proposed amendment to HI-STORM UMAX to store horizontal canisters at the HI-STORE facility; on December 6, 2016, to discuss the draft environmental report; and on February 1, 2017, to discuss the proposed safety analysis report.

The NRC conducted a pre-submission readiness audit of Holtec's application to construct and operate the HI-STORE CISF. The purpose of the audit was to familiarize NRC staff with the content and structure of the license application prior to submittal, and provide any feedback to Holtec regarding the level of detail that the staff expects to ensure a timely and efficient acceptance review of the application.

**C. Audit Team**

1. Jose Cuadrado, Project Manager (Audit Lead)  
Spent Fuel Licensing Branch, DSFM
2. John McKirgan, Branch Chief  
Spent Fuel Licensing Branch, DSFM
3. Meraj Rahimi, Branch Chief  
Renewals and Materials Branch, DSFM

4. Yoira Diaz-Sanabria, Branch Chief  
Containment, Structural, and Thermal Branch, DSFM
5. Jin-Ping (Jack) Gwo, Systems Performance Analyst  
Renewals and Materials Branch, DSFM
6. John Wise, Sr. Materials Engineer  
Renewals and Materials Branch, DSFM
7. Steve Everard, Structural Engineer  
Containment, Structural, and Thermal Branch, DSFM
8. Joseph Borowsky, Thermal Engineer  
Containment, Structural, and Thermal Branch, DSFM
9. Jimmy Chang, Thermal Engineer  
Containment, Structural, and Thermal Branch, DSFM
10. Eli Goldfeiz, Health Physicist  
Criticality, Shielding, and Risk Assessment Branch, DSFM
11. Zhian Li, Sr. Nuclear Engineer  
Criticality, Shielding, and Risk Assessment Branch, DSFM
12. Jeremy Tapp, Transportation and Storage Safety Inspector  
Inspection and Operations Branch, DSFM
13. Jill Caverly, Sr. Project Manager  
Environmental Review Branch, FCSE

**D. Audit Scope**

During the audit, staff reviewed the proposed license application (LA), the safety analysis report (SAR) for the HI-STORE CISF, selected portions of the HI-STORM UMAX and HI-STORM FW FSARs that are referenced in the HI-STORE SAR, and the environmental report (ER). The staff used the guidance in Regulatory Guide 3.48, NUREG-1567, and NUREG-1748 to perform its audit review.

As discussed in the audit plan, the staff's review focused on verifying whether the draft LA, SAR, and ER contain sufficient information for staff to begin a detailed technical review when the application is submitted for NRC review. The staff began its review with the HI-STORE SAR, which contains the discussions, analyses, and justifications to demonstrate how the proposed design and operations of the CISF meet the site-specific ISFSI requirements in 10 CFR Part 72. The staff then reviewed specific sections or analyses from the HI-STORM UMAX or HI-STORM FW FSARs that are incorporated by reference in the HI-STORE SAR. The staff focused on specific SAR sections that contain new site-specific analyses that incorporate site parameters to demonstrate compliance. The staff's audit review did not verify the presence of all analyses necessary for demonstrating compliance with all NRC regulations. Rather, the staff

reviewed specific scenarios or analyses, and verified that the justifications, analyses, and/or supporting calculations were properly identified and available.

## **E. Audit Observations**

After the completion of the audit, the staff collected its observations regarding the content and format of the documents reviewed. The staff's observations, listed below, are organized by the specific HI-STORE FSAR Chapter in which it was identified (or in the environmental report) and classified according to the following categories:

- **(PRSI) Necessary for completion of acceptance review**– observations that may become the subject of a request for supplemental information (RSI);
- **(PRAI) Necessary for completion of detailed technical review and regulatory compliance findings; Safety or Environmental** – observations that may become the subject of a request for additional information (RAI);
- **(Ed) Editorial** – observations about the editorial format or content of the license application, including the references cited in the LA/SAR/ER.

### Chapter 1 – General Information

- The staff observed that Chapter 1 references analyses from the HI-STAR 190 Transportation Cask, which is still under NRC review and approval. The applicant should confirm that any references made in the HI-STORE SAR to the HI-STAR 190 SAR remain valid after the completion of NRC's review of the HI-STAR 190 Transportation Cask. **(Ed)**
- The staff observed that the proposed schedules for construction listed in the SAR contain some construction activities that start prior to the potential issuance of NRC's SER or the final environmental impact statement. The applicant should ensure that any construction activities at the site complies with the requirements in 10 CFR 72.40(b). **(PRAI)**

### Chapter 2 – Site Characteristics

- The staff observed that the draft Chapter 2 did not contain a flood analysis for the proposed site. **(PRSI)**
- The staff observed that the meteorology section in draft Chapter 2 should be supplemented to ensure that the meteorological data sources referenced are within sufficient proximity to the site. **(PRSI)**
- The staff observed that the hydrology description of the site should be supplemented to provide more discussion about the effects of water intrusion into the engineered backfill of the HI-STORM UMAX canister enclosures. **(PRSI)**
- The staff observed that the draft Chapter 2 did not contain a discussion of geotechnical information pertaining to subsurface soil stability that addresses the possibility of concurrent excavation and operational activities. **(PRSI)**

### Chapter 3 – Operation Systems

- The staff observed that the descriptions of the cask receipt and transfer operations at the proposed site should provide more information about their expected durations. The staff will need this information to determine if the proposed activities at the site comply with the radiation protection requirements in 10 CFR 72.104 and 106. **(PRAI)**

### Chapter 5 – Installation and Structural Evaluation

- The staff observed that although the form and structure of Chapter 5 is generally consistent with NRC guidance, many of the detailed structural evaluations and model descriptions were still in draft form when reviewed. **(PRSI)**
- The staff observed that although the draft Chapter 5 cited adequate NRC-endorsed codes and standards for the proposed cranes and lifting equipment to be used at the site, it did not contain drawings or specifications for the equipment or how they would be installed that staff may need to facilitate the review. **(PRAI)**
- The staff observed that the draft Chapter 5 contained placeholders for the specific building codes or standards to be used for the proposed buildings and structures to be constructed at the site. **(PRSI)**

### Chapter 6 – Thermal Evaluation

- The staff observed that the draft Chapter 6 did not yet contain a Fire Protection Program or a description of how the proposed design and operations at the facility will meet the fire protection requirements in 10 CFR Part 72. **(PRSI)**
- The staff observed that the Reference section in draft Chapter 8 was missing **(PRSI)**
- The staff observed that the calculation packages were not provided/referenced for many thermal analyses **(PRSI)**
- The staff observed that the narrative discussing how the incorporation by reference satisfied the regulations was sparse. **(PRSI)**

### Chapter 7 – Shielding Evaluation; Chapter 11 – Radiation Protection Evaluation

- The staff observed that the draft Chapter 7 did not discuss in sufficient detail the proposed site boundary, site layout, and site operations (either through drawings, maps, or descriptions), needed to calculate doses to workers and the public from operations at the site. **(PRSI)**
- The staff observed that the draft Chapter 11 did not contain a detailed discussion of the site's radiation protection program nor how the site's proposed operational and design features are relied on to meet the radiation protection program requirements in 10 CFR Part 20. **(PRSI)**

### Chapter 8 – Criticality Evaluation

- The staff observed that the draft Chapter 8 did not contain a discussion or demonstration of how operations at the proposed facility will meet the double contingency requirements for criticality safety in 10 CFR 72.124(a). **(PRAI)**

## Chapter 9 – Confinement Evaluation

- Although the draft Chapter 9 contained most of the references necessary to demonstrate compliance with confinement requirements, the staff suggested that the inclusion of specific analyses from the HI-STORM UMAX FSAR into the HI-STORE SAR could improve the efficiency of the staff's review. **(PRSI)**
- The staff observed that the draft Chapter 9 should clearly describe the confinement components/boundary, and include figures showing the confinement boundary for the two types of canisters, including figures showing accessible portions and non-accessible portions for helium leakage rate testing. **(PRSI)**
- The staff observed that the draft Chapter 9 did not include sufficient details about the acceptance criteria to be used for the proposed acceptance testing of canisters during receipt at the facility. **(PRSI)**

## Chapter 10 – Conduct of Operations Evaluation

- The staff observed that the draft Chapter 10 did not provide sufficient details about the durations of canister receipt, transfer, and retrieval operations that staff will need to evaluate compliance with radiation protection requirements in 10 CFR 72.104 and 106. **(PRAI)**
- The staff observed that the draft Chapter 10 did not discuss in sufficient detail the proposed plans and procedures for retrievability of the spent nuclear fuel. **(PRAI)**
- The staff observed that the descriptions of temporary shielding and the procedures for using it during transfer operations at the proposed site should be expanded for staff to complete its review. **(PRAI)**
- The staff observed that the procedures for the proposed helium leakage test to be conducted upon receipt of spent fuel canister at the facility need to be described in more detail, including specifics about the test standard and how it will be used to demonstrate the integrity of spent fuel canisters. **(PRSI)**
- The staff observed that the draft Chapter 10 did not discuss the proposed acceptance criteria to be used by the applicant before accepting the canister for storage at the proposed site. **(PRSI)**
- The staff observed that although the applicant discusses a proposed training and certification program for the facility that addresses the requirements in 10 CFR Part 72, the program does not discuss in detail the specific training or qualification criteria that it will use to meet these requirements. **(PRAI)**
- The staff observed that the organization chart, Figure 10.4.2 depicted the radiation safety organization under the operations manager, which would not allow sufficient freedom for the radiation safety staff to adequately perform their duties without undue pressure to schedule. **(PRAI)**

## Chapter 16 – Technical Specifications

- The staff observed that the proposed technical specifications need to clarify the terminology used to specify the amount of spent nuclear fuel to be stored at the site. **(Ed)**
- The staff observed that the technical specifications reference limits or storage configurations from the HI-STAR 190 Transportation Cask, which is still under NRC review and approval. The applicant should confirm that any references made to the HI-

STAR 190 SAR remain valid after the completion of NRC's review of the HI-STAR 190 Transportation Cask. **(Ed)**

#### Chapter 17 – Materials Evaluation

- Although draft Chapter 17 provides some discussion and descriptions of possible material degradation mechanisms for the structures, systems and components that will be used in the proposed facility, the staff observed that the applicant does not always provide a quantitative evaluation of environmental factors, either from operating experience or from relevant scientific literature, for the staff's consideration in its evaluation. **(PRAI)**

#### Chapter 18 – Aging Management Evaluation

- The staff observed that the proposed aging management programs for the facility, described in draft Chapter 18, only provided generic descriptions and methodologies for their implementation at the proposed site and did not discuss provisions for monitoring high burnup fuel. **(PRSI)**
- The staff observed that the use of the terms "maintenance" versus "aging management" was sometime ambiguous regarding whether these activities apply to the initial period of licensed storage or to the extended (i.e., after 20 years) period of storage. **(Ed)**

#### Environmental Report

- The staff observed that the draft environmental report should include additional descriptions of the affected environment, as well as additional discussion of the impacts from concurrent construction and storage operations. **(PRAI)**

#### **F. Audit Exit Meeting**

On February 23, 2017, after the completion of the staff's audit review activities the staff held an exit meeting with Holtec to share and discuss each of the observations in this audit report. During this meeting, each member of NRC's audit team discussed the basis for each observation, answered clarification questions from Holtec staff related to the scope of each observation, and provided feedback on possible approaches to address the staff's observations in the final license application submission. Prior to adjourning, Holtec staff expressed their appreciation to NRC staff for conducting the audit review and restated their commitment to submitting a high-quality application for NRC review that addresses the audit observations.